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PLENARY CONFERENCES

PC-1. ASSESSMENT OF DANGEROUS RADIATIONS INDOOR AND OURDOOR- IMPACT ON THE PUBLIC HEALTH

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The dangerous radiation like ultraviolet, ionized, gamma and x have been studied in order to evaluate their impact to the public health. Especially the atmospheric ultraviolet radiation, due to the ozone hole, became more and more important for the public health particularly in summer time. This research has been focused to ultraviolet radiation (outdoor) in various seasons, in different regions. Also, various types of lamps of varied power have been investigated regarding their ultraviolet radiation production (indoor). The significant conclusion is that the highest values of ultraviolet radiation are observed in summer time and specifically at noon. The milky lamps are produced less ultraviolet radiation than the transparent lamps due to absorption. Similarly is between lamp - projector without mirror with those with mirror. As more broad the spectrum of ultraviolet as the absorption from the atmosphere is weedier.

Keywords: public health, ultraviolet radiation

PC-2. "GREEN INFRASTRUCTURE" CONCEPT
Harmony of Community Needs with Environmental Values in Land Use Planning

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Providing subsistence, shelter and basic daily needs for more than 7 billion people is a heavy burden on the natural resources worldwide. Conservation and pollution prevention while utilizing the natural resources without compromising the needs of the future generations is the key for sustainability of development. In this regard, main task of the current generations is to benefit from their physical land and natural resources in an environment-friendly, "Green" manner in order to provide their future generations a better quality of living conditions to further their developments.

Developed countries of today are indebted their economic wealth to rapid growth in their industrial activities in the last four decades. Community service infrastructures and industrial activities heavily rely on utilization of natural resources; namely, energy *(oil, gas and coal)*, metallic and non-metallic minerals, forestry and agriculture. Eventhough there is no globally accepted performance criteria to characterize the environmental quality at country level, it is a common perception that the environmental quality is relatively better in the developed countries compared to the developing countries.

Despite its vital role in sustainability of development, industry, especially the mining and chemical manufacturing activities continue to have the perceived negative image in the communities and are accused of not being "Environment-Friendly - Green Enough". However, it should be born in mind that, there is no clear definition for "How Green is Green".

In recent years "Green Infrastructure" has become synonymous of "ecological networks" and a buzzword in European biodiversity policies. Building up of a Green Infrastructure needs smart and integrated

approaches to spatial planning and to ensure that natural resources are utilized and land is turned into areas capable of providing multiple other functions for nature and society. In this regard, ensuring an harmony between the community needs and the existing environmental values becomes a major task in land-use planning. In doing so, communicating the good deeds of man-made interventions on land and mineral resource use activities should also be a main task of these ecological networks.

In this presentation, a conceptual review of community infrastructure projects along with applicable resource conservation, pollution prevention and site reclamation/rehabilitation approaches will be presented and the "**How Green is Green?**" question will be discussed.

PC-3. WHAT BIOSENSOR FOR POLLUTION CONTROL IN AQUATIC ENVIRONMENTS?

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Toxic substances dangerous to humans, agricultural livestock and wildlife may contaminate water resources and drinking water supplies. These substances are natural such as heavy metals, toxins and pollutants or synthetic compounds such as pesticides and pharmaceutical compounds. The toxicity and ubiquity of these compounds make necessary the development of fast, sensitive and reliable methods to detect them. The analytic method that may be considered for their detection is HPLC, GC or HPLC combined with mass spectroscopy (MS). To this purpose, many groups have developed biosensors useful for a preliminary screening test to assess the water quality. The main advantages of biosensors, over traditional analytical techniques for the detection of environmental contaminants, are their cost-effective, fast and portable detection, which makes in situ and real time monitoring possible, without extensive sample

preparation. However, most biosensors still have a few drawbacks. Mostly they allow the detection of just one analyte.

Biosensors can be classified according to the type of recognition element (enzymatic, whole cell or affinity-based biosensor) used. Enzymes were the first recognition elements included in biosensors. Enzymatic biosensors measure the selective inhibition or the catalysis of enzymes by a specific target

Another frequently used recognition element, especially for the monitoring of environmental pollutants, are whole cells such as bacteria, fungi, yeast, animal or plant cells.

Affinity-based sensors are very sensitive, selective and versatile since affinity-based recognition elements can be generated for a wide range of targets.

In this lecture, innovative biosensors for environmental monitoring, based on enzyme, bacteria and affinity receptor will be presented.

IWA - YWP WORKSHOP:

INNOVATIVE TECHNOLOGIES

WS-1. A SURVEY OF NEW TECHNOLOGIES FOR WATER AND WASTEWATER TREATMENT

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Water is an essential substance for living systems as it allows the transport of nutrients and waste products in living systems. Research shows a clear correlation between diseases and the amount and types of fluids consumed, health-promoting properties of nutrients which can be added to water, optimal intake levels, and consumption patterns. Although three quarters of the Earth's surface is covered with water, most of that water is not suitable for human consumption. Today, hundreds of millions of people in vast regions of the world do not have access to water to meet their basic needs. Natural disasters also create conditions which limit the availability of water that is suitable for human consumption. Industrial processes use significant amounts of water which require treatment before discharging to surface water systems. Municipal wastewater treatment systems discharge their effluents which often impact the aquatic organisms. This paper provides a survey of new developments and innovations relative to water treatment for drinking purposes and wastewater treatment during the last few years. For drinking water treatment, the recent technological advancements relate to primarily filtration (media filtration and membrane systems), disinfection processes, ion exchange, and carbon adsorption processes. For wastewater treatment, a significant majority of recent developments relate to biological processes and advanced treatment technologies such as adsorption. A review of the recent patents show

innovative designs for treatment units, efficient approaches for water quality, as well as nanotechnology applications for removing impurities and disinfection purposes.
The concern over increasing needs for drinking water and awareness for development of systems to improve water quality both for drinking purposes and for effluents from wastewater treatment and industrial facilities have provided incentives to develop new technologies and improve performance of existing technologies. In this paper, the patents on treatment of water and wastewater approved during the period from 1999 to 2007 were reviewed. The patents surveyed were classified into two groups as technologies for water purification systems for drinking water, and technologies for treatment of wastewater. An assessment of the current and future outlook for development of new technologies, methods of treatment, equipment and instruments which can be used for water and wastewater treatment applications are presented.

Keywords: Water treatment, water filtration, ultrapure water, wastewater treatment, ion exchange, disinfection, sorption, membrane filtration, nanofiltration, wastewater.

WS-2. CONTRIBUTIONS ON BIOLOGICAL REACTORS FLOW OPTIMIZATION

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In order for the biological processes in wastewater treatment systems to develop optimally a good contact between the microorganisms and the substrate has to be realized. The reactors homogeneity can be achieved by applying intensive mixing systems that have high energy consumption. This paper has the aim of determining the optimal system that can assure the close contact while maintaining the energy need as low as possible.

Keywords: wastewater, biological treatment, flow optimization

WS-3. TEMPERATURE AND MIXING SIMULATIONS IN AN ANAEROBIC DIGESTER

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Domestic wastewater treatment plants have high energy loads for a good development of treatment processes. The organic load of sludge resulting from wastewater treatment is an inexhaustible source of potential energy to the treatment plant, if used in an efficient process of anaerobic digestion (AD). Since AD is also a major consumer of energy, then to get a larger amount of energy than necessary for the process, it is necessary to optimize the anaerobic digester, both in terms of hydraulic and in terms of heat, so that the heat loss is minimal and the temperature distribution to be uniform.

Keywords: wastewater treatment, anaerobic digestion, optimization

WS-4. MODELING THE DISTRIBUTION OF DISSOLVED OXYGEN CONCENTRATION IN BIOREACTORSOF A LEACHATE TREATMENT PLANT

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A necessary condition for proper functioning of the economically optimal biological reactor is the correlation between the flow rate of introduced and consumed oxygen during the metabolic degradation of organic materials.

Modelling of physical, chemical and biological processes of aeration tanks in leachate treatment plants is difficult because they are very complex. In the aerobic biological reactor, the oxygen consumption varies over time and space due to the unevenness of the influent load of biodegradable organic substances or change the kinetic relationship between the growth rates of biomass and elimination rates of the substrate.

Biological reactors for the treatment of leachate considered, provided with two types of air dispersion devices placed at the bottom of the basin (perforated pipe in the first bioreactor and porous diffusers in second bioreactor), was created using Flex PDE, two models.

Modelling the dissolved oxygen concentration in the leachate, was aimed to optimize the process of mass transfer of oxygen from air into water, having an important role in minimizing the operating costs of facilities, energetic optimization of aeration systems and an improving on performances for leachate treatment.

The models were designed for a two-dimensional domain, and to appreciate the distribution of oxygen concentration for both bioreactors equipped with different lenses (perforated pipes and porous diffusers). Numerical integration of the dispersion equation for the analysed case was adapted by running a program written by the user using Flex PDE software package. The phenomenon of mass transfer at the interface was found by a continuous flow conditions required in the surface pores through which compressed air is blown.

The results show that the use of air insufflation made from porous diffusers is more efficient, compared to the system made from perforated pipes, the required value of the concentration of dissolved oxygen reached in a time period much lower, similar to that encountered in practice.

Keywords: modelling, dispersion, dissolved oxygen.

WS-5. AEROBIC GRANULAR SLUDGE VS. CONVENTIONAL WASTEWATER TREATMENT TECHNOLOGIES

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Due to stringent regulations and increased awareness towards environmental protection, during the past decades were developed and implemented several wastewater treatment technologies which proved to be more or less effective or cost-efficient. Recent trend in wastewater treatment research focuses on developing new biological wastewater treatment technologies with higher removal efficiencies and lower investment and/or operational costs. The performance of a biological system for wastewater treatment depends significantly on the active biomass concentration, the overall biodegradation rates, the reactor configuration, and the feeding rates of the pollutants and oxygen. The paper presents the aerobic granular sludge comparatively towards the conventional biological technologies in terms of performances, investment and operational costs. Aerobic granular sludge has several advantages over conventional technologies such as fast settling ability, high biomass retention and ability to withstand high organic loading including potential toxic substrates, leading towards a compact reactor system thus allowing high conversion rates and efficient biomass separation to minimize the reactor volume.

Keywords: wastewater treatment, aerobic granular sludge

WS-6. FORMATION OF AEROBIC GRANULES IN SEQUENCING BATCH REACTOR TREATING DAIRY INDUSTRY WASTEWATER

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Aerobic granular technology, compared to conventional activated sludge wastewater treatment plants, is a novel alternative offering numerous advantages such as high biomass retention, good settling ability and simultaneous removal of organic load and nutrients. The main focus of research was to evaluate granules formation and evolution of treatment performances during startup and steady state conditions. The experiments were performed in lab scale sequencing batch reactors with automated control of the operational cycle: anaerobic feeding (45min.), aerobic reaction (11 h), settling (5min.) and effluent withdrawal (10 min.). One of the bioreactors (D) was inoculated with conventional activated sludge while the other one (GM) was inoculated with crushed aerobic granular sludge. Both bioreactors were fed with dairy industry wastewater with high organic and nutrients load (CODCr=1723 – 3550 mg O_2/L, BOD_5 = 492 – 1806 mgO_2/L; NH_4^+= 64.6 - 114 mg/L, P tot = 5.04 – 21.5 mg/L). Aerobic granular structures were observed even after 5 days (10 treatment cycles) with 67 to 556 µm in diameter in D bioreactor and with 392 to 1200 µm in GM bioreactor. The granules diameter in D bioreactor increased significantly after 25 days to diameters between 513 µm and 1276 µm and up to 2 mm by the end of the experiment. The granules in GM bioreactor increased to 764-1482 µm and up to 4 mm in diameter by the end of the experiment. Treatment performances increased rapidly along with the growth of granules size.

Keywords: aerobic granular sludge, dairy wastewater, SBR

WS-7. EVALUATION OF COMBINED ACTIVATED SLUDGE – MICROALGAE SYSTEM FOR WASTEWATER TREATMENT

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The biotechnological principle of using combined microalgae – activated sludge system for wastewater treatment consists in bidirectional metabolic fluxes that can be established between the photoautotrophic microalgae and heterotrophic bacteria. Thereby, the oxygen released during the photosynthesis process by the microalgae species is used by bacteria to degrade organic matter, the resulted degradation products (mainly CO_2) being used in turn as nutrients by the microalgae for cell development.
Since the microalgae biotechnology was first recognized as a viable solution for wastewater treatment, it was used mainly for tertiary treatment. However, during the last decade, several researchers focused their studies on using the microalgae-activated sludge system for secondary wastewater treatment, high treatment performances for domestic and industrial wastewaters being attained.
The main drawback of this biotechnology is represented by the poor microalgae cells recovery, currently applied methods (centrifugation, filtration, flocculation/coagulation etc.) involving high costs, contamination with heavy metals, filter clogging etc. In order to solve this problem, several researches were conducted in this field and, until now, bio-flocculation method seems to be the most feasible solution.

Keywords: microalgae-activated sludge system, microalgae recovery, wastewater treatment

WS-8. ENVIRONMENTAL ASSESSMENT NATIONAL DEVELOPMENT PLAN OF RIVER BASINS FROM ROMANIA

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The objective of the Decision no. 1076 of 8 July 2004 on establishing the procedure for environmental assessment for plans and programs, is to provide a high level of environmental protection and contribute to the integration of environmental considerations into the preparation and adaptation of certain plans and programs, to promote sustainable development by making a environmental assessment of plans and programs that may have significant environmental effects.

Environmental assessment is an integral part of the procedure for the adaptation of plans and programs.

In the field of water management the Directory Scheme of River Basins Management and Development is a planning instrument in the water field on river basin. It has two components: the River Basin Development Plan, component of water resources quantitative management and the River Basin Management Plan, component of water qualitative management.

The purpose of the National Development Plan for River Basins is to determine the actions, measures, options, solutions and works for: achieving and maintain the balance between water requirements and availability of resources, mitigation of negative effects of natural phenomenon on life, goods, human activities and of environment, the use of water potential and determining the environment requirements on water resources and water management in terms of climate change.

The main objectives for the river basin management plans defined by Ministerial Order no. 1258/2006 integrate objectives in relation to the requirement of water and therefore it reflects in the River Basin National Development Plan.

The current development plans, including the national plan, were elaborated on the basis of substantiation studies, elaborated by numerous institutions in the field, studies to which NIHWM participated not only as developer, but also as coordinator.

Strategic Environmental Assessment for NDPRB was done by following the steps set by GD 1076/2004.

In the environmental assessment of NDPRB, the plan objectives contribute to achieving environmental objectives relevant to consider the potential significant environmental effects if the plan was implemented or not as follows: analysis of the national environment on existing data and information support, identification of environmental aspects and environmental issues relevant to the national territory for which NDPRB may have a direct addressing, identification/formulation of the relevant environmental objectives to which NDPRB has to respond for the identified environmental issues, the analysis of environmental conditions without the implementation of NDPRB provisions, assessing the effects on the environment generated by the alternatives analyzed by NDPRB and justifying the chosen alternative, through the evaluation of how the proposed objectives and measures contribute to relevant environmental objectives.

Strategic environmental assessment involves the analysis plan objectives from the perspective of potential conflicts that may arise in achieving them.

From the perspective of the strategic environmental assessment of NDPRB there is identified mainly the opportunity of promoted measures according to the magnitude and reversibility of environmental effects, with emphasis on consideration of national security perspective to ensure water demand and general aspect of the geographic location for the establishments.

Keywords: environmental assessment, Directory Scheme of River Basins Management and Development, National Development Plan of River Basin

SECTION I

SUSTAINABLE ENVIRONMENTAL TECHNOLOGIES

- **plenary conferences**
- **oral presentations**
- **posters**

- PLENARY CONFERENCES -

PC-4. COMBINED SORPTION MATERIALS BASED ON BLEACHED COTTON FIBERS AND FERROCYANIDES OF d-METALS, SORPTION AND STRUCTURAL PROPERTIES

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Radiocesium-137 is a long-lived radioactive isotope with high toxicity and migration properties. Its accumulation in the human body causes a number of diseases. Sorption methods with the application of ferrocyanides of d-metals ([FC]K-Me) is used for extraction of cesium radionuclides from aqueous solutions and biological media. [FC]K-Me are microcrystalline and highly dispersed substances, which are characterized by relatively high selectivity to the cesium ions, also chemical and thermal stability. The immobilization of such substances on solid carriers improves their exploring characteristics.

We developed the method for obtaining of combined sorbents based on bleached cotton fiber (BCF) and [FC]K-Me (Me: Cu^{2+},Fe^{3+},Ni^{2+},Co^{2+},Zn^{2+}) intended for concentration of radioactive cesium. Obtaining of the samples of sorption materials was carried out by modifying BCF by [FC]K-Me colloidal solutions under hydrothermal conditions that promotes the activated adsorption of [FC]-particles on the surface of cellulose. Obtained by this method sorbents are characterized by persistent retention of inorganic phase in volume of the matrix in the pH range 3.0–11.0.

Study of the sorption properties of the combined sorbents with respect to ^{137}Cs was performed from the model solutions. Obtained

sorption materials based on mixed salts [FC]K-Ni and [FC]K-Co are characterized by the maximum value of the degree of extraction of ^{137}Cs from aqueous solutions (99.9%). Samples based on [FC]K-Fe and [FC]K-Cu obtained at the same conditions of modification process achieve values of the degree of extraction 99.0 and 95.3% respectively. In the case of application of sorbent based on BCF and [FC]K-Zn has the lowest value of the degree of extraction - 62%. At the same time the distribution coefficients (in cm^3/g) of obtained cellulose sorbents based on [FC]K-Me decrease in the following order: [FC]K-Ni ($8.4*10^5$) > [FC]K-Co ($3.5*10^5$) > [FC]K-Fe ($4.0*10^4$) > [FC]K-Cu ($7.62*10^3$) > [FC]K-Zn ($6.36*10^2$).

The analysis of IR-spectra in the range 4000 - 300 cm^{-1} indicates the appearance in the spectra of the modified samples the valence vibration band of CN-groups (2144 cm^{-1}) after immobilization of [FC]-phase. IR spectra of initial and modified BCF are characterized by the presence of absorption bands at 3600-3000 cm^{-1}, which correspond to the valence vibrations of free OH-groups. The broadening of these bands for modified sample indicates a partial disordering and the restructuring of the hydrogen bonds during modification process, as a consequence, the appearance of a greater number of available hydroxyl groups for hydration. X-ray diffraction of the initial and modified samples shows a slight decrease in intensity in the range of 2θ as 9-32° on diffraction for modified samples that is also indicates the disordering in cellulose structure. Modification process leads to a slight decrease the crystallinity of cellulose structure in average 7-12%.

The results of DTA indicate the processes of thermal degradation of cellulose in the samples: at the temperatures till 120 and after 270 °C – correspondingly removal of physically and chemically bonded water, and at the range 270-450 °C - fiber degradation. For initial BCF thermal degradation process ends at 500 °C, while samples modified by [FC]-phase characterized by the less degradation temperature which is 420-450 °C. The shift of the final decomposition temperature of the modified samples in the lower temperature region is connected with higher content of amorphous component in the cellulosic material that is easily amenable to thermal transformations.

Thus, obtained sorbents can be used as a filter material for removal of radioactive cesium from aqueous solutions and biological liquids.

PC-5. NEW TECHNOLOGIES OF WATER TREATMENT ON THE BASIS OF SORPTIO AND CATALYSIS PROCESSES

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Active carbons and catalysts obtained on their basis are valuable chemicals products widely used in various fields, including the purification of waste water, potabilization of surface water and groundwater. Adsorption of harmful substances and their transformation on catalytic supports is a complex process. It depends on the effective radius and the pore sorption volume, surface area of meso- and macropores, the quantity and quality of active centers of carbonaceous adsorbents, and chemical structure, molecular weight, physical-chemical state of adsorbed substance.

The report contains the results of scientific research related to synthesis of activated carbons from plant raw material. The chemical reactions that occur during charcoal carbonization and activation of vegetable raw materials are discussed. Structural parameters values are given as well as of the adsorption capacity of intact activated carbons and of those oxidized with various chemical agents.

Active carbons and catalysts obtained on the basis of these carbonaceous adsorbents were used in the process of removal from surface water and groundwater of organic compounds and inorganic compounds in reduced state. Chemical mechanisms are presented for reactions occurring during the adsorption and transformation of organic and inorganic pollutants.

PC-6. INNOVATIVE *IN SITU* REMEDIAL TECHNIQUES – KNOWLEDGE TRANSFER AND PRACTICAL EXPERIENCE

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This paper refers to practical knowledge obtained during a transfer of innovative *in situ* remedial technologies (chemical oxidation – ISCO, enhanced biological dechlorination – bioERD and nano-zero-valent iron – nZVI and their combination), from laboratory conditions to company remedial practice.

In situ chemical oxidation (ISCO) is one of promising remediation technologies applied within the Central and Eastern Europe. Type and extent of contamination, as well as treated matrix and an application method are driving parameters for determining, which of the oxidation agents and/or their combinations is the best choice for set site conditions. Laboratory model experiments of Fenton's reagent, potassium permanganate and sodium persulfate (activated as well as non-activated) and selected conclusions of pilot-scale tests carried out on sites contaminated by chlorinated ethenes will be presented. Further, information on a possibility improving ISCO performance by adding of surfactants will be given.

Biologically enhanced reductive dechlorination (bioERD) offers a potential for destruction of chlorinated ethenes by an addition of a suitable electron donor directly to a contaminated ground. Organic by-products or processing waste of a food industry (e.g. beet molasses, stillage, whey) represent suitable as well as low-cost alternative electron donors for

boosting the biological ERD process. Results of laboratory experiments and pilot-scale testing performed on sites contaminated by chloroethylenes will be outlined.

Nano zero-valent iron (nZVI) has 20 to 30-times higher reactivity then conventional ZVI and thus this aspect is often stated as a main advantage of its usage (as a contrariety to its high price). Stoichiometry and passivation of nZVI active surface by reaction by-products are closely associated together and this fact directly influences practical efficacy this material. Experimental testing of various nZVI samples' reactivity (coming from different suppliers) on Cr(VI+) and achieved results of a pilot-scale application on a site polluted by chlorinated hydrocarbons and petroleum substances will be introduced.

Moreover, ERD and nZVI can be successfully combined in order to speed up remedial process, stabilise its performance and to cut clean-up financial costs. During this remedial train, nZVI particles generally accelerate an establishment of anaerobic conditions in the ground and make the first decomposition step (chemical reduction) of pollutants of target. Later, the bioERD process finishes contamination treatment and, in general, returns natural conditions on remediated sites. Selected results from laboratory to pilot-scales of Cr(VI+) and Persistent Organic pollutants (POPs) decontamination will be presented.

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PC-7. STUDIES REGARDING OBTAINING UNCONVENTIONAL FUELS FROM SLUDGES COMING FROM TERTIARY TREATMENT OF SOME WASTEWATERS

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Tertiary wastewater treatment sludge can become a source of potential fuels. Up to now, the methods applied for making the best use of such sources aim at either obtaining energy through indirect processes or using sludge for agricultural land improvement. Most methods applied on a national scale have major technical and economic disadvantages and a negative impact on the environment.

The present paper summarizes the studies conducted by the researchers of PRO AIR CLEAN ECOLOGIC S.A. Timisoara. The purpose of the paper is to promote the direct use of sludge and its resulting advantages.

Beside the direct use of tertiary wastewater treatment sludge, the effective application of byproducts as well as waste resulting from various economic sectors is also taken into consideration.

- ORAL PRESENTATIONS -

I-O-1. REMOVAL OF SULPHATE AND HEAVY METALS FROM MINE WATER - COMPARISON OF ETTRINGITE PRECIPITATION VS. NANO FILTRATION IN A PILOT PLANT

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The Rosia Montana Gold Corporation is developing the Rosia Montana Gold Project located in the Apuseni Mountains of Romania. The development of this project includes treatment of all AMD generated from historical mining activities which have taken place over the last 2000 years. WISUTEC GmbH has developed innovative technology for removal of heavy metals and sulphate from the AMD. Following extensive laboratory tests [1] a pilot plant designed by WISUTEC was fabricated by Bauer Water GmbH, in Germany, and transported to the project site for testing. Positioned at the historical underground mines lowest discharge point (Adit 714) in Rosia Montana, the pilot plant operated continuously (24/7) over a period of 8 months from January to August 2012. Following this testing period the pilot plant was transferred to RMGC's Environmental

Department, whom operates the pilot plant locally, and has also assisted in the testing of AMD water from other mine sites in Romania.
The pilot plant includes two flow sheets, or technological approaches, to metal and sulphate removal: The first is a two-stage precipitation process comprising lime dosing to precipitate metal hydroxides followed by ettringite precipitation for sulfate removal. The second is a nano filtration process for sulphate removal, including a chemical pretreatment of the feed (if necessary) and subsequent precipitation of sulphates from the concentrate (or brine) produced.
The applicable Romanian surface water discharge standards (NTPA001) could be consistently achieved with both technologies during testing at ambient air temperatures ranging from -20°C to +35°C. The trials have provided reliable "real world" data for industrial scale design and application tailored to project site conditions.

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I-O-2. TREATMENT TECHNOLOGIES OF AQUEOUS MEDIA LOW-CONTAMINATED BY URANIUM AND ACCOMPANYING HEAVY METALS

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The environmental pollution by radioactive and heavy metals species represents a continuous challenge for the scientific community mainly due

to their negative impact on the human health. Mine waters and the effluents resulted from the uranium ores processing activity contain beside uranium radio-elements and heavy metals. The enforced legislation that regulates the safety limit concentration of the uranium and accompanying elements in the aqueous media specific to the uranium ores must be respected. Therefore it is necessary to develop new highly effective treatment technologies for the removal of the radioactive and heavy metals from those systems.

Among the studied treatment technologies for the decontamination of those aqueous media, the Ra^{226} removal by co-precipitation as $Ra(Ba)SO_4$ and $Ra(Ba)CO_3$ respectively, followed by flotation has been studied and implemented. The removal of Mo (VI) from tailing ponds using sorption-flotation technique was also investigated. Other investigated treatment technologies as environmentally friendly alternatives to the classical decontamination ones (ion exchange and solvent extraction) were biotechnologies, fito-remediation and biosorption. The adsorption process on a large variety of materials is still investigated and applied. Ultra-filtration, reverse osmosis, contaminants' transport across either supported liquid membranes or emulsified liquid membranes were recently developed. Another, relatively recent developed remediation method involves reactive iron nano-particles utilization for uranium and heavy metals immobilization based on system's redox potential manipulation. The separation efficiency of this method may be improved using other techniques such as dissolved-air flotation technique in order to get the uranium an heavy metals concentrations in the resulted effluent to the safety limits stipulated by the enforced legislation. The present contribution aims to present the progresses recorded in this very challenging field of interest emphasizing the advantages and disadvantages of each treatment technology. The combined technologies can provide the right answer, if one does not use additional polluting agents.

I-O-3. CATALYTIC OXIDATION OF TEXTILE DYES MIXTURE AND AUXILIARY COMPOUNDS IN MODEL SOLUTIONS

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Advanced oxidation methods of organic compounds lead to their partial mineralization and enhance of adsorption process efficiency on the surface of oxidized activated carbon.

For this purpose it has been studied the catalytic photo-oxidation process of compounds in the following mixture: direct brown dye (CD) - 200 mg / l ethylene glycol (ETG) - 60mg / l and anionic surfactant (sodium lauryl sulfate, SLS) - 60 mg / l . We have studied the oxidation process using model solutions containing this mixture (CD, ETG and SLS) under the action of Fenton's reagent, in the presence and absence of UV irradiation or under the action of electric current (in the electrochemical cell). The same studies were performed by replacing the iron(II) ion with titanium dioxide.

As a result of laboratory research, we have found increasing of the oxidation degree and mineralization, by photocatalytic oxidation and thus decreased the concentration of organic compounds. Due to the oxidation of dye molecules and other auxiliary components, by strong oxidation ability of free OH* radicals, resulted carbon dioxide, water and low molecular organic compounds (alcohols, ketones, organic acids). The decrease of mixture of organic compounds concentration (for the values of COD-Cr) depends on the nature of catalysts and the presence of electric power. The oxidation degree is greater in the presence of iron (II) ions than in the presence of titanium dioxide after oxidation of the mixture of organic compounds with hydrogen peroxide in model solutions. One explanation is

that UV irradiation increases the concentration of free OH* radicals as iron ions further decompose hydrogen peroxide, but in the presence of titanium dioxide, the leading band electrons are accepted by free OH* radicals, converting these radicals to ions, as shown in the mechanism by GARCIA, J., et al. This leads to lower concentration of OH* radicals in model solution and reducing of oxidation effect, respectively. On the contrary, in the presence of electric power, electrons are accepted by the electrode, and the OH* radicals concentration does not decrease, but increases, and this leads to the enhancement of the oxidation effect and mineralization of organic compounds.

After oxidation for 1 hour of the pattern solutions of dye CD, ethylene glycol, and anionic surfactant with photo-Fenton's reagent and electric power, the oxidation level was 91-95%.

It was established that the treatment with the titanium dioxide mixture (0.5g / l) and Photo-Fenton's reagent, lead to an oxidation degree and digestion of 57-77%, using only electrochemical method - 64-75%.

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I-O-4. DICLOFENAC REMOVAL AT LOW CONCENTRATIONS FROM WASTEWATERS BY ELECTROCHEMICAL PROCESSES

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Pharmaceuticals are used on a wide scale and their use and diversity is raising yearly. They are designed to have a specific pathway of action and also certain persistence in humans and animals. Because of these features a great part of pharmaceuticals pass unchanged through their bodies and thus, by urine and excrements, they reach wastewaters. Concerns related to the presence of pharmaceuticals in water are due to their toxic effects upon the aquatic organisms detected at low levels of concentration. Most of pharmaceuticals pass unchanged through wastewater treatment plants and thus they emerge into waters bodies. Because of extraordinary performances of the analytical chemistry the investigation regarding the presence of pharmaceuticals in the environment are nowadays possible. The pharmaceuticals were found in the range of ng/L-µg/L in the effluents of wastewater treatment plants and surface waters. The electrochemical methods are efficient tools for wastewater treatment. The aim of this paper was to apply the electrochemical oxidation on Dimensionally Stable Anodes to remove pharmaceuticals at low concentrations from wastewaters. Two anodic compositions were used: $Ti/RuO_2 – TiO_2$ and $Ti/RuO_2/SnO_2 – Sb_2O_5\text{-}RuO_2$ and diclofenac, a non-steroidal anti-inflammatory drug, which is recalcitrant to biological degradation, was chosen as a model of pharmaceuticals. The experiments were carried out by using simulated solutions of diclofenac of 1 mg/L in 0.1 M Na_2SO_4 as supporting electrolyte and spiked effluent of a wastewater treatment plant. The applied current densities were 100, 200 and 300 A/m^2 and pH of 5.8 and 11. The process was followed by recording the UV spectra and assessing the diclofenac concentration in the electrolysed solutions by HPLC with UV-VIS detection. The best results were obtained by using $Ti/RuO_2/SnO_2 – Sb_2O_5\text{-}RuO_2$.

Keywords: electrochemical oxidation, dimensionally stable anodes, diclofenac

I-O-5. ADVANCED DEGRADATION OF 4-CHLOROANILINE FROM WATER IN UV/TiO_2/H_2O_2 SYSTEM

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Chlorinated aniline belongs to the anilines family which are common pollutants, being frequently used as intermediates for the chemical synthesis in polymer, rubber, pesticide, pharmaceutical and dye industries. Due to their high toxicity and persistence in aquatic environment, they are classified by European Water Framework Directive 2000/60/EC as the priority pollutants and are restrictedly regulated in EU countries. Since their presence in water bodies is risky for human health and aquatic life, developing of powerful, modern treatment methods like advanced oxidation processes (AOPs) are necessary in order to assure pollution mitigation. If properly applied, TiO_2-based photocatalysis can be regarded as an environmentally friendly and cheap treatment option.

In the present study, solution with (0.14-14.2) x 10^{-4} M 4-CLA content were photo-oxidized in the following working conditions: pH=4; [TiO_2] = 50-500 mg/L; [H_2O_2] = (0.1-10)x10^{-3}M; t_{irr} = 5 – 180 minutes.

The pollutant degradation pathway by three possible routes was proposed, according to organic intermediates identified by gas-cromatograph coupled with mass spectrometry-screening method. The first route consists of OH radical attack on target pollutants with amino group substitution and 4-chlorophenol (4-CP) formation. The second degradation route represents OH radical attack on aromatic ring by hydrogen abstraction with aniline-radical formation, that is subsequently stabilized by dimerization to 4,4'-dichloroazobenzene (DCAB), which is further oxidised to 4-chloronitrobenzene (4-NCB). The third route of pollutant degradation takes place by a heterolytic mechanism consisting of hydrogen and chloride atoms release, as HCl, and aniline (A) formation, which is oxidized to 4-aminophenol (4-AP) by OH radicals addition to the aromatic ring. The secondary intermediates (4-CP, 4-AP, 4-NCB) are subsequently

hydroxilated to hydroquinone that is also oxidized to benzoquinone leading to carboxylic acids by its ring cleavage under OH radical atack.
Based on experimental results can be concluded that after 90 minutes of irradiation, 4-CLA was complete degraded. Mineralization yields of organic chlorine and nitrogen were around 81% and 85%, respectively for prolonged irradiation (180 min.). These results are consistent with presented degradation pathway that proposed as intemediates, aromatic compound like 4-CP, A, 4-NCB and 4-AP. The presence of these intermediates in irradiated samples is also supported by 82.4% TOC removal yield obtained at prolonged irradiation.

Keywords: photocatalysis, UV/TiO_2/H_2O_2 system, 4-chloroaniline degradation

I-O-6. ADVANCED TECHNOLOGIES FOR OBTAINING COMPOSITE "CORE-SHELL" NANOSTRUCTURES AND ENVIRONMENTAL APPLICATIONS

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This paper presents advanced technologies for obtaining composite "Core-Shell" nanostructures and environmental applications. Composite "Core-Shell" are structured nanoparticles which contain a core from one material (coloured, fluorescent, with magnetic properties, drug container, full or empty) and a protective shell from another material (stabilizing particles, with biorecognition, receptive and optical functions, etc.) with sizes ranging between 20 and 200 nm. The basic composition for both the core and the

shell can be changed, providing a wide range of properties and applications.
The existence of drugs, hormones, toxic substances, synthetic polymers, etc in wastewaters is a great problem for environment. In this research the technologies for obtaining biodegradable "Core-Shell" composites with shell from natural biopolymers (collagen, casein or their combination) and immobilized in core drugs (ampicillin or gentamicin) in the smallest amount were developed.
The experimental techniques used in the study of the release mechanisms and identification from water will consist in ultraviolet, infrared spectral methods, electronic scanning and optical microscopy, chromatography. All the analytical methods will provide proper information regarding the structure of the resulted "Core-Shell" composite and interactions with drugs.
Knowing and controlling the release mechanism of drugs in "Core-Shell" composite is a protection measure against assaulting the body with unnecessary amounts to be assimilated and also for environment because are discharged in smaller quantities in water, soil, etc.

I-O-7. TREATMENT POSSIBILITIES OF GROUNDWATER CONTAMINED WITH ORGANOHALOGENATED SOLVENTS

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Chlorinated ethanes such as 1,2-dichloroethylene (1,2DCE), three chloroethylene (TCE), tetrachloroethylene (QCE) were identified in some groundwater sources used for potable purpose. Contamination of groundwater can occur from many sources, the most important of which being leachates from waste disposal sites. Analysis of contaminated groundwater has shown high concentration level of halogenated volatile

organics (1,2DCE = 14-18 mg/L, TCE = 80-130 mg/L, QCE = 198-258 µg/L), over the current limits imposed by enforced legislation (L 458(r1)/2011: $CMA_{TCE + QCE}$ = 10 µg/L).
The main treatment technique used by individual water consumers is based on GAC adsorption in one or two steps (ηTCE = 99.4%, ηQCE = 99.8%, ηDCE = 46%), which can't assure the required quality for drinking water, the residual concentrations being higher than CMA value (1,2DCE ≤ 10 mg/L; TCE ≤ 500 µg/L; QCE ≤ 0,5 µg/L).
The applied treatment processes for advanced degradation of chlorinated ethenes are base on oxidation using photolysis or ozonation in different systems: UV alone, UV/H_2O_2, UV/O_3, O_3 alone, O_3/ H_2O_2. Also, air stripping can be used for pollutants removal.
The paper presents the experimental results obtained for the advanced removal of halogenated compounds by coupling air stripping with chemical oxidation, which can provide drinking water quality in compliance with legislation requirements.

Keywords: groundwater, chlorinated ethenes, air stripping, oxidation

I-O-8. ADVANTAGES OF MUNICIPAL SEWAGE SLUDGE DEHYDRATION USING THE GEOTUBES METHOD

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In 2008, Joint Stock Company "Apa-Canal Chisinau" together with experts from Netherlands and Poland started the implementation of municipal sewage sludge processing using the geotubes method - bags for municipal sewage sludge dehydration as a solution for bad odour removal. Sewage sludge dehydration process using the „geotubes" method takes place rapidly, in about 7-20 days. This process is catalyzed by reagents that ensure the clogging of municipal sewage sludge.

From September until the end of 2009, a pilot Project on municipal sewage sludge dehydration in geotubes started and it was conducted by "Apa-Canal Chisinau" in cooperation with the Dutch company „TenCate";

then, the activities planned under the Project Execution "Geotubes" were developed. Within the pilot Project there were dehydrated about 90 000 m^3 of raw sewage sludge. In this regard, there were used 40 bags of different size, occupying only 1.25 ha of platforms, while the use of previous technology would take 6 ha. Also, the municipal sewage sludge that was pumped in this period was dehydrated within one month. Previously, it took about 18 months.

Dehydrated sewage sludge in geotube bags is discharged at the storage place once a year in the cold period – in the period from December to February, when the release of specific odours and infections is minimal. The Wastewater Treatment Plants from Europe activate quite similar to this (C. Becciev, 2011). The difference is that European technology of "geotubes" is not used for as large enterprises as in Chisinau. According to data presented by the Joint Stock Company "Apa-Canal Chisinau", in the past two years, about 110-115 thousand m^3 of dehydrated municipal sewage sludge, with the humidity of 78-80%, using the "geotubes" method is accumulated annually in the Wastewater Treatment Plant. In connection with the production of this new form of sewage sludge it was necessary to study its composition. The research was performed on dehydrated sludge which was transported to the fermentation landfill in December 2010. The samples included the municipal sewage sludge pumped to the Wastewater Treatment Plant in the period October 2011 - October 2012.

Compared with the traditional technology (open air drying beds), the period of dehydration is shorter; carbon content (21.8% of dry mass) and total nitrogen content (2.6%) were approximately two times higher, total phosphorus content (2.8% P_2O_5) recorded an insignificant decrease (10%) while potassium remained at about the same level. The studied municipal sewage sludge is characterized by a weak alkaline reaction. The pH value ranged from 7.1 to 7.8, forming the average of 7.4 ± 1.1. The humidity was on average of 65.1 ± 26.2%. The content of organic matter of the sewage sludge in natural humidity was of 15.1 ± 6.7%.

Chemical composition demonstrates that municipal sewage sludge dehydration using geotubes represents an important source of organic matter for soil and nutrients for agricultural crops. Sewage sludge is rich in total nitrogen, especially in phosphorus – element that lacks in about 76% of Moldova's agricultural soils. Mobile forms of nitrogen and phosphorus make up about 14-17% of the total content. One of the most important factors limiting the use of municipal sewage sludge as organic fertilizer is

the excessive content of heavy metals. The main source of heavy metal content is the wastewater from industrial enterprises, but due to changes that occurred in the structure and volume of production issued by the industrial enterprises from Chisinau municipality, there were recorded significantly decreased volumes of wastewater. As to data obtained on the content of heavy metals and comparing them with the limiting values, we found that they do not exceed the allowable concentrations developed by the industrialized countries.

I-O-9. EVALUATION OF INDIGENOUS OLIGOTROPHIC PEAT AS LOW-COST SORBENT FOR ACCIDENTAL OIL SPILLS

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Removing of oil spills from solid surfaces, sea, rivers and lakes formed as a result of accidental spillage during transport or storage is of great concern. Such ecological accidents have created a great need to find more efficient and low-cost materials for oil spill cleanup. The methods commonly used to remove oil involve the use of dispersants, skimmers, sorbents etc. The main limitations of some of these techniques are their high cost. Sorption has been observed to be one of the most effective techniques for removal of spilled oil under ambient conditions. In this work, indigenous oligotrophic peat was prepared using several methods and tested (according to ASTM F726-12 Standard Test Method for Sorbent Performance of Adsorbents) as a low cost sorbent in order to determine their potential for oil spill cleanup in terms of adsorption capacity, floatability and leachability. To cover the most common oil products causing accidental spills, for this study were used: gas, diesel and motor oil. The peat sample prepared by drying, chopping and sieving had highest adsorption capacities (expressed as g pollutant/g sorbent), depending on the contact time and pollutant properties, of 4.13 –

5.02 for gas, 5.44 - 6.81 for diesel oil and 15.13- 15.17 for motor oil. The adsorption capacity of indigenous peat sample increases along with the viscosity and density of the pollutants, as follows: gas<diesel<motor oil. The adsorption performances of tested indigenous peat samples are similar to those of similar adsorbent imported materials existing on the market.

Keywords: oligotrophic peat, sorbent, oil spills

I-O-10. SUITABILITY OF GRANULATED LEAD SLAG FOR VALORISATION

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Sustainable development is the type of economic development in which people's present needs are met without compromising the future generations' possibility of meeting their own needs. In order to reach the aim of sustainable development we must promote the durable use of natural resources by valorizing the wastes generated by industrial processes into products able to replace such resources.

Framework Directive 2008/98/EC on Wastes, transposed in Romania through Law no. 211 of 2011 on the regime of wastes, establishes the steps to be taken for the protection environmental and the protection of people's health by preventing or reducing the negative effects resulting from the generation and administration of wastes and by reducing the general effects of using natural resources and increasing the efficiency of such use.

This paper investigates the slags obtained after fast cooling of liquid slag resulting from processing the lead-rich concentrates in a Water-Jacket hearth furnace in order to recycle it as a construction material and a secondary aggregate for road construction.

The chemical analysis of granulated slag resulted from the pyrometallurgical processing of lead-rich concentrates was performed quantitatively using X-ray fluorescent spectrometry, micro-structurally by scanning electronic microscopy (SEM) and optic microscopy, and micro-compositionally by energy-dispersive x-ray microanalysis (EDAX). The compositional phases were determined by x-ray diffraction (XRD) qualitative analysis. A leaching test was carried out in order to evaluate the constituents which can be leached from the slag and to determine if these constituents meet the specific reference values. The preliminary estimation of the acid draining of the slag was performed using the modified static ABA test by acid-base analysis.

The possibility of using granulated slag as a construction material for embankments, road foundations, or sub-base and base layers was assessed by determining its chemical and physical-mechanical characteristics (granulometric analysis, compaction characteristics, California bearing ratio, permeability) and geotechnical (direct unconsolidated, undrained shearing strength) so as to enable the comparison of slag with natural sand.

The oxide chemical composition of the granulated slag was determined by x-ray fluorescent spectrometry, using a wave-dispersive x-ray fluorescence spectrometer (WDXRF). The grain distribution obtained by sifting the slag was assessed in comparison with that of sand in order to classify the slag as a non-cohesive earth class, depending on the predominance of certain grain fractions, its non-uniformity and plasticity coefficients. The granulated slag's compaction characteristics were determined by normal and modified PROCTOR test, in order to assess the maximum dry density and volumic weight corresponding to the optimum dry and wet moisture content. The relative bearing capacity characteristics or the CBR index were determined by CBR testing. The permeability of the granulated slag was assessed by the variable gradient permeameter method. The shear strength was determined by unconsolidated undrained (UU) direct shear test.

In order to determine the possibilities of using granulated slag as secondary aggregates, the geometric and physical-mechanical characteristics of the slag were determined experimentally with a view to establishing the fields in which these slag could be used and to compare their characteristics with those of the sand.

I-O-11. OPPORTUNITIES FOR BIOGAS MARKET DEPLOYING IN ROMANIA - IMPORTANT ISSUES FOR ENVIRONMENTAL PROTECTION -

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The challenge to choose this domain, in the frame of EU Directives, National Action Plan and other provisions focused on renewable, out of each the biofuels play an important role, was fed knowing the huge biomass and waste potential existing in Romania.
The biogas can essentially contribute to growing up of renewable (20%) from total energy demand till 2020. Renewable include wind, solar, hydro-electric and tidal power and geothermal energy and biomass as well.
The work takes in account the state of the art regarding the existing technologies and points out the current spreading of such kind of plants over the world.
The available information on this topic was carefully collected and processed, in order to stress both the importance of the subject and the methods to implement on local areas such useful technologies.
Although in the past Romania owned hundred of biogas plants, which were dismantled, today there are just a few based on outside technology (especially from Germany) having medium and small capacities.
On the other hand, the existing Romanian technologies are waiting for turning in account, being competitive with others, as regard the efficiency and exploitation.
Today, in Europe the most applied concept for biogas plant is to produce biogas which goes directly to a cogeneration installation, producing electric and thermal energies. These sources are supplied to the existing grids, part

of thermal source (hot water) is turning for internal need (digestor heating)[1]
The solution have to be carefully applied, based on local specific conditions, since sometime the thermal energy did not find a feasible utilization due to supplementary cost of distribution. For each specific case an optimal solution can be found based on a feasibility study.
The Romanian technologies, which can compete the market, having big advantages including reduced investment costs, simplicity of operation, easy maintenance and versatility of the materials to be processed into digestor [2].
The work presents the current and future possible situation in Romania, where the existing raw materials and wastes can contribute on a real success for energy saving parallel with environmental protection.

Keywords: Biomass, field and domestic wastes, manure, biogas systems, economics

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I-O-12. NEW IDEAS FOR OLD NECESSITIES

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In common with many countries Romania has a legacy of land contamination caused by industrial development and related practices. Much land contamination has been present for long periods of time. Contaminated land can cause harm to human health, water supplies, natural habitats and property, but not all contamination poses problems.

Contaminated land is different from brownfield. Brownfield sites are land or premises that have previously been used or developed. They may also be vacant, or derelict. However, they are not necessarily contaminated.

What is contaminated land? Contaminated land is land that has been polluted with harmful substances to the point where it now poses a risk to human health and/or the environment. Contamination can be on the surface or below it.

What causes contamination? Most contamination is caused by industrial and waste management. Accidents and industrial practices – many of which were considered normal at the time - released potentially harmful substances into the land, aquifers (underground water stores) and rivers.

Oil refineries, railways, steel works, landfill sites, petrol stations, gas works and accidental industrial spills may have all been sources of contamination in the past. Contamination can also come from historical activities dating back hundreds of years, such as spoil heaps from some Roman lead mines. Some contamination can also come from naturally occurring substances, such radon and naturally high levels of arsenic.

If contaminated land or groundwater is likely to pose a significant risk on a site then clean up (or remediation) is the final stage in managing contamination. During the past fifteen years a number of techniques for both containing and remediating contaminated sites have been developed.

Site clean-up should always address specific risks that have been identified. Our approach for contaminated land is that sometimes so much of the area has been developed on previously that it would be prohibitively expensive to clean up every site to the same condition as it originally was. Instead, our approach is to require sites to be cleaned up to a standard that is suitable for its current and/or intended use.

Clean-up is normally only required during redevelopment. The exception to this is if a site represents a 'significant risk of significant harm' to a defined end user – such as people or protected nature reserves.

In the past, the most usual technique for ground remediation was to dig out the contamination, send this to landfill and then back fill the space with clean material. This approach is still quite common, but new clean up techniques are becoming much more common place.

For groundwater treatment, traditional techniques include pumping the groundwater to the surface, treating this, and then re-injecting the water

back into the ground. New ground and groundwater techniques are becoming more common as the sustainability debate advances.

Developing new standards for sustainable site clean-up is one of the key areas for the industry today. In particular formerly favoured remediation approaches historically used huge volumes of virgin materials and – particularly for oil removal from groundwater – can use far more fuel than the oil they actually recover.

I-O-13. DEVELOPMENTS IN SUSTAINED RELEASE OXIDANTS: MODELING AND CASE STUDIES

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1,4-Dioxane (dioxane) is increasingly recognized as a challenging and emerging contaminant at sites where trichloroethene (TCE) and 1,1,1-trichlorethane (TCA) releases to soil and groundwater have occurred. Dioxane is a cyclic ether used as a degreasing agent and solvent stabilizer. In 1985, 90% of all US dioxane production was used to stabilize the solvent TCA. Once released into groundwater dioxane migration occurs more rapidly compared to volatile organic contaminants (VOCs) due to its miscibility, low affinity for sorption to soil organic matter, and resistance to biodegradation and abiotic breakdown (Mohr et al. 2010). Due to these factors, dioxane plumes occupy a substantially larger footprint than VOC plumes. For example Walsom and Tunicliffe (2002) report dioxane plumes that are twice the lengths of associated solvent plumes and affect an area up to six times greater. Similarly to VOCs a significant mass of dioxane may reside in fine-grained deposits, slowly diffusing back into the aquifer resulting in the formation of large and dilute plumes (Payne et al. 2008). In 2010, US EPA published a final toxicity review for dioxane recommending a steeper cancer slope factor that resulted in lowering of the California and Massachusetts advisory drinking water thresholds (USEPA 2010).

Dioxane is not easily remediated. *Ex situ* advanced oxidation processes (AOPs) are the most widely developed approach for dioxane

treatment (USEPA 2006). Because of high O&M costs, *in situ* approaches are required. Natural attenuation of dioxane is being evaluated at a number of sites and while evidence of dioxane oxidizing bacteria exists, site data show rates are insufficient to contain the plume (Mora et al. 2011). Cometabolism via propane sparging is a promising approach – but may result in high O&M costs and safety issues for continued treatment of large dilute plumes. Traditional ISCO is also not a solution to large dilute plumes because the reactants are short-lived (Siegrist et al. 2011). Slow-release oxidants have been used successfully to treat chlorinated solvents in reactive barrier and zone configurations with both permanganate and persulfate in laboratory and field efforts (Dugan et al., 2013; Christenson et al., 2012; Kambhu et al., 2012).

A sustainable, simple, and low O&M approach has been developed using innovative oxidation chemistries in concert with innovative slow-release deployment strategies to achieve cost-effective treatment of large and dilute dioxane plumes with oxidants in the form of sustained-release permanganate and sustained-release unactivated persulfate. Paraffin wax is used as the environmentally benign and biodegradable matrix material for encapsulating solid potassium permanganate ($KMnO_4$) or sodium persulfate ($Na_2S_2O_8$) particles. The paraffin wax protects the particles from instant dissolution and potentially undesirable nonproductive reactions and is also nontoxic and biodegradable. The oxidant is released from the wax matrix over time through the processes of dissolution and diffusion. Sustained-release (SR) oxidants contain between 70%-80% permanganate or unactivated persulfate and formed as cylinders for direct push applications, inserted into holders for emplacement in permanent or temporary wells. The material may also be chipped/cubed for hydro-fracturing into low permeability media or fractured bedrock for treating back diffusion of organic contaminants. Experimental results from 2-D tank experiments will be presented as well as the results from pilot-scale field efforts. The experimental results are being used to develop a user friendly SR design tool that provides information on the predicted longevity of the SR barrier, appropriate SR candle spacing, as well as other important SR barrier design and implementation elements. In addition to the laboratory and field data, discussion will include a number of practical applications of the SR design tool.

I-O-14. ASSESSMENT ON THE PHYTOREMEDIATION OF CRUDE OIL POLLUTED SOILS, GROWTH PERFORMANCE OF *ACHILLEA MILLEFOLIUM* AND TPH REMOVAL EFFICIENCY

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The study presents experimental data on phytostabilization / phytoremediation of 5.57% total petroleum hydrocarbons (TPH) contaminated soils, using plants of the species *Achillea millefolium*. Studies have been conducted on pots placed in outdoors, in three experimental variants, in the absence / presence of an additional treatment: 1. contaminated soil; 2. contaminated soil treated with fertilizer agent, stabilized municipal sludge; 3. contaminated soil treated with fertilizer and amendment based on indigenous volcanic tuff with clinoptilolite. After four months of growth the plant roots have formed a strong twinned network throughout the vegetation soils of pots volume. The reduction of the content of the total petroleum products in the contaminated soil was 45.4% and 65.4% for the variant of contaminated soil treated with fertilizer agents, anaerobically stabilized sludge from the municipal treatment plant in the absence / presence of the amendment with indigenous volcanic tuff, respectively.

Keywords: total petroleum hydrocarbons, phytostabilization / phytoremediation, stabilized municipal sludge, volcanic tuff, *Achillea millefolium*.

I-O-15. PREDETERMINATION OF AMENDMENTS FOR THE ENHANCED PHYTOREMEDIATION OF FLY ASH DUMPS

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The phytostabilization of the slag and fly ash dumps was studied in an experimental block consisting of variants fertilized with different organic fertilizing agents, conditioned municipal sludge or biological sludge resulting from a slaughterhouse in the absence / presence of an organic stimulus. The organic stimulus was used during the sowing stage and subsequently through regular foliar applications on the grown crop. The organic stimulus Biocomplex 900 is based on a marine brown algae extract and comes from EKOGEA. The degree and rate of the germination of the seeds of *Lolium perenne* was studied, at the same time with the coverage of areas sown during different phenophases of plant development and the amount of biomass harvested. The slaughterhouse sludge used in an amount of 0.5 kg/square meter with the addition of the organic stimulus Biocomplex 900 determined the rapid vegetation of the polluted, fertilized topsoil of slag and fly ash matter, along with green biomass harvests 2-3 times higher than in other experimental variants.

Keywords: slag and fly ash dumps, organic fertilizers, algae extract, *Lolium perenne*

I-O-16. TCE OXIDATION EFFICIENCY BY POTASSIUM PERMANGANATE FOR CONTAMINATED SOIL REMEDIATION

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This paper presents trichloroethylene (TCE) removal efficiencies from soil-polluted matrix based on batch oxidation experiments with potassium

permanganate, at laboratory scale. The influence of $KMnO_4$ dose and the reaction time on TCE degradation were evaluated, taking into account: chloride ions generated and residual TCE in aqueous phase. The soil sample was CAH-free topsoil having the following main characteristics: pH = 7.5, humus 3.3% d.w., 2 g TCE/ kg d.w. (addition of TCE analytical reagent), 58 mg Cl^-/kg d.w., 55 g Fe/kg d.w., 29 mg Pb/kg d.w.
Batch tests were performed in slurry system (soil:distilled water weight ratio of 1:10), continuous stirring. Solid oxidant $KMnO_4$ was added in the range of 4.75 g/kg d.w. (stoichiometric amount) – 220 g/ kg d.w. and reaction times were two hours, 2 days and 4 days each of them corresponding to at least two different oxidant doses.
Potassium permanganate reacts with both soil organic matrix and TCE. Trichloroethylene oxidation efficiency depends on the oxidant dose and oxidation/solubilization of soil organic matrix. The conversion of organic chlorine from TCE to ionic form increased with oxidant dose. Over 60 g $KMnO_4$/kg d.w. soil is need to obtain TCE degradation efficiency higher than 90%. At the same time, the organic load (COD, TOC) in aqueous phase increases due the solubilization of humic mater. MnO_2 generated in the oxidation-reduction processes remains in the soil bulk.

Keywords: soil, TCE, oxidation, potassium permanganate, chlorides

I-O-17. IMPLEMENTING REMEDIAL TECHNIQUES AGAINST RADON IN DWELLINGS IN THE URANIUM AREA BAITA-STEI

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Radon is the second leading cause after smoking related lung cancer occurrence. IRART Project 2010 (European funds) have been selected 21 homes for the remediation of 2 complete integrated

measurements campaigns (in different seasons), from a batch of 303 homes (58% of all houses in localitatiile, Cimpani, Baita Fanate and Nucet). Based on these integrated measurements were identiffied, in a first stage, 40 locations with radon values between 2500 and 6000 Bqm^{-3}. From these homes that have fulfilled the main selection criterion (values of indoor radon concentrations higher than 800 Bqm^{-3}) as a result of discussions with residents have selected 20 houses and also a pilot house for effective remediation.

Remediation techniques for each house have been chosen based on the experimentation of various remedial methods on the pilot house (pressurization, depressurization, eolian fan, antiradon membranes, insulation) and after some screening measurements of radon sources for each location. Effective remedies was estimated on the basis of corrective coefficient (R) both through continuous measurements and through integrated measurements

$$\mathbf{R = (C_i – C_f)/C_i x100}$$

where Ci and Cf are the concentrations before and after remediation

Summarize the final results after all the interventions made during the project June 2010-June 2013, including those conducted during the audit and after it (13th May-14 June, 2013) look like that the results are good and very good, ranging from house to house and from room to room and covering the interval of 65.2 – 95.1%, respectively 50.4-95.1%, with a mean value of 80,9%. The results are compared with those obtained in the framework of the European project RADPAR (Radon Prevention and Remediation) which was funded by the European Community in the period 2009-2012 with the participation of 14 countries and can be found that our results are the same as or better than the most efficient application techniques of RADPAR Program

The concentration of radon in those 21 homes was reduced from the average of 992 Bqm^{-3} at an average of 160 Bqm^{-3} and that impact on the health of population living in these houses means a reduction of almost half of the cases of lung cancer, estimated on the basis of the model TF-TR used in estimating the risk of exposure to radon [1].

[1]. Work presented at: 7th Conference on Protection against Radon at Home and Work, 2th – 6th September, Prague, 2013

I-O-18. KNOWLEDGE BASED SUSTAINABLE DEVELOPMENT STRATEGY OF SUCEAVA COUNTY

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The instruments meant to implement the 2020 EU Strategy must be better structured compared with those used for the implementation of Lisbon Strategy. The sustainable development strategies implemented at local, regional level must be continuously updated in order to respond to the real needs of local communities. The present paper presents the results obtained within a pilot project carried in 2012 in the Suceava County, Romania, which tried to rebuild the local sustainable development strategy based on the capabilities and expertise of local specialists. The strategy was modeled using the Balanced Scorecard tool and for the first time a strategic map was created for the pilot region.

Keywords: sustainable development, knowledge management, Balanced Scorecard, strategy

I-O-19. TESTING RADON MITIGATION TECHNIQUES AGAINST RADON IN A PILOT HOUSE

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The work presents testing of some radon mitigation techniques in a pilot house in Baita-Stei radon prone area, located near an old uranium mine (NW part of Romania). The applied radon mitigation techniques are based on the depressurization and pressurization of the building sub-soil, on the effect of the combination of an eolian and an electric fan coupled to depressurization system, applying a radon barrier membrane and testing the combination of the radon membrane with soil depressurization system. Finally, are studied and tested an automated system of monitoring and control indoor radon concentrations.

Keywords: indoor radon, radon mitigation, radon-prone area

- POSTERS -

I-P-1. THE PHYSICO-CHEMICAL STUDY OF NEWLY OBTAINED PRODUCTS OF TANNIN ORIGIN

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Grape seeds are a valuable source for obtaining enotannins, natural compounds with phenolic structures that possess remarkable antioxidant properties.

In order to improve the physical-chemical properties of these compounds, by oxidation-reduction processes, their solubility's were changed and were obtained new compounds with pronounced antioxidant, antibacterial and antifungal properties, which can be successfully used in important fields such as medicine, cosmetic and agriculture [1,2].

To broaden the spectrum of physical-chemical and pharmacological analysis of compounds in this class, Italian enotannins were selected as raw material for research, from white grape seeds (Tannin 1) and red grapes (Tannin 2), that were subjected to physical-chemical properties modification. New compounds, Tanoxil 1 and Tanoxil 2 were obtained by depolymerization reactions of macromolecular structures of initial enotannins Tannin 1 and respectively Tannin 2. [3]

The total number of acidic functional groups (carboxylic and phenolic), C_{total}, by acid-base titration were determined, according to Temporary Pharmacopoeia Monograph for the pharmaceutically active

substance Enoxil, adjusted to optimal parameters for measurements in aqueous 5% solutions. C_{total} values determined for Tanoxil products certify a double increase for Tanoxil 1 (C_{total} 0.1565 meq/g) or even triple increase for Tanoxil 2 (C_{total} 0.1901 meq/g) of the value of this parameter, compared to the total content of acidic functional groups of the initial tannin products Tannin 1 (C_{total} 0.0726meq/g) and respectively (C_{total} 0.0662 meq/g) for a 5% solution Tannin 2.The influence of storage time of 5% aqueous solutions of Tanoxil 1 and 2 on C_{total} parameter were studied. The obtained results allowed us to conclude that the total acidic functional groups (carboxylic and phenolic) remains practically unchanged during the studied period of 30 days.

For the determination of antioxidant activities (AAT%) of the investigated compounds, it has been used ABTS radical cation decolorization assay. The obtained data indicate that the antioxidant activity of the new products, as it refers to Tanoxil 1 and 2, is very similar and, at the same time, is very high (93.16% -95.58%).

These new compounds of natural origin have strong antioxidant activities and are of great interest for future microbiological and pharmacological research, as they have high antioxidant activities (about AAT% = 95) and a considerable content of acidic groups (C_{total}/g = 0,1901 meq/g).

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I-P-2. USE OF MINERAL AND LOCAL ACTIVATED CARBON ADSORBENTS FOR WATER PURIFICATION FROM SYNTHETIC DYES

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Adsorption processes occupy a special place in a variety of technologies for purifying waters of biologically harmful non-degradable components [1]. In the Republic of Moldova there are significant deposits of mineral adsorbents, such as diatomite, tripoli and clay minerals [2], while fruit processing enterprises can provide sufficient raw materials (as fruit stones, nut shells, grape seeds) for obtaining active carbons [3].

As a support for adsorbents adsorption, there were selected the local Vascauti and Ghidirim diatomites as well as activated carbons CAS-23 and CAN-8, prepared from peach pits and nut shells in the Institute of Chemistry. As the objects of this research were selected synthetic colorants - red congo and direct blue, e.g. compounds with the same structural skeleton, but different functional groups, that exhibit a different chemical behavior.

It has been established that the adsorption of direct blue dye on the Ghidirim diatomite is about 2-3 times lower than that of the congo red dye. This phenomenon is explained by a larger number of $-SO_3Na$ groups in the direct blue dye structure, which causes a higher total negative charge resulting from its dissociation, leading to their rejection by the negative electric adsorbent particles and minimizing this way the adsorption value. The dye adsorption on mineral adsorbents is, therefore, a complex phenomenon, comprising the immobilization in the pores and electrostatic interactions. In the case of carbon adsorbents the important factor for immobilization of dye molecules is the mesoporous adsorbent volume value, the pollutant adsorption being almost directly proportional to the mentioned structure parameter. The analysis of obtained data from

adsorption isotherms of congo red and direct blue dyes on the same type of active carbon shows a pretty large difference in the dye adsorption values, in spite of the fact that both dyes have the same structural skeleton. Perhaps, in this case the steric factor occurs, e.g. the size of molecules and their varying degree of hydration, due to the number and nature of different functional groups (SO_3H, OH, NH_2) of colorants that capture the H_2O molecules. It is also possible the influence of electric charges, arising from dissociation of both functional groups of colorants and those on the carbon surface (OH, COOH), similar to the case of mineral sorbents.

The obtained experimental data allow us to conclude that: a) the local adsorbents, both the mineral and especially the carbon ones, exhibit very good adsorption properties compared to the synthetic dyes and can be used for purification of waste waters of textile enterprises, b) studied adsorption of dyes depends largely on the origin of adsorbents, their structural features and the nature of functional groups.

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I-P-3. SYNTHESIS OF MAGNETITE NANOPARTICLES USED FOR SELECTIVE HEAVY METALS REMOVAL FROM INDUSTRIAL WASTEWATER

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Magnetite (Fe_3O_4) nanoparticles have attracted increasing research interest in the fields of catalysis and environmental recovery in recent years. This is because magnetite nanoparticles possess not only strong adsorption/reduction properties, but also they are easily separated and collected by an external magnetic field. The good adsorption activities of magnetite nanoparticles for many heavy metal ions have been reported in several articles.

This paper is based on obtaining nanosized magnetite by treating mill scale. Magnetite (Fe_3O_4) nanoparticles with mean diameter of about 7 and 13 nm were prepared by a partial reduction coprecipitation method and, respectively, a modified Massart method. They are generally composed of very small particles with high surface area. This is typically because nanoparticles have a greater surface area per weight than larger particles; this causes them to be more reactive to certain molecules.

We studied the adsorption capacity of the these nanoparticles of magnetite and other compounds such as Polyethylene glycol (PEG) and Polyvinylpyrrolidone (PVP) covered with magnetite, for different kinds of waste water (synthetics) with different concentrations of metal ions (Pb and Cd) at different time periods.

We performed a complex characterization of adsorbent from morphological, composition, structure and quality terms (electron microscopy, EDS, XRD, XRF), and the waters were chemically analyzed before and after treatment.

From the study results it may be concluded that magnetite nanoparticles are a very effective sorbent for removal of Cd and Pb from aqueous solution.

I-P-4. WASTEWATER PURIFICATION CONTAINING METAL IONS AND ORGANIC COMPOUNDS USING ACTIVATED CARBON

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This paper presents experimental results on the purification of waste water containing metal ions (lead and zinc) and organic substances (benzene and toluene) using activated carbon as adsorbent material in the form of powder, granules and silver impregnated granules.

We studied the adsorption capacity of the three types of materials, for six kinds of waste water (synthetics) with different concentrations of metal ions (10 mg / L Pb and 5 mg / L Zn) and organic compounds (2.5 mL C_6H_6 and 2.5 ml $C_6H_5CH_3$), at low values of pH (acidic solution of pH = 2-3).

We performed a complex characterization of adsorbent (activated carbons) from morphological, composition, structure and quality terms (electron microscopy, EDS, XRD, XRF), and the waters were chemically analyzed before and after treatment (AAS, CCO-Mn).

Experiments have proved the efficiency and performance of the activated carbon in the adsorption of metal ions and organic compounds from waste water, resulting in retention reaction yields of over 70% for metal ions in the presence of organic compounds, approximately 80% for metal ions in the absence of organic compounds and about 95% for organic compounds in the absence of metal ions.

I-P-5. RESEARCH AND DEVELOPMENT OF THE PILOT-SCALE PHOTOCHEMICAL H_2O_2/UVC SYSTEM AS THE *EX-SITU* DECONTAMINATION CELL FOR HEAVILY POLLUTED WATERS (CONTAMINATION WITH ORGANIC SUBSTANCES)

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Much effort has been spent to the research, development and optimisation of advanced oxidation processes. They mostly involve photocatalytic oxidation with titanium dioxide and many modifications of this process, methods with hydrogen peroxide, use of the Fenton agent (Fe^{2+}/H_2O_2), or photoFenton agent (Fe^{2+}/H_2O_2/UV), or very recently efficient applications of peroxodisulfates ($Na_2S_2O_7$) or even ferrates.

The presented contribution focuses on the complex study of the pilot-scale photochemical H_2O_2/UVC system arranged as the *ex-situ* decontamination cell for heavily polluted waters (contamination with organic substances. The method principle comprises the rational decomposition of hydrogen peroxide induced by UV-C (254 nm). The produced OH radicals are very efficient oxidation species enabling the direct destruction of wide spectrum of organic compounds.

The corresponding tests were performed with three reactors of different scales (1 L, 21 L, 42 L), however, following the same design and construction details. These reactors are essential parts of the *ex-situ* decontamination cell supposed for the effective treatment of subsurface waters and technology waste waters. The purified water is repeatedly circulated inside the system to achieve the required particular concentration limits.

First attention is paid to the technology part. Details on the reactor construction, process optimisation and model reactions (oxidations of 4-chlorophenol) are carefully discussed. The mode of hydrogen peroxide

dosing (continuous or discontinuous) and the overall dosed amount of hydrogen peroxide were identified as the key process parameters. Also the intensity of the UV-C, concentration of contaminants, flow rates and the systems retention time are principally important process parameters.

The initial concentration of 4-chlorophenol was 0.5 mmol/l. It was reduced below the detection limit, in about three hours and no side products were identified. These tests were mostly performed with the smallest type of the reactors. The next two units were then used for treating real contaminated waters from three different locations with three completely different types of contaminations. The most efficient was the developed technology in the destruction of aliphatic chlorinated hydrocarbons. The initial concentration of 6 mg/l was reduced below the detection limit in about 25 min of the process. The experiments were also quite effective with the BTEX contaminated waters, with nitrobenzene and aniline waters, and even with waters containing complicated PAHs.

This contribution also brings details on the economy feasibility of the designed processes in comparison with traditional approaches.

Keywords: Photochemical oxidation, H_2O_2, UVC radiation, remediation, contaminated water, decontamination cell, pilot scale

I-P-6. APPLICATION OF TiO_2 - BASED PHOTOCATALYSTS FOR XENOBIOTICS DEGRADATION FROM WATER: NITROBENZENE CASE STUDY

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Nitrobenzene (NB) is the most common nitroaromatic pollutant found in wastewater and even in natural waters. Its presence is being related to the discharge of not properly treated industrial effluents resulted from pesticides, explosives and dyes industries. Due to its bio-refractory

character and high chemical stability NB is not efficiently removed from wastewater by classical biological and physical-chemical processes. One promising treatment methodes is the use of in-situ generated high oxidized species, like hydroxyl radicals, by different advanced oxidation processes (AOPs). Among these, TiO_2 photocatalysis is of great interest because it is a high effective destructive degradation technique and the catalyst is non-toxic, readily available and relatively no expensive. Some limitations of photocalalytic activity are charges recombination, the band edge absorption threshold less than 400nm and the low photon utilization efficiency. These disadvantages can be supressed by doping of TiO_2 with heavy metals.
The photocatalytic degradation of NB under UV irradiation (λ>320nm) in pristine TiO_2 and heavy metal doped TiO_2 aerated slurry solution. The catalysts were obtained by sol-gel method. Various experimental conditions like metal dopant nature (Ni, Co, Fe), their concentration (0.5-5% wt of TiO_2) and catalyst calcination temperature (300-500^{0}C) influence on pollutant degradation have been studied. The photocatalytic experiments were performed on solution with $2.2x10^{-4}$ M NB initial content, using 100 mg/L catalyst dose, at irradiation time between 30-240 min. The kinetics of NB degradation and organic nitrogen mineralization was assessed and pseudo-first-order rate constants were calculated. Obtained results revealed improved NB degradation efficiency in the presence 0.5%Fe-TiO_2 calcinated at 400^{0}C. In these experimental conditions the pollutant degradation rate constant value is $k_{NB} = 2.54x10^{-4}s^{-1}$ and the NB turnover efficiency is higher than 97% for 240 min irradiation time. It was also demonstrated that depending on the nature of the dopant, its concentration increasing has different effects on pollutant degradation rate constant. In the case of iron, higher pollutant degradation rate was obtined for the lowest dopant concentration tested, unlike the cobalt and nickel for which concentrations increasing in a certain domain provide improved NB degradation. Obtined results emphasise that proper selection of dopant nature and its concentration assures charges recombination delay improving catalyst photoactivity and thus pollutant dergadation.

Keywords: photocatalysis, doped TiO_2 catalyst, heavy metals, nitrobenzene degradation

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I-P-7. CONSIDERATION ON MANGANESE REMOVAL FROM GROUNDWATER BY CHEMICAL OXIDATION USING CHLORINE BASED COMPOUNDS

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Manganese can be found in natural water (underground and surface waters) both in its reduced, soluble form, Mn(II) and in the oxidated form, MnO_2 (pyrolusite), respectively, Mn(II) being identified especially in groundwater.

Typically, Mn concentrations from natural origin in groundwater are lower, but can range up to 1500 µg/l or higher (Mn = 70-1500 µg/l, CMA_{Mn} = 50 µg/l).

The high concentration in groundwater for potable use poses several technical and health problems, such as oxide precipitation in pipe network, water discoloration, turbidity, bio fouling, corrosion, metallic taste, odor and manganism (a Parkinson's like disease), only for concentrations over 500 µg/l.

Oxidation and precipitation are the most common methods to remove Mn(II). Application of chlorine based compounds (Cl_2, NaClO, ClO_2) to waters containing uncomplexed manganese results in oxidation of metallic ions and MnO_2 precipitation.

The objectives of this study are as follows:

- evaluation of the main parameters which influence the manganese (II) oxidation level (pH, oxidant dose, reaction time);
- influence of associated pollutants upon the manganese (II) oxidation process.

The following case studies are presented:

- manganese alone;

- manganese associated with iron;
- manganese associated with ammonium ion and organic load.

Keywords: groundwater, treatment, manganese, iron, ammonium ions, organic load

I-P-8. EVALUATION OF MUNICIPAL SLUDGE THICKENING BY CENTRIFUGATION – A CASE STUDY–

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When operating, a wastewater treatment plant generates waste as a result of primary settling process and residual sludge produced during the biological treatment process. When combined, both wastes form sludge that, in most cases, is treated anaerobically with biogas generation and energy recovery. However, further treatment, disposal strategy of sludge and associated costs are strongly dependent on the efficiency of thickening method used. Basically, thickening is applied to reduce the volume of municipal sludge, thus increasing the dry matter content (up to 9%) and organic load of the anaerobic fermentation bioreactor leading to lower reactor volume, lower energy requirements and increased biogas production.

The paper presents a case study for sludge thickening by centrifugation at a Romanian municipal WWTP – process parameters selection, efficiency improvement and polyelectrolyte consumption assessment. In order to choose the optimal parameters in terms of efficiency and costs, 11 sets of experiments were performed on primary sludge, secondary sludge and mixed sludge using different polyelectrolyte doses, several centrifugation speeds and times.

Keywords: municipal sludge, thickening, centrifugation.

I-P-9. RESEARCH ON GABBROS FROM CAZANESTI- CIUNGANI, ROMANIA, IN ORDER TO IDENTIFY NEW RECOVERY DIRECTIONS

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Gabbros are mafic igneous rocks (45 - 52% SiO2), plutonic type. These rocks have been formed at great depths with slight variations of temperature and pressure. The degree of crystallinity (holocrystalline rocks - complete crystallized mass), the absolute crystals size (phaneritic rocks - crystals larger than 2 mm), varied mineralization and useful elements led to a high economic interest on the gabbros exploitation.

Usually, gabbros are investigated mainly in order to exploit iron, titanium, vanadium, and its use in architectural constructions, ornamental rocks and monuments. However, through extensive research it was observed that gabbros often contain significant amounts of chromium, nickel, copper, cobalt, gold, silver and platinum. Thus, increasing of scientific and technological performance have led to the concern of developing new methods for these elements recovery.

This study analyzes the gabbro of Cazanesti - Ciungani, Romania, which are in fact a layered magmatic complex in which one can distinguish the horizon consists of gabbro with vanadiferous titanomagnetite and gabbro with olivine or pyroxene. Considering preliminary results, which show remarkable values for titanium and vanadium, we considered relevant to examine in detail the Cazanesti -Ciungani mineralization (host rock and ore).

This paper presents the results obtained from chemical analyzes (FAAS, ICP, DCP) and mineralogical analysis (optical microscopy in transmitted and reflected light and DRX), which provides key information for estimating profitability and establishing the parameters of recovery technologies in order to identify new recovery directions.

I-P-10. RESEARCHERS REGARDING THE EFFECT OF DRY GRINDING AND THERMAL DEHYDROXYLATION ON SERPENTINITE DUBOVA-MEHEDINȚI, ROMANIA

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Industrial wastes stored after past mining exploitations are posing important environmental issues, especially when they are situated in the vicinity of protected areas, as in case of "Porțile de Fier" National Park Reservation from Romania. The high content of useful components with an economical value from Dubova-Mehedinți dump offers the opportunity of processing in order of revaluation.

The crystalline structure alteration of serpentinite from Dubova-Mehedinți dump caused by advanced grinding and followed by different thermal treatments in order of processing it by an efficient technology was investigated through X-ray powder diffraction (XRPD), optical microscopy in transmitted and reflected light, grain size distribution and composition chemical analysis (ICP, DCP, AAS).

By XRPD methods were investigated structural modifications that occur after grinding and thermal treatment. With the increase of grinding time and thermal treatment temperature, XRPD showed the modification of the structure.

The preferred transformation of serpentine's structure with the grinding time and under thermal treatment influence led to the increase of Si/Mg ratio in the analysed particles. Grain size distribution of the treated material revealed that if initially in the grinned material a decrease of particle size occurs, with the increase of grinding time at over 40 minutes, than the grinding will be followed by ultrafine particle agglomeration, the phenomenon emphasizing with grinding time prolongation.

I-P-11. CHARACTERIZATION OF SERPENTINITE DUMPED FROM DUBOVA- MEHEDINTI REGARDING COMPLETE RECOVERY THROUGH SUSTAINABLE ENVIRONMENTAL TECHNOLOGY

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Recent use of serpentine minerals in the storage and fixation of the carbon dioxide in the form of stable compounds of magnesium carbonate, in order to reduce CO_2 pollution levels of the atmosphere, attracted the experts attention on the silica gel resulted as a residue from serpentinite rocks attacked with mineral acids. The literature shows as a possible application of the silica gel in the form of membranes, to be used as adsorbent materials. Thus, the use of serpentine minerals for that purpose represents a novelty. The data published so far have led to the identification of minimum two processes for obtaining silica from serpentinite rocks. The methods consist of solubilization of the different components of the serpentinite rocks with different mineral acids, when it can be obtained either silica gel or an amorphous and porous silica.

The main parameters that influence the characteristics and performance of the final product- silica, depend on several factors: composition, structure, grinding degree and the purity of the raw material-serpentinite rock.

Due to the economic potential given by sustainable recovery of serpentine minerals dumped, from Dubova-Mehedinti area located near a protected area- "Portile de Fier" National Park, it was initiated a complex analytical study (optical microscopy, XRD, chemical analysis- FAAS, ICP, DCP) in order to evaluate useful mineralogical components for their separation and extraction.

The paper presents the results obtained on informative samples carefully selected. The results showed that studied serpentine samples are composed of about 95% of all serpentine group species, including the following major compounds: SiO_2, MgO, Fe_2O_3, Al_2O_3, LOI. In proportion of

over 75%, as major phases, antigorite and lizardite were identified. These are stacked lamellar minerals in serpentine group. Chrysotile, chlorite and talc appear as isolated phases. All these data are positive indicators regarding the possibility to use the serpentine minerals to obtain inorganic structures of porous silica.

I-P-12. ACRYLIC AQUEOUS DISPERSION FOR FINISHING OF NATURAL LEATHER WITH THE FILM

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Leather finishing aims at embellishing, colouring, imparting lustre and a nice feel, covering surface defects, forming a surface layer to protect the leather during wear and being in line with fashion trends.
Natural leathers are finished by coating with aqueous dispersions consisting of 2-3 polymers, pigments, waxes, metal complex dyes, fillers, penetration agents etc., for basecoat, then applying nitrocellulose, acrylic or polyurethane emulsions for final dressing (fixing). The physico-mechanical properties of leather finishing layer (wet and dry friction, flexural strength) depend on the type of polymer used in the composition of finishing disperse systems.
Acrylic and polyurethane polymers are most commonly used in the composition of disperse systems of natural leather finishing.
Acrylic polymers are used in all stages of finishing, from impregnation to the top coat, and generally provide a film with good flexibility, adhesion, and light resistance.
In the experiments performed new materials were tested for the finishing of natural leather, acrylic polymers for the basecoat and for the top coat in order to replace the final nitrocellulose dressings with dressings based on acrylic aqueous dispersions, without toxic solvents.

Experiments performed aimed at the following aspects:

- the physico-chemical, spectral (IR, at temperatures of 27°C, 50°C and 70°C) and optical (SEM, at temperatures of 25°C and 100°C)

characterization of new Romanian products based on acrylic copolymers in aqueous dispersion:

- A finishing aqueous dispersion based on acrylic copolymers self-crosslinking with a monomer composition containing butyl acrylate, methyl methylacrylate, acrylic acid, N-methylolacrylamide, to varying degrees; the acrylic binder provides film-forming for leather finishing and gives aesthetic and functional properties to finished semi-processed leather products (Medacril EFP33, marked AC-33);
- binder based on acrylic copolymer with the addition of epoxy resin, diluted in water, used as a fixing agent (final dressing) for finishes applied to natural leather, replacing fixation with nitrocellulose emulsions, and providing increased wet and dry abrasion resistance to finishes.

- development of dry finishing technologies for natural leather using these aqueous acrylic dispersions and imported acrylic polymers as control (Vecosol Binder AC 310 and Vecosol Binder AC 408, VECO company, Italy, marked AC-310 and AC-408);

The physico-mechanical properties of finished leather using these new acrylic dispersions have values falling within standards in force (STAS 1619/1994) and values of 200,000 flexions for repeated flexural strength, values of 4/2-5/3 for resistance to wet friction (standard min. 4/2) and values of 5/3-5/4 for resistance to dry friction (standard min. 5/3).

Dressings made using the studied acrylic binders can be applied to natural grain leathers by spraying or by roll coating and have the advantage that acrylic dressings are free of toxic solvents.

I-P-13. THE RHEOLOGICAL BEHAVIOUR OF WAX EMULSIONS USED IN NATURAL LEATHER FINISHING

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The main characteristics required for leather are: color, brightness, matting, feel, repeated flexural strength, appearance, softness, embossing,

water resistance, water vapor permeability, resistance to light etc. Feel agents (wax emulsions, oils) are used to change the feel of the finish (which can be oily, waxed or silky) and to improve the physical properties of finished leather.

Waxes are used in natural leather finishing to reduce stickiness of thermoplastic binders and get the desired feel or color darkening effects (for fashionable waxed leather assortments). Waxes are esters of superior monocarboxylic acids with superior primary monohydric alcohols.

76/769/EL/2003 Directive banned the use of nonylphenol in industrial products due to its ecotoxicity assessment. Nonylphenol biodegradability is very low, 30% compared with other non-ionic surfactants. An alternative for the replacement of ethoxylated nonylphenol is that of ethoxylated fatty alcohols which are 100% biodegradable.

This paper deals with testing wax emulsions obtained from beeswax, lanolin, stearin, paraffin oil and 100% biodegradable anionic emulsifier. The obtained waxes are easily emulsifiable in the wax in water system using nonionic emulsifier. Wax emulsions have a good stability.

The obtained wax emulsions were tested to determine the physico-chemical and rheological characteristics. The rheological characteristics of emulsions influence stability to storage and their application properties. The values of physico-chemical properties of obtained wax emulsions are comparable with those of an imported product tested as control. The rheological behavior of obtained wax emulsions was studied at different temperatures and it was found that there are linear decreases in kinematic viscosities with the increase of temperature in the studied range.

Experiments were conducted to develop dry finishing technologies for natural leather using these wax emulsions in the final dressing. The prepared wax emulsions were used in the composition of the final dressing and were tested in different proportions to improve final feel and water resistance of leather finishing films.

As a result of the experiments it was found that these materials are uniformly coated on the leather, they provide special effects (waxed, silky) and enhance the appearance, feel, abrasion resistance and water resistance of film-coated finished leather.

SECTION II

ENVIRONMENTAL ASSESSMENT. MANAGEMENT SYSTEMS

- oral presentations

- ORAL PRESENTATIONS -

II-O-1. CONCEPTS REGARDING THE ENVIRONMENTAL INTEGRATED ASSESSMENT

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Environmental relationships with socio-economic activities has become a concern since the last decade of the last century and has evolved in complexity and shapes according to evolutionary laws and interest in environmental compliance requirements and demands.

This paper will review summarizes the scientific substantiation of mandatory regulatory provisions and procedures for obtaining permits and authorizations from the competent environmental institutions and the voluntary environmental certification ISO14001 and EMAS registration in the registry.

Keywords: assessment, environment, integrated system

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II-O-2. DEVELOPMENT OF PROFESSIONAL COMPETENCIES ASSESSMENT CENTER ECOIND

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European Parliament and Council by a recommendation, in April 2008, established the European Qualification Framework (EQF) which stipulates that the professional skills development and evaluation are done based on units of competence described in the professional training standards and the occupational standards.

INCD ECOIND participated as a partner in a POS DRU project at the development of infrastructure for assessment of professional competencies obtained by other means than the formal one, through the development and authorization of eight centers for assessment of environmental protection occupations. One of these, the Professional Competencies Assessment Centre ECOIND founded in institute was authorized for *Environmental Responsible* occupation.

This paper presents the technical documentation compiled for evaluation and authorization of the center: candidates' assessment tools and forms used in the candidates' assessment process.

Keywords: assessment center, units of competence, occupational standards, elements of competence, assessment tools.

II-O-3. ENVIRONMENTAL RISK MANAGEMENT BASED ON ROUGH SET THEORY USING EMAS RELEVANT RECOMMENDED INDICATORS

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The article presents the possibility to use Rough Set Theory (acronym RST) to manage environmental risk using EMAS III relevant recommended indicators. The general considerations about how to use the theory as a new instrument in order to take environmental decision in uncertainty conditions within organization EM system to increase organization management performance are presented.

Keywords: RST, EMASIII

II-O-4. SPATIAL AND TIME VARIATION INFLUENCE OF SOME HEAVY METAL ION SPECIES CONTENTS ON THE EVOLUTION OF ECOLOGICAL RISK

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Environmental authorities are more and more involved in planning of the evaluation strategies for the ecological risks implied by sediments

contamination. Nevertheless, the estimation of the long term effects of the sediments contamination is still difficult and implies a high degree of uncertainty. Sediments represent an important pollution source for the aquatic environment, because are the final accumulation medium for a multitude of organic or inorganic contaminants.

This paper presents the investigations carried out on the quality of surface water and sediments collected from Abrud hydrographic basin affected by long lasting activity extraction of minerals. Investigations carried out have as purpose to establish the water quality Abrud river upstream and downstream of the pollution sources including Foiesu river (right tributary of Abrud) and also the changes induced upon them along investigated time period.

It was also evaluated the partition of some metals (Cu, Cd) within all fractions defined by sequential extraction operations using the BCR (Community Bureau of Reference). Metal distribution in those fractions offers information on their bio-availability, which in turn allows aquatic environmental risk assessment.

It is found that the risks induced by the two analyzed metals are changing according to the conditions of surface water flow, sediment composition punctual and weather conditions.

It highlights for both heavy metals the positive evolution of environmental risk over time.

Keywords: sediment, ecological risk, sequential extraction, metals mobility

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II-O-5. THE CHARACTERIZATION OF PRIORITY HAZARDOUS SUBSTANCES DISTRIBUTION AT THE LEVEL OF ABIOTIC COMPARTMENTS (WATER/SEDIMENT) OF THE OLT RIVER BASIN, IN THE INDUSTRIAL PLATFORM AREA RAMNICU VALCEA

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This paper aims to evaluate pollution priority hazardous substances in the river Olt ecosystems induced by the industrial platform Ramnicu Valcea.
There is generally insignificant soil pollution caused organochlorine substances (1,2 Dichloroethane, Trichloroethylene, 1,2,4 trichlorobenzene ether β,β'diclordiizopropilic, perchlorethylene) and heavy metals (nickel, cadmium, copper, zinc, lead). There was a significant pollution with copper in the point S7, point was situated at approx. 50 m east of Monomer plant, vicinity pool DA 602 (wastewater treatment).
In general the water samples from the river Olt and the accumulation lakes on the river Olt not found pollution of a heavy metals, nickel, copper, cadmium, zinc and lead. The exception is the point P7 (Cremernari) in which nickel was within grade quality. For organochlorine substances analyzed in the three sections is observed that 1,2-dichloroethane, trichlorethylene and perchlorethylene took values that are within the limits imposed by the Order no. 161/2006, and 1,2,4 trichlorobenzene and ether β,β'diclordiizopropilic falls below the detection limit of the method.
In sediment samples collected from the Olt River and the accumulation lakes on the river Olt is found higher concentrations of nickel in the sections S1, S2, S3, S6, all sections situated upstream of the platform, copper in sections S3 and S6, cadmium in section S7 (Cremenari), lead in sections S1, S3, S6, S9, zinc in the sections S1 , S3, S6, S7, sections S1, S3, S6, situated upstream of the platform.

Also observe that in all sections, 1,2 dichloroethane, trichlorethylene, perchlorethylene, 1,2,4 trichlorobenzene and ether β,β 'diclordiizopropilic, taking values below the detection limit of the method.
From the results it is observed accumulation of metals (nickel, copper, zinc and lead) greater in the upstream industrial platform Ramnicu Valcea, downstream sections from which one can deduce that pollution sources could be Ramnicu industrial activities located in Valcea upper Olt.

Keywords: priority hazardous substances, pollution, water surface, sediment, soil

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II-O-6. EVALUATION OF MERCURY POLLUTION IN OLT RIVER BASIN INDUCED BY HISTORICAL AND CURRENT POLLUTION SOURCES

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This paper aims at establishing the historical and current sources of mercury pollution, for monitoring mercury dispersion in Olt River Basin

ecosystems (B.H.Olt) and development of the quality of aquatic ecosystems upstream and downstream of pollution sources investigated.

For this, samples water and sediment from spring B.H.Olt (Balan) and until it flows into the Danube, upstream and downstream of pollution sources and soil samples from industrial sites in B.H.Olt vicinity, were collected.

The degree of pollution with mercury was established and mercury pollution on ecosystems soil, water and sediment from B.H.Olt. was evaluated by comparing the determined values during the investigation period, with the legislation.

Keywords: mercury detection, water surface, sediment, soil

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II-O-7. IMPACT OF THE PROPERTIES AND COMPOSITION OF INUNDATING NATURALLY CARBONATED MINERAL WATER ON THE SOIL IN THE AREA OF OLT VALLEY

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In this present study we analyzed the impact of three naturally carbonated mineral water springs to the soil pH value of the surrounding farmlands in the Olt Valley, selected by us. The field and forest areas are inundated by the mineral water making the soil wet, and we assume that by its mineral salt content it affects the pH value of the soil, thus altering fertility. By our measurements we tried to prove these assumptions. Moreover, we would like to support our research by the observation of the changes in vegetation around the springs.

II-O-8. GEOCHEMICAL MODEL OF THE GROUNDWATER AT COUNTY-WIDE SCALE IN ROMANIA. CASE STUDY

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This paper presents a functional model for the investigation of the groundwater quality expanded to the size of a county of Romania, considered as a case study. Were followed several steps: defining the surface area of the study, establishing the methodology of the investigation (the sampling method and the quality indicators), design of the experimental field, applied methodology and getting a set of functional

groundwater geochemical model of the entire county. Were determined for each groundwater sample a total of 20 physical and chemical quality indicators and overall analytical determinations were subjected to a total of 119 samples of water from underground with free level. Each sample was located with a GPS receiver, so all the results are a georeferenced database for the entire county. We have mapped the distribution of the pollutant concentrations to a number of relevant nutrient pollution category and a map of the "nitrates" indicator, the pollutant with the highest amplitudes of the concentrations recorded.

Keywords: groundwater pollution, nutrients, geochemical model

II-O-9. INVESTIGATION OF THE GEOLOGICAL ENVIRONMENT IN CASE OF THE ACCIDENTAL POLLUTION PRODUCED WITH OIL PRODUCTS. CASE STUDIES

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The investigation of the geological environment is absolutely necessary in the case of pollution and more so in the case of the accidental pollution in order to determine environmental damages and in order to take the appropriate measures necessary to restore it to bring it to the acceptable quality conditions in accordance with the requirements of the legislation. This article presents the results of investigating the geological environment in two case studies, which allows a concrete analysis of the factors involved in oil pollution case. Distinguish a number of important factors such as the lithology and geomorphology of the land, mainly slope, the meteorological factors (rainfall, soil frost), depth of the underground water table level, land drainage, etc. The analytical results obtained are presented in details and the quantitative estimation of the soil affected by oil pollution related to land surfaces analyzed in the two specific cases studied.

Keywords: geological environment, pollution, oil products pollutions

II-O-10. DETERMINING THE DANGEROUSNESS OF WASTE

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Producers and holders of waste - legal entities - are forced to fit each type of waste generated from its work on the national list of waste (for Romania, waste list is contained in the Government Decision no. 856/2002). Therefore, occur frequently requests to characterize the waste in order to their classification. This has made to be necessary a methodology to establish (in a consistent and reproducible manner that take into account the legislative provisions and the needs of those working in the production, transport and capitalization / waste disposal) the hazardous/non - hazardous nature of a waste. The methodology established and used in the INCD ECOIND Bucharest was based on Romanian legislation (legislation harmonized with the European one), which, however, is not able to make easy work of framing a waste.

Methodology for determining the dangerousness of waste is laborious. A correct methodology requires as much information about the analyzed waste: data obtained from the client, from literature, from safety data sheets of the raw materials used in waste-generating processes or in waste – treating processes, from data obtained by analytical determinations performed on waste samples analyzed; it is important, therefore, to correctly identify the quality indicators to be determined. Further, the method includes identifying risk phrases of all determined or potential components existing in waste. The quantification of dangerous properties of analyzed waste samples is achieved by summing the total concentration of compounds that shows the same risk phrase, responsible for a particular dangerous property.

To minimize the effort of applying this methodology, it was necessary to develop a database (with the names of substances, CAS Registry Number,

molecular weight, solubility in water, risk phrases etc.) for the potential constituents of a wide variety of waste, the database that remains open.

Keywords: Hazard Assessment, wastes

II-O-11. ENVIRONMENTAL RISKS INDUCED BY THE PRESENCE OF DANGEROUS POLLUTANTS IN MUNICIPAL LANDFILLS SURROUNDING AREAS

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The issue of waste management is among the priority concerns for environmental protection both nationally and internationally.

The continuous growth of human activities has economic, social and environmental implications. Among the environmental problems caused by human activities, the municipal waste management has gained a priority for environmental protection. Emissions from municipal landfills negative have impact on all environmental components, "air", "water" and "soil".

Landfills are acknowledged as generating impact and risk to the environment and public health.

Composition and typology of waste deposited on landfill of municipal waste is extremely different. They may contain a number of compounds which often shows a dangerous character.

By default, they are found in emissions from storage and hazards to the environment.

The paper highlight specific cases, the risks associated with these pollutants in adjacent deposits areas.

Keywords:environmental risk, municipal landfills, dangerous pollutants

II-O-12. GETTING THE MOST OUT OF OPERATIONAL DATA IN ENERGETICS

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Putting the Europe 2020 Strategy at work means acting in top areas like energy and environment. Both power production and environmental protection imply very elaborate strategies, important investment and continual upgrade of technologies and operational procedures. An important source for information leading to more efficient power production installations is the massive databases present in any power unit and including records of all "historical" operational parameters. The paper addresses, as a short-term, inexpensive action for better energy efficiencies, the problem of data-mining of such databases as a managerial tool for improving the existing level of performance of power equipment. Data-mining exploits the records of operational parameters by trying to identify trends and patterns, extracting valuable information by mathematical / statistical processing of records, creating an objective background for managers and policy developers. In the first stage, records are tested for consistency and coherence (which can lead to immediate measures for improving the way information is collected from the existing power producing equipment, e.g., installing better monitoring devices). The next step, presented by the paper, is the identification of best "historical" efficiencies recorded (internal benchmarking) that should be the first target to achieve for managers and operators. Attaining and maintaining the level of best recorded performance is the simplest, least expensive, most straightforward way to improve current efficiency and prove the positive impact of data-mining. Follows a comparison of technological and environmental performances against up-to-date BAT-BREF documents for the power production industry. This analysis should point out to most significant aspects of the existing technology, responsible for large specific consumptions, important environmental impacts, etc. Results of applying the data-mining to the TERMICA-Suceava power plant led to a better

knowledge, by the managers, of the technology and its up and downs, pointed to short-term potential improvements and allowed the development of long-term policies for addressing technical and environmental issues.

Keywords: Energy production, environmental protection, energy efficiency, data-mining, mathematical modeling.

II-O-13. LOW TEMPERATURES THERMAL ENERGY – A HUGE MARKET AND POTENTIAL ENVIRONMENTALLY FRIENDLY

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In everyday life, the concept of thermal energy is associated, in outlook, with areas or facilities which are distinguished by relatively high temperatures. In the shadow of this perception, we are tempted to not see the quantities of heat that benefits all of us, for personal convenience or for carrying some activities. The reason for this negligence is that the heat enters our lives at relatively low temperatures, which is not perceived as dangerous. Required amount of heat at low temperature are huge and are largely obtained on account of adequate fossil fuels quantity burning. This conduct can not be considered environmentally friendly because, on the one hand, leads to high rates of diminishing fuel reserves and, on the other hand, increase the rates in which terrestrial atmosphere is loaded with fossil carbon. However, "Mother Nature" is generous and gives us the opportunity to obtain large amounts of heat through smart exploitation of local resources present practically in any area.
This work aims to analyze the thermal energy at low temperature consumption under three aspects. The first of these concerns the structure and dimensions of the particular market. The second issue concerns the "supply" of available heat in the environment. Finally, the third aspect concerns the technical possibilities available for an intelligent exploitation of natural heat supply to cover a portion of alleged market.

II-O-14. USING AN ENVIRONMENTAL COSTS' COMPOSITE INDEX AS A TOOL FOR MANAGERIAL DECISIONS

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Compliance of Romanian industrial organizations to European Union environmental regulations constitutes a premise for sound environmental performance and is accompanied by important costs. A clear identification and evaluation of both tangible and intangible environmental costs incurred within an industrial organisation / sector represents the baseline for proper managerial decisions. The proposed composite index is taking into account the main environmental costs identified within the organisation / sector and is representing an important base for decisions related to the improvement of both economic and environmental performance of organisation / sector. A methodology for both identification of tangible / intangible environmental costs and calculation of environmental costs composite index was developed based on available United Nations – Environmental Management Accounting and Material Flow Cost Accounting – ISO 14051 procedures. The methodology was applied in a first step at the level of an industrial organisation from energy production sector and then translated to the sectorial level. Its application resulted in a set of measures to be implemented at the level of industrial organisation in order to improve its performances and options for sustainable development of the energy production sector. A set of eco-efficiency indicators to be applied at the level of organisation and industrial sector was also developed in order to assess their environmental performances.

Keywords: environmental costs, composite index, eco-efficiency

II-O-15. THE EUROPEAN LEGISLATION AND THE IMPLEMENTATION OF EMS AND ENMS

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Faithful to the sustainable development concept, the EU implements, step by step, the strategy regarding prevention of pollution, for general environmental protection and for resources protection, including the resources, renewable or not, dedicated to power generation.

If we only take a look to the last decade, we can find a whole batch of EU Directives, Regulations and Decisions which address the spectrum of the mains categories of environmental aspects: air quality, water quality, industrial pollution and prevention control, waste management, hazardous substances, climate changes, noise etc. And all these have one single declared purpose: the reducing of the environmental impact through a systematic and cross frontier approach on necessary actions. Regarding the concerns for the energy efficiency, the EU has defined specific targets until 2020: 20% energy saving of total primary energy, 20% reduction of greenhouse gases emission - below the 1990 level, 20% from the mixed energy must come from renewable resources. In this case, too, was issued a new Directive for the implementation of EU Policy on energy efficiency.

Environmental Management Systems (EMS) and Energy Management System (EnMS) are two of the tools which, ***implicitly or explicitly***, are promoted by the EU in order to achieve the targeted goals and objectives. Both management systems have requirements set by international standards (such as ISO 14001 and ISO 50001), by which an organization may establish and implement Policies and Objectives for environment or energy, with the assumption of compliance with legal requirements and other requirements to which the organization subscribes.

The European Directives were evolving over time, both in structure and in the form of expression. In the beginning of the last decade the key-concepts used were POLICIES, COMMUNITY OBJECTIVES and ACTIONS PROGRAMMES – all these being the principal elements of the Management systems, too.

Later on, the European Directives began to promote equivalent terms for PREVENTIVE ACTIONS, CORRECTIONS and CORRECTIVE

ACTIONS for the NONCOMPLIANCE with critical limits stated by the relevant legislation. Moreover, we can find wording like: ENVIRONMENTAL ASPECTS and IMPACT ANALYSIS, EMISSION MONITORING and COMPLIANCE WITH LEGAL REQUIREMENTS, specific actions of the OPERATIONAL CONTROL, EMERGENCY PLANS and PUBLIC COMMUNICATION.

In some cases (e.g. waste management and energy efficiency), the European Directives have become very explicit in the recommendations they make regarding the utility of EMS and EnMS implementation, based on ISO 14001 and ISO 50001 international standards.

Policy, objectives, environmental aspects, impact analysis or energy audit, responsibilities establishment, communication with interested parties, operational control, emergency preparedness, monitoring, evaluation of compliance with legal requirements, treatment of nonconformities through corrections and corrective actions, preventive action taken…they are all clauses of the standards ISO 14001 and ISO 50001!

Although the implementation of EMS and EnMS is a voluntary decision, the fact they are subject of recent recommendations of the European Directives shows the conviction that these Management systems represent effective tools in achieving commitments regarding environmental protection and pollution prevention or energy performance (energy efficiency, energy usage and energy consumption).

II-O-16. ROUGH SET THEORY A PROMISING INSTRUMENT FOR DIAGNOSIS AND PREDICTION INCLUDING POLLUTION PHENOMENA

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The paper presents the use of Rough Set Theory (acronym RST) as a new emerging instrument to support the environmental decision in uncertainty

conditions. New developed methodologies for environmental pollution diagnosis and prediction and their use in environmental impact/risk assessment are presented. Those methodologies can be successfully used to make prediction regarding pollution phenomena and seems to be a promising simple instrument to be implemented in order to adapt the measures to be taken in adequate time during incidental/accidental discharges so that pollution plume concentration (regardless the pollution type) to be estimated.

Keywords: RST, pollution prediction

II-O-17. DEFINING OCCUPATIONS AND ENVIRONMENTAL COMPETENCES EVALUATION OF PERSONS USING OCCUPATIONAL STANDARDS

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In last few years the field of environmental occupations, among other occupations that have occurred due to the interest in sustainable development, have seen extensive development. For quick adaptation of the workforce to labor market needs, steps are necessary, since the definition of what environmental occupations, establish a strategy for development and adoption of occupational standards, training and / or professional skills assessment environment for these occupations. In this paper the approaches adopted are currently trades on the definition of environmental and occupational importance of developing appropriate standards for assessing environmental professional skills.

Keywords: qualifications, professional competence, assessment center, units of competence, occupational standards.

SECTION III

POLLUTION CONTROL AND MONITORING

- plenary conference
- oral presentations
- posters

- PLENARY CONFERENCE -

PC-8. ENVIRONMENTAL MONITORING BY USING AGGREGATED INDICATORS

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The issue regarding environmental monitoring in order to point out the environmental quality and its pollution has been very discussed in the last years. Carrying out environmental monitoring, especially monitorisation of air quality, is usually done be using simple indicators, emphasising concentrations for single pollutants. The same is also observed when analysing water pollution, i.e. the water quality is usually emphasised by using several simple indicators.

Another direction is to develop so called aggregated indicators, used for characterising the air quality and water quality. Such indicators integrate several single pollutants. As interesting this direction is, as difficult and still not well clarified is the aggregation way. There are different possibilities to carry out such an aggregation, one of them is the fuzzy logic based aggregation.

Because of the advantages brought by using fuzzy logic, this aggregation possibility has been very discussed on different levels.

In this paper the concrete aggregation possibility by using fuzzy logic will be presented and some concrete results regarding a new air pollution indicator API will be presented.

- ORAL PRESENTATIONS -

III-O-1. QUALITY CONTROL OF DRINKING WATER IN BRASOV MUNICIPALITY USING FIRST DRAW AND FULL FLUSH SAMPLING PROCEDURES

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The present study investigates the influence of in-house installation systems to the tap water quality in Brasov Municipality in order to get an overview of the current contamination levels of drinking water at the consumer's tap. In a sampling campaign organized in March 2013, the samples were collected from customer's cold line pipe with first draw (1st liter taken in the morning from kitchen without previous flush of the tap) and fully flushed sampling (after flushing five minutes same tap) procedures. In the monitoring program were included samples from Tarlung Water Plant, drinking water samples from storage tanks situated in different Brasov areas, 34 samples from customer's tap and 12 samples from branch pipes. The investigated parameters (metals, organic compounds and microbiological parameters) were those included in Romania Legislation in accordance with European Drinking Water Directive 98/83/EC.

The metallic element Al, As, Cd, Cu, Cr, Fe, Mn, Ni, Pb, Se, Sb and Zn were analyzed in tap water samples using inductively coupled plasma atomic emission spectroscopy technique. The monitoring data show an influence of the material used in the internal distribution system within the customer buildings to the tap waters quality. Around 18% of first draw samples indicated a pollution of drinking water with Ni (2 samples) and Pb (2 samples). The metal concentrations recorded in tap waters collected with tap flushing procedure and also the samples collected from branch pipe were situated in the limit values in all studied cases.

It was notice a decrease of free chlorine concentration in stagnated water (in most samples, below the limit of detection for the test method) compared with branch pipe and fully flushed samples. This permits the development of microorganisms, the stagnated water being unprotected from the bacteriological point of view.

The present study demonstrate that materials used in water supply domestic installations have a major contribution in deterioration of water quality provided by the local distribution network, due to the processes of water stagnation and lack of maintenance of the internal distribution materials.

Keywords: tap water, stagnation, metals

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III-O-2. SPE – HPLC/DAD ANALYSIS OF BENTAZONE AND AZINPHOS-METHYL IN WATER SAMPLE

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A simple and reliable method was developed for the determination of bentazone and azinphos-methyl in water using high-performance liquid chromatography with diode array detection (HPLC-DAD) at 254 nm. Chromatographic separation was carried out on a BDS Hypersil C8 column (15 0mm x 4mm, 5 µm particles) at 20 ^{0}C and 0.8 ml/min flow rate with a mobile phase consisting of acetonitrile - ultrapure water (80 : 20, v/v). Satisfactory separation of two pesticides was obtained in 7 minutes by injecting 10 µl standard solution. The linearity ranges of the calibration curves ranged from 0.27 µg/ml to 2.47 µg/ml for bentazone and from 0.34 µg/ml to 3.1 µg/ml for azinphos-methyl. The selectivity of the method was tested by injecting standard solution containing a mixture of azinphos-methyl, bentazone, atrazine, simazine and propazin. These compounds were separated at differents retention times, this showing the selectivity of method. The recovery rate was tested using two SPE cartridges: Strata X (Phenomenex) and LiCrholut EN (Merck). The Strata X cartridges were found to be more suitable for extracting the two organophosphorus pesticides from surface water samples. The average recoveries were 95.8% for azinphos-methyl and 105.6% for bentazone.

Keywords: HPLC, bentazone, azinphos-methyl, water

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III-O-3. SIMULTANEOUS DETERMINATION OF B-LACTAMS ANTIBIOTICS IN WASTEWATER SAMPLES BY SOLID PHASE EXTRACTION FOLLOWED BY HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY AND TANDEM MASS SPECTROMETRY

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In the present work, an analytical method for the simultaneous determination of six β-lactams antibiotics (ampicillin, amoxicillin, penicillin V, penicillin G, oxacillin and cephalexin) is proposed for the determination of these compounds in wastewater treatment plants (WWPTs) influents and effluents. The β-lactams were extracted from water samples using Oasis HLB cartridges with pre-concentration factors up to 250. The compounds have been separated using a Zorbax SB-C18 (50 mm x 2.1 mm, 1.8 μm) HPLC column and gradient elution with mobile phase consisting of aqueous formic acid and acetonitrile. Detection was performed by mass spectrometry with a triple quadrupole using an electrospray interface. The linear range of the standard curve was from 1.0 to 600 $ngmL^{-1}$ (R^2>0.99). Average recoveries of β-lactams in fortified samples were generally above 74% with relative standard deviations (RSDs) lower than 11 %. Limits of detection were in the range 5-265 ngL^{-1} and 2-106 ngL^{-1} for influent and effluent wastewater samples, respectively. The described method was applied to the determination of the β-lactams in wastewater samples from a municipal WWTP.

Keywords: antibiotics, β-lactams, wastewater, WWTPs

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III-O-4. TYPICAL PROFILE IDENTIFICATION OF POLLUTION SOURCES BY POLYCYCLIC AROMATIC SULFUR HETEROCYCLES

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A semi-quantitative method has been developed for the determination of typical profiles of PASHs to identify the main sources of soil pollution. PASHs compounds selected in this study were 2,3-dimethylbenzothiophene, 6,7-dimethylbenzothiophene, naphto[1,2-b]thiophene, phenanthro[3,4-b]thiophene, 3-phenylbenzothiophene and 3-(naphthyl)benzothiophene. Extraction of soil samples was carried out by ultrasonication using n-hexane. Final analysis was performed by gas chromatography using a non-polar capillary column TR-5ms (60 m, 0.25 mm, 0.25 µm) and the detection by high resolution mass spectrometer with magnetic and electric sector using electronic impact ionization. The linear range of the standard curve prepared from contaminated soil was from 1.0 to 8.0 $ngKg^{-1}$ (R^2>0.97). Limits of detection ranged from 0.13 $ngKg^{-1}$ to 2.50 $ngKg^{-1}$. The developed analytical method was successfully applied to study the soil profiling polluted by mobile and fixed sources.

Keywords: PASH, soil, pollution sources, profiles

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III-O-5. MONITORING OF SURFACTANTS CONCENTRATION IN AQUATIC ENVIRONMENT USING DIFFERENT ANALYTICAL METHODS

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Surfactants (also called surface active agents or wetting agents) are organic chemicals which are widely used for industrial, agricultural, and pharmaceutical applications, in products as diverse as pesticides, detergent powders, household/industrial/cleaning/disinfectant products, petroleum products, cosmetics, and pharmaceuticals. There are hundreds of compounds that can be used as surfactants and are usually classified by their ionic behavior in solutions: anionic, cationic, non-ionic or amphoteric (zwiterionic). After use, surfactants are disposed to wastewater-treatment plants and finally with effluent water to surface waters due to their incomplete degradation. Moreover, they may be released directly into the surface waters and can freely circulate in different environmental compartments including living organisms.
Each surfactant class has its own specific properties and becomes indispensable to recognize in more detail behavior, fate and effects of surfactants on aquatic environment.
Surfactant analysis plays a major role worldwide and their content in the environment should be determined as quickly, precisely and accurately as possible. Their separation and identification can be challenging due both to

the diversity of surfactants and the complexity of the sample matrix. This analytical problem can be solved using sensitive and reliable analytical techniques at sample preparation step and final determination step.
Usually, colorimetric techniques are the standard methods for the determination of anionic, nonionic and / or cationic surfactants in aqueous solutions, but these traditional techniques are susceptible of interferences on analysis results and these limit severely the application of the spectrophotometry technique.

This paper highlights appropriate techniques for environmental samples preparation and analytical methods applied to control and monitoring the content of anionic, nonionic or cationic surfactants in different aquatic environmental samples. The overall concentration of surfactants in different water samples was determined by colorimetric methods and the chromatographic technique (liquid chromatography) applied at the final determination step, gives possibility to determine individual types of surfactants in solvent extracts of environmental samples.

Keywords: surfactants, analytical determination, environmental samples

III-O-6. APPLICATION OF X-RAY FLUORESCENCE SPECTROMETRY FOR ANALYSIS OF PRECIPITATES FROM MINE WATER

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A method for simultaneous analysis of Fe, Mn, Al, Ca, Mg, Si, Ba, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se, Zn and As from mine waters precipitates was developed employing an NEX CG - Energy Dispersive X-ray Fluorescence Spectrometer.
The XRF analysis results were verified with other consecrated method such AAS and ICP-MS using standardized methodologies, including pretreatment of samples.
Good correlation of results between methods was achieved (±2-7%).

Minimum sample preparation (drying, sieving and then prolene cup preparation) is needed, and up to 4 samples can be analyzed per hour. Limit of detection for analyzed elements were between 2 and 25 mg/Kg dw. XRF analysis method was successfully used for analysis of some precipitates obtained from mine waters using various precipitation methods. A closed nonferrous metals mine from northern part of Romania was chose as source of mine water.

Keywords: Energy Dispersive X-ray Fluorescence, mine water precipitation, metals.

III-O-7. DETERMINATION OF BERYLLIUM IN STATIONARY SOURCES EMISSIONS

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Systemic toxic pollutants such as heavy metals, exerts its actions on different organs and human body systems, the effect being specific to this substance.

Their spread in the environment is increasing and their accumulation in the environment and in the human body is important for the pathological changes that occur.

Beryllium is an important component of nuclear reactors as a neutron source with low neutron-absorbing capacity. Beryllium oxide is used in insulators, resistors, spark plugs and microwave tubes from the electronics industry.

Little information about atmospheric input of beryllium (Be) into ecosystems are known, despite its highly toxic behavior. Beryllium is a

toxic material and an inhalation risk causing sensitization and chronic beryllium disease (CBD) to receptors[1].

Beryllium and its compounds are included in ,,Class I carcinogens'' according to Order 462/1993, and the emission limit value is 0.1 mg/m^3 at a mass flow greater that 0.5g/h.

Beryllium emissions are isokinetically sampled from the source.The particulated emissions are collected in a probe and on heated filters and the gaseous emissions are collected in a series of chilled absorbes with absorption solutions.

This paper presents the results obtained by optimizing the beryllium determination method from stationary sources emissions using electrothermal atomic absorption spectrometry (ETAAS) and at also present the performance characteristics of the method[2,3]. The limits of detection (LOD) were 0.0018 µg/m^3, the linearity ranges under optimized conditions were 0.05-2 µg/l and the limits of quantification (LOQ) weren 0.0027 µg/m^3.

Keywords: stationary sources emissions, Be, ETAAS, isokinetically

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III-O-8. MICROSTRUCTURES AND PROCESSES FOR BIOTRANSISTORS WITH APPLICATIONS IN ENVIRONMENTAL MONITORING AND FOOD SAFETY

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Environmental monitoring and food safety are major concerns in the development order of modern society. To achieve these tasks, various methods for detecting harmful substances were proposed and dedicated devices were developed. During the recent period of time an increased interest in using organic semiconductor field effect transistors (OFET) in biological and chemical detection has arisen. Those sensors are small, with a good capability of detection at very low concentrations of specific analytes and reasonably cheap.

In order to fulfill this objective a complex technological process was developed. After a thorough analysis of available processes, a suitable technological solution was chosen. The process has two important steps, one for manufacturing the solid state device and one concerning the deposition of organic semiconductor film. For the first step, a four mask process was developed for constructing the field effect transistor, containing the initial oxidation, diffusion of the gate electrode and growing the gate oxide, contacts opening and metal deposition of source plus drain electrodes. The second step is reserved to the deposition of organic semiconductor film.

To verify and develop the manufacturing processes for OFET, a specialized structure was designed. This microstructure is of a FET type, with source and drain electrodes located under the organic semiconductor (bottom contact configuration). The gate electrode is diffused in the substrate and the contact is taken out on the surface of the chip. For achieving the organic semiconductor two thiophene compounds were

chosen, namely: bisdodecil tetrathiophene (TTE 12) and poly-3-hexilthiophen (P3HT). Because the molecular ordering of polymer films depends on the degree of ordering of the molecules in the solution, for the P3HT polymer films three solvents were tested, namely: (i) dichlorobenzene, (ii) chloroform and (iii) tetrahydrofuran. To investigate the transport properties, seven types of procedures have been developed and tested, based on the organic semiconductor TTE 12 and P3HT.

Experiments performed on the packaged OFETs shown that the developed technological processes permit the construction of a sensor for detecting dangerous substances with multiple applications in environmental monitoring and food safety.

The development of the technological processes and the fabrication, with their help, of a biotransistor with organic semiconductor (OFET), opens a new research direction aiming for multiple applications. The main goal of our approach is the development of specialized sensors targeting applications for monitoring the state of the environment and the presence of hazardous substances in food. Further experiments and studies will be carried out to create a sensor for the detection of pesticides at low concentrations (less then 10-7 g/l).

III-O-9. HAZARD CLASSIFICATION OF DANUBE- DANUBE DELTA (WATER AND SEDIMENT) BASED ON ORGANISMS SENSITIVITY

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An acute evaluation of toxicity in Danube River - Danube Delta Romanian sector (1075 – 0 km) was proposed including surface-water and sediment. The conventional classification of natural waters is based primarily on chemical and physical parameters. Recently the hazard classification has included the use of selected microbiotests based on organisms' sensitivity. The spatial (11 control points) and temporal (in winter, spring and summer of 2013) toxicity effects have been assessed using a biotests batery with

representative species of producers (grean algae *Pseudokirchneriella subcapitata),* consumers (rotifers - *Brachionus calyciflorus, crustaceeans – Daphnia magna, Heterocypris incongruent)* and decomposers (bacteria - *Vibrio fischery,* protozoans – *Tetrahymena thermophile).* The physical, chemical, biological and microbiological characteristics of water and sediment also have been performed. The preliminary tests results revealed no acute to slightly toxic effect, respectively Class I and II of hazard. The sediment samples were more toxic than water. The toxicity results were directly influenced by organisms sensitivity, sampling locations, season and climate change issues. The water quality according to hazard classification was related to pollution classification and biological determinations (macrozoobenthos, phytoplankton and zooplankton).

Keywords: Danube River, Danube Delta, microbiotests, hazard classification

III-O-10. MICROBIAL POPULATION DYNAMICS IN DELTAIC AQUATIC ECOSYSTEMS – CASE STUDY ON SFANTU GHEORGHE BRANCH

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The aquatic ecosystem – a perfect environment to propagate the microbial characters.

Nowadays, the water resources are limited to water requirements and they are not always of proper quality. The microbiological contamination of water is a current problem with negative effects on population health especially in the Danube Delta, where, some times, the raw surface water is used as drinking water source, without any treatment or disinfection process.

In the period January - July 2013, an investigation program of microbiological water quality of Sfantu Gheorghe Branch has been started.

11 control sections were selected and the water and sediments samples were monthly collected in sterile bottles.
The most important parameters for microbiological water quality such as fecal indicators were analyzed by two methods: membrane filtration method for water samples and multiple tube method for sediment samples.
The results indicated a high degree of microbiological pollution of aquatic ecosystems in the first months and it also was observed an indirect proportionality between bacteriological indicators in water and sediments, but it's not a general rule. This phenomenon is based on sedimentation of microorganisms depending on the environmental conditions. Bacteria identified were subjected to antibiograms to assess the possibility of transmission of resistance to antibiotics.
The drinking water analysis emphasized contamination with potential pathogenic bacteria from surface water that may have adverse effects on human health.

Keywords: microorganisms, aquatic ecosystem, Danube Delta

III-O-11. LONG- TERM BIOLOGICAL CHANGES ALONG DANUBE AND DANUBE DELTA SYSTEMS AFTER INDUSTRIALIZATION PERIOD

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Over the last 50 years humans have converted the export of fluvial materials which induced significant changes in biology, chemistry and morphology of the aquatic systems. The study presents the long-term changes induced on biotic communities alongside chemical parameters in Danube and Danube Delta system after industrialization period in the context of compliance with Water Framework Directive requirements. The Danube basin has been subject to some important ecological changes, caused mainly by: hydrotechnical works, the built up of two large reservoirs (Iron Gates I and II) for hydrotechnical power plants, the conversion of

floodplains into agricultural lands, opening the Danube-Black Sea canal which linked Cernavoda to Agigea, multiple uses of chemicals in agriculture which enrich the Danube waters fertilizers and pollutants, navigation development, uncontrolled tourism. The survey was done in 16 sampling sections along Danube and Danube Delta (St. Gheorghe Branch) based on field experiments over 10-years (2003-2013), researches and national reports before and after industrialization period.

The main problems identified in the basin were: contamination with hazardous substances, contamination with substances that enhance the heterotrophic organism's growth, oxygen depletion, microbiological contamination, high nutrient loads and eutrophication. Those changes affected the aquatic ecosystems of the biocenosis structure reflected by biodiversity reduction, the loss of the equilibrium between plankton species – benthos fauna, the algal blooms causing eutrophication, diatoms abundance, loss of sensitive taxa, high number of endangered species and the decrease of biological productivity.

The results assessment will allow the present ecological status to be redefined.

Keywords: Danube, St. Gheorghe Branch, industrialization, biotic communities, ecological status.

III-O-12. ANALYTICAL INVESTIGATIONS CONCERNS REGARDING Ni AND Pb DISTRIBUTIONS AND MOBILITY IN RIVER SEDIMENTS AFFECTED BY MINING ACTIVITIES

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The heavy metal pollution is among the most disseminated environmental contamination, at least in some regions of Romania, having a particularly adverse effect on surface water and sediments in affected areas [1].

This type of contamination could be directly linked to some industrial activities like smelting and mining.
The main task of this study is to assess the heavy metal outflow from the contaminated sediment to the aquatic environment, with its subsequent toxic effect on the living organisms in water [2].
In this paper we study the distribution and mobility of nickel and lead in sediment samples taken from a highly heavy metals polluted area, the principal anthropologic input being from existing and former mining activities.
The main objective of this study was to evaluate the ecological pollution degree by determining the mobility and distribution of nickel and lead in sediments of rivers polluted by industrial human activities [3].
In order to determine the mobile fraction of nickel and lead in sediment samples we used BCR extraction method that separates three fractions which differ in the mobility of existing metal chemical species and a method of leachable extraction fraction by cold extraction method using certified reference material [4].
Our results show that by applying BCR sequential extraction method on sediment, it is found that nickel due to its higher mobility than lead, induce a significant degree of pollution by its migration from sediment to surface water.

Keywords: sediment, mobility, sequential extraction, heavy metal, bioavailability

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III-O-13 URBAN AIR POLLUTION WITH PARTICULATE MATTER; DISTRIBUTION OF DIMENSIONAL FRACTIONS AND CHEMICAL SPECIATION

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Due to adverse effects on human health and on the environment, air pollution with particulate matter (PM), is an area of broad interest to researches around the world.

Understanding the adverse effects of particles and devising appropriate control strategies require spatial and temporal information on particulate matter mass concentration, aerodynamic size and chemical composition.

This paper presents the results obtained in a case study organized in the fall of 2012 in a residential area with low traffic on the outskirts of Bucharest in order to determine the ambient air pollution with particulate matter PM 2.5, PM 10 and TSP, and chemical speciation of these particulate matters, according with Directive 2008/50/EC requirements. During 10-24.09.2012, daily samples were taken for particulate matter PM 2.5, PM 10 and total suspended particulates to determine the concentration and mass ratio between dimensional fractions of particulate matter by gravimetric method and chemical speciation by ion chromatographic method.

The average concentration of particulate matter in the ambient air for all three dimensional fractions was below the limit established by national and European environmental legislation: 33.9 ±10.9µg/m^3 for PM 2.5, 46 ±15.1µg/m^3 for PM 10 and 73.1 ±20.2µg/m^3 for TSP. PM10 particulate matter containing an average of 76.6% PM 2.5 and represents 62.3% of the total particulate matter; PM 2.5 is 47% of TSP. Ion chromatographic analysis indicated the presence in all three dimensions fractions of the following ions PO_4^{3-}>NO_3^->Na^+>Ca^{2+}>Cl^->K^+>F^->Mg^{2+}>SO_4^{2-}; the most abundant ion was PO_4^{3-}.

By analyzing the correlations between the three dimensional fractions of particulate matter, the Pearson statistical method reveals a good correlation between low dimensional fractions (R: 0.83 for PM 2.5 and PM 10) and a weaker correlation between PM 2.5 and TSP (R = 0.65); but the correlation between ions identified in particulate matter was poor.

In conclusion, the correlation indicates the presence of several sources of particulate matter smaller than 10 μm, with different chemical composition, at concentrations below the limits. It was also concluded that the weaker correlation between PM2.5 and TSP happens most probably due to the resuspension phenomenon.

Keywords: ambient air pollution, chemical speciation, ion chromatography, particulate matter

III-O-14. COMPARATIVE ANALYSIS OF METHODS FOR MONITORING CO_2 EMISSIONS FROM THE ENERGY SECTOR IN THE CONTEXT OF CLIMATE CHANGE

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In an economy increasingly globalized a country's energy strategy is done in the context of changes and developments taking place worldwide. Due to increasing energy demand, energy has developed rapidly without the problem of environmental protection. [1].

Energy sector is the largest sector in the emissions of greenhouse gases, responsible for 66,44% of total emissions of greenhouse gases generated nationwide in 2009. Total energy demand in 2030 will be around 50% higher than in 2003 [1]. European Commission proposes a set of documents representing the new energy policy of the EU, decrease emissions of greenhouse gases by 20% by 2020 compared to 1990. [2; 3]. Monitoring and reporting of greenhouse gas (GHG) is the basis for the (EU

ETS) Romania, has undergone two phases of the EU ETS, first phase was performed in 2005-2007 in accordance with the Order of 1175/2006 and in the second first phase, in 2008-2012 in accordance with Decision 589/2007.[4; 5]. In the third phase of monitoring, starting on 01.01.2013 in all EU Member States nr.601/21.06.2012 rules apply. The paper proposes an application in the energy sector, for the evaluation of CO_2 emissions using both **calculation** data from **analytical laboratory investigations** and those determined by **direct measurement** of the source. From research carried out it was determined the method for assessing CO_2 is **direct measurement** and for reporting and monitoring that both **methods** can be used **(direct measurement and calculation),** the results being comparable, the differences in uncertainty margin were under 10%, acceptable for automatic measurements [5; 6] .

Keywords: monitoring, reporting, measuring emissions of greenhouse gases

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III-O-15. CORROSIVITY OF ATMOSPHERES IN RELATION TO AMBIENT AIR QUALITY

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Metals, alloys and metallic coatings can suffer atmospheric corrosion when their surfaces are wetted. The nature and rate of the attack depends upon the properties of surface-formed electrolytes, particularly with regard to the level and type of gaseous and particulate pollutants in the atmosphere and the duration of their action on the metallic surface. The character of the corrosion attack and the corrosion rate are consequences of the corrosion system, which comprises the metallic material, the atmospheric environment, the technical parameters and operation conditions.

The corrosivity category is a technical characteristic which provides a basis for the selection of materials and protective measures in atmospheric environments subject to the demands of the specific application, particularly with regard to service life. Data on the corrosivity of the atmosphere are essential for the development and specification of optimized corrosion protection for manufactured products.

This paper presents the results of a study ordered by the biggest Cogeneration Plant from Romania, started in November 2012 and finished in August 2013. The study involves three stages of air quality and meteorological parameters monitoring. Each stage was 30 days long, and was developed in represented periods of the year (November, April and July). The main objective of the study was to establish the potential influence of the ambient air quality and meteorological parameters, on the corrosion of metals and alloys. Because the Cogeneration Plant is located nearby a very big Refinery Plant, another important objective was to establish the influence of the Refinery Plant on the quality of ambient air from the area. Because the Cogeneration Plant uses natural gas in order to

produce electricity so they have a small level of emissions, it was expected that the Refinery Plant to be the main polluter from the area. The specific pollutants selected for monitoring are: particulate matter (PM10, PM2.5 and TSP), metals (Pb, Cd, Ni), oxides (NO_2, SO_2), anions and cations from particulate matter (Na+, K+, Ca^2 Mg^{2+} PO_4^{3-}), and the main important meteorological parameters: barometric pressure, temperature, humidity and direction/speed of wind.

The results of the study have been used to frame the ambient air quality nearby the Cogeneration Plant in a category of corrosivity and to verify the compliance with the limits imposed by the environmental legislation. A very good correlation between wind direction blowing from the Refinery Plant and concentrations has been observed, which indicates that the main polluter from the area is the Refinery Plant.

Keywords: air pollution, particulate matter, corrosion, cogeneration plant

III-O-16. BIOMASS WASTE GASIFICATION IN ORDER TO REDUCE AIR POLLUTION

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Climate change is a major challenge of our times, described as a complex area in which we must improve the knowledge and understanding to take the most appropriate measures, in order to minimize the effects and, if possible, to restore climate equilibrium.

Due to energy crisis, research was oriented towards finding new possibilities to produce low cost energy with minimum environmental impact. One of the most important ways to produce green low cost energy is by converting residual biomass into energy by transforming biomass into biogas through anaerobe digestion or through coincineration with solid fuels.

This paper presents the results of two case studies developed in order to calculate the pollution reduction by transforming biomass into energy through biogas production or coincineration. First case study aims to estimate the emission decrease of greenhouse gas by using anaerobic digestion of biomass waste, resulting biogas and sludge. Biogas can be used as an alternative source of energy and sludge may be used as a soil amendment and fertilizer in agriculture. It has been observed a reduction of 53-73% of CO_2 emission after using biogas to produce electricity. The sludge from the biogas station corresponds qualitatively to fertilize agricultural land and can lead to a corresponding reduction in CO2 equivalent to produce 902.4t of NH4NO3. The second case study was developed in order to establish the level of CO2 emission reduction by using the biomass with coal in the energy industry. It is also observed a reduction of CO2 emissions correlated with the amount of biomass used for coincineration. Both case studies indicate a high reduction of greenhouse gas after using biomass for direct or indirect production of energy.

Keywords: anaerobic digestion, biogas, air pollution, biomass

III-O-17. VALORIZATION OF SOME WASTE TO OBTAIN SOUND-ABSOPTION COMPOSITE MATERIALS, TARGETING THE REDUCTION OF THE NOISE POLLUTION

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The noise is a complex of sounds without a periodical character that affect the biological and psychological health of humans and other organism from nature. Noise pollution represents the human or animal exposure to sounds at disturbing, stressful or harmful levels. This paper

aims to introduce new systems for absorption and attenuation of noise from industry or from urban and extra-urban transport based on composite materials made from recycled solid waste. Compared to conventional materials this new type of composites incorporates various wastes that can harm the environment.

The absorption coefficient is used to express the capacity of a material to absorb the sound waves – to transform the kinetic energy of the sound waves into thermal energy. It is expressed in percents and represents the proportion between the total sum of energy that is transmitted and absorbed by the material and the total incidence energy of sound waves.

This paper presents several types of composites produced using waste matrix binder. Absorbing capacity of sound for the new composites varies depending on the proportion of waste used. Also, are presented correlations between the grading of the reinforcing material that is used, the density and porosity of the resulted composite and the absorption sound waves coefficient for composite material samples which are reinforced with different wastes.

Keywords: noise, sound waves, absorption coefficient, composite material, wastes.

III-O-18. USING NUMERICAL SIMULATION SOFTWARE FOR IMPROVING WASTEWATER TREATMENT EFFICIENCY

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The aim of this paper is to show the using of numerical software in order to improve the wastewater treatment plants efficiency from the design phase. The use of computer simulation programs to evaluate and design wastewater treatment plants is becoming more prevalent; design engineers

often implement models without adequate influent characterization and calibration. In this paper the STOAT (Sewage Treatment Operation and Analysis over Time) software is considered to simulate a real wastewater treatment plant, to analyze the solids retention time and the nutrients (N and P compounds) in the effluent taking into account different activated sludge models.

Keywords: wastewater treatment, effluent, nutrients, STOAT

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III-O-19. EFFICIENCY OF THE MONITORING INDICES IN EXPLAINING THE DISSIMILARITY IN THE ECOLOGICAL STATE OF LOTIC SYSTEMS IN DOBROGEA-LITORAL BASINS

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Successful implementation of the Water Framework Directive and achieving its objective of good ecological status of all water bodies depend on the set of indicators the monitoring system is currently operating, with respect to their power to capture the change in the ecological state of aquatic ecosystems and to assist decision makers in identifying priority actions at different spatiotemporal scales. In this context, assessing the current status of lotic systems and testing the effectiveness and relative sensitivity of ecological indicators used by the monitoring system for lotic water bodies are priorities undertaken to scientifically assist an effective monitoring system and improve the quality of the decision making for water bodies. Based on quantitative numerical data provided by the "Romanian Waters" National Administration (ANAR) concerning the structure of benthic invertebrate communities, phytobenthos, phytoplankton and the values of physicochemical parameters in the period 2009 and 2010, the ecological status of lotic water bodies in Dobrogea-Litoral basins was assessed. The degree of intra- and inter-annual similarity / dissimilarity in the current state of water bodies was statistically tested and validated and the key indicators / indices explaining the dissimilarity were identified. The results highlight the importance of integrated approach in the monitoring of water bodies and the need to refine the methods used in order to better assist managers to assess ecological status and prioritize the pressures and stressors acting in basins.

Keywords: monitoring indices, ecological state, lotic systems.

- POSTERS -

III-P-1. OPTIMIZING THE DETERMINATION OF ORGANOCHLORINE PESTICIDES USING SOLID PHASE MICROEXTRACTION

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SC APA NOVA SA

Introduction

In this paper we studied operating parameters to determine the optimal conditions for separation and concentration of organochlorine pesticides in aqueous samples using solid phase microextraction. These parameters are tested: type of fiber, extraction mode, incubation time and temperature, stirring speed, extraction time, desorption time, bake out time and temperature, vial penetration.

Principle SPME

Solid phase microextraction (SPME) was developed to address to need to facilitate rapid sample preparation in the laboratory. In the technique, a small amount of extracting phase that is dispersed on a solid support (fiber) is exposed to the sample for a well-defined period of time. In one approach, a partitioning equilibrium between sample matrix and the extraction phase is reached. In this case, convection conditions do not affect the amount extracted. In a second approach that uses short time pre-equilibrium extraction, if convection or agitation or both are constant, then the amount of analyte extracted is related to time. Quantitation can then be performed based on time accumulation of analyte in the coating. SPME is considered to be complete when the analyte concentration has reached distribution equilibrium between the sample matrix and the fiber coating. In practice, this means that once equilibrium has been reached, the extracted amount is constant within the limits of experimental error and it is independent of further increases of extraction time.

The distribution coefficient K_{fs} of the analyte between the fiber coating and sample matrix is defined as:

$$K_{fs} = \frac{C_f^{\infty}}{C_s^{\infty}} \quad (1)$$

The equilibrium conditions can be described by equation (2), according to the law of mass conservation :

$$C_0 \cdot V_s = C_s^{\infty} \cdot V_s + C_f^{\infty} \cdot V_f \quad (2)$$

We can combine and rearrange equations (1) and (2) and finally, the number of moles of analyte *n* extracted by the coating can be calculated from equation (3):

$$n = C_f^{\infty} \cdot V_f = C_0 \cdot \frac{K_{fs} \cdot V_s \cdot V_f}{K_{fs} \cdot V_f + V_s} \quad (3)$$

Equation (3) indicates that the amount of analyte extracted onto the coating (*n*) is linearly proportional to the analyte concentration in the sample (C_0), which is the analytical basis for quantification using SPME.

Operating parameters

For improving the kinetics of the mass transfer between sample and fiber we explored these issues:

- In order to achieve maximum efficiency of extraction of the pesticides from the spiked aqueous solution, three different fibers, PDMS 100 µm, PDMS 65 µm, PDMS 30 µm were initially evaluated in this study
- Fiber SPME can be performed in two basic modes: direct immersion and head space. In direct extraction, the fiber coating is dipped into the aqueous sample and allows analytes to partition between the coating and the matrix. In headspace extraction, the fiber is placed in the headspace above the aqueous matrix during extraction. Depending on the volatility of compounds is chosen way of work

- The effect of incubation temperature was investigated by varying in the range of 50-90 °C and time in the range 1 – 15 minutes.
- The extraction time was evaluated from 3 to 30 minutes
- The desorption time was evaluated from 1 to 8 minutes
- The bake out time was investigated by varying in the range of 5 – 20 minutes and temperature in the range 200 – 250^{o}C.
- Stirring speed was tested in range 250 – 350 rpm

Studies are accompanied by figures and graphical representations of the concentration depending on the parameter analysed.
All experiments were carried out in the spiked aqueous solutions (deionized water enriched with CRM which contains organchlorine pesticides mix in acetone) using an GC/MS Agilent – MPS Gerstel with automated device SPME.

SPME advantages

SPME integrates sampling, extraction, concentration and sample introduction into a single solvent-free step. Analytes in the sample are directly extracted and concentrated to the extraction fibre. The method saves preparation time and disposal costs and can improve detection limits. The additional advantages are that SPME requires small sample volume. It has been routinely used in combination with gas chromatography (GC) and GC/mass spectrometry (GC/MS) and successfully applied to a wide variety of compounds, especially for the extraction of volatile and semi-volatile organic compounds from environmental, biological and food samples.

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III-P-2. LEAD DETERMINATION USING A SYSTEM BASED ON THE REDUCTION OF NON-FLUORESCENT RESAZURIN TO FLUORESCENT RESORUFIN

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The purpose of this paper is to design and implement a flow injection assembly for the kinetic fluorescence determination of lead. The proposed method studies the influence of lead on the resazurin - sodium sulphide

reaction in alkaline environment. Fluorescence measurements were performed at 590 nm.
The lead sample is injected in a bi-distilled water carrier flow and mixes a sodium hydroxide flow. The resulting flow then mixes a sodium sulphide - resazurin flow. The reaction takes place in a reaction loop. Parameters such as resazurin, NaOH and Na_2S concentrations, injected volume of lead, flow rates and length of the reaction loop were studied and optimised. The method is simple, sensitive, fast, automatic and not very expensive.

III-P-3. CHEMILUMINESCENT REACTIONS FOR MONITORIZATION OF POTENTIAL TOXIC COMPOUNDS IN WATERS

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Chemiluminescence (CL) reaction mechanism describing the effect of thiols (R-SH) on luminol oxidation is still unknown, although several papers reported the CL generated by these compounds in reaction with luminol, in the absence of H_2O_2 but in the presence of a metallic catalyst in alkaline media.

With this in mind, a flow injection analysis (FIA) system based on CL reaction given by luminol and mercaptoacetic acid in the presence of potassium ferricyanide as co-oxidant, in alkaline medium, was designed and optimized for several heavy metals determination in waters.

III-P-4 EVALUATING THE RESISTANCE OF AQUATIC HETEROGENEOUS ECOSYSTEMS TO CHANGES OF METAL CONTAMINANT LEVELS

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Any buffer system has a certain potential reserve, which controls equilibrium and keeps one of the equilibrium parameters constant. The lack of information about the metal buffer properties of ecosystems can be explained by the absence of the quantitative theory that may predict their buffer behaviour. The low buffer capacity of ecosystems, that are unable to preserve a constant equilibrium parameter, leads to disastrous environmental consequences. We have proved that buffering of intensive thermodynamic variables in ecosystems significantly differ from the classical buffering in aqueous solutions. Whereas buffering in a mono-phase system is controlled by homogeneous equilibria, heterogeneous equilibria between solid (mineral) and aqueous phases, control such thermodynamic parameters of ecosystems, as the concentration, temperature and pressure. An essential characteristic of any buffer is its buffering capacity "β", which defines the change of equilibrium concentration of mobile components, as a result of their addition to or removal from the system. In this paper, a novel ion-molecular buffer approach for estimating buffer capacities for natural water – mineral equilibria has been developed. Using this approach, the buffer capacity regard with any component of the heterogeneous system can be assessed. A remarkable proportional relation between different capacities with respect to ions of the compound distributed between two phases has been established. The influence of major thermodynamic parameters, as temperature, pH and main chemical component concentrations of natural waters upon system buffer capacities has been investigated. It is expected that such approach will help to predict long-term effects in natural pollutant diminishing as a remediation option. The obtained results are indented to

provide researchers with a compulsory tool to set reliable limits of ion (including metal) levels in ecosystems.

III-P-5. INVESTIGATION OF MONITORING SYSTEMS FOR WATER QUALITY OF THE DANUBE RIVER IN THE BORDER REGION ROMANIA – BULGARIA

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Based on official data, a comparative analysis of the process of monitoring the Danube River in Romania and Bulgaria. The aim is to confirm the positive practices of each country in the cross-border region and to develop a comprehensive strategy for integrated unified cross-border monitoring of water quality of the Danube.

III-P-6. EFFECTS OF NUTRIENTS POLLUTION – PUBLIC AWARENESS CAMPAIGN

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Nutrient pollution originated from agricultural or household activities, is one of the main issues our modern world has to deal with. Due to the specific aspects this type of pollution implies - the uncertain nature of pollution source, the relative continuous character of the pollution process, the complex environment system implied (soil, surface waters, and ground

waters), these issues are difficult to manage and presume an integrated approach and a strategic perspective. Another aspect that gives this phenomenon a special status is the transborders pollution character.

Romania, as an EU member, has committed to accomplish the compelling liabilities derived from European Directives. Integrating the two directives in Romanian legislation - 2000/60/CE and 91/676/CEE – was achieved by amending the Law 107/1996 and GD 964/2000. These obligations regard achieving a balanced ecological and chemical state of waters, through measures that concern important water management issues: organic substances pollution, nutrients and hazardous substances pollution. In a specific approach included in the process of implementing the 91/676/CEE Directive, Romania has been initially assigned with nitrate vulnerable areas, for 255 regions, representing 8.64% of the total surface of the country and, respectively, 13.93% of the total agricultural surface.

Meeting the aforementioned Directives requirements imply technical, administrative and social proceedings. These arise from the main targets drafted in the project mainframe „Integrated Control of Nutrient Pollution", as follows: (i) reducing nutrients discharge in water bodies; (ii) promoting behavioral shifts at regional level; (iii) providing support in strengthening regulation and institutional capacity system.

Theoretically, the educational segment - formative and promoting, objectified in the project through component 3, defined as "Strategy for public informing and replication of project interventions", is designed to provide the necessary set of knowledge in the field, according to specific particularities of a complex target group - authorities, population from the rural environment, of different ages and occupations. The public awareness program, as part of the „Integrated Control of Nutrient Pollution" project, is structured in two major directions: providing of appropriate training services for target audience sections and media coverage - promoting shows, materials, and press appearances. By combining these instruments, the knowledge delivered directly to the targeted audience becomes nationally available.

III-P-7. AQUATIC ECOLOGICAL RISK ASSESSMENT OF CHEMICAL POLLUTANTS

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All the European norms related to chemicals risk characterization (industrial chemicals, pharmaceuticals, detergents, pesticides and biocides) require the aquatic risk evaluation using the sensitivity of living organisms at different trophic levels as a measure of environmental protection.
Traditionally, Ecological Risk Assessment has been used to investigate the effects of the release of particular chemical pollutants (toxicants) into the receiving "environment". Usually the aquatic risk involve literature data collecting and laboratory testing (own experimental data) to estimate the Predicted Exposure Concentrations of chemicals in the water (PEC aquatic) and the Predicted No-Effect Concentration on organisms (PNEC aquatic). If the ratio of PEC/ PNEC is < 1, no futher assessment is deemed necessary.
In Romania the research on aquatic ecological risk of hazardous chemicals, human farmaceuticals and detergents started in 2009 within three national projects. In the period of 2009 – 2013, aquatic toxicity bioassays were performed for 10 human farmaceuticals, 3 industrial hazardous chemicals and 2 type of surfactants. Ecological effects were characterised in terms of aquatic risk considering the national and international data and recognised Risk Assessment methodologies adapted at our laboratory conditions and indigenous organisms.
The most studied chemicals showed a relatively limited acute toxicity and the final results have reveled insignificant or low risks on aquatic organisms. These data have allowed to estimate the admisible limits of chemicals in natural water in order to complete the national norms concerning the surface water quality. There are still many gaps in national chemicals risk assessment concerning the indirect risks, bioacumulation, recalcitrants metabolites, sinergisms and lak of chemicals consumption databeses.

Keywords: toxicity bioassays, aquatic risk assessment, chemicals, PEC, PNEC

III-P-8. ISOLATION OF KERATINOPHILIC FUNGI FROM SOIL

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The soil represents an important reservoir of keratinophilic fungi. These fungi naturally colonize keratinous materials and play a significant role in the degradation of keratinized residues. Aim of this study was to determine the prevalence of keratinophilic fungi in farmyards. The isolation of keratinophilic fungi was performed using the Vanbreuseghem procedure. Several fungal strains belonging to *Aspergillus*, *Cladosporium*, *Fusarium*, *Penicillium* and *Trichophyton* genera were isolated from soil.

III-P-9. THE CONTENT OF TRACE ELEMENTS IN SOILS AND PLANTS NEAR THE HIGHWAYS OF THE REPUBLIC OF MOLDOVA

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The paper presents the results of determination of total and mobile forms of Mn, Cu, Zn, Pb in soils and plants near the traffic routes. Research has highlighted the influence of emissions on the accumulation degree in the

soils (0-10 cm) and plants of Mn, Cu, Zn, Pb in south direction in the interval of 5-15 m and 50-100 m distance from the road. Forest in the neighborhood serves as a barrier to accumulation of microelements, depositing them in high concentrations in the litter. Accumulation of trace elements is more intense in vegetables cultivated near the highways, with high concentrations in leaves (cabbage, tomatoes). The straw cereals accumulate trace elements below the maximum allowed. It is recommended that the distance of 100 m from the road (on both sides) to be grown only industrial crops, excluding the growing of fruit, vegetables and fodder plants. In these areas it is necessary to apply phytotechnical measures, soil pH should be maintained at values above 6.2-7.0. On these soils will be administered increased amounts of organic fertilizers. Do not allow cattle grazing on the brink of the roadside.

III-P-10. NOVEL ASPECTS OF MICROBIAL DE GRADATION OF POLY(VINYL ALCOHOL) AND WOOD BLENDS

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The accumulation of plastic waste is considered a major contributing factor to the environmental degradation. Poly[vinyl alcohol) (PVA) is present in various applications and the degradability of its blends could be improved by addition of renewable raw materials. Several PVA – wood blends were prepared and incubated with a fungal strain. The effects produced by microorganism activity on polymeric substrates were evaluated by SEM observations, FTIR spectra and mechanical measurements.

III-P-11. Pb (II) REMOVAL FROM AQUEOUS SOLUTIONS BY FLOTATION WITH ATYPICAL COLLECTOR

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Lead is present in the aqueous media from different industry. Although currently is apply different technologies for lead removal, its toxicity to aquatic organisms and environmental damage justify the performing research and in order to efficientisation and optimisation and study of new methods. Among these methods are found the group of adsorptive bubble separation methods of which flotation is part, and effective method due to its characteristics: high efficiency, selectivity, adaptability, opportunity to recover obtained foam in order to processing etc. The condition for the flotation process achievement is hydrophobicity of species that make the separation object. In the case of hydrophilic species (Pb(II)aq) hydrophobisation is achieved through interaction with a collector reagent. In order to avoid further pollution is required further study of new collectors as well as evaluating acute toxicity on aquatic organisms both the collector and the effluent resulted from the flotation process. In this paper are studied possibility of using caffeic acid (CA)(acid 3-(3,4—dihidroxifenil)propenoic,$C_9H_8O_4$) as collector in flotation by: testing of the surfactants properties, hydrophobic agent function with the formation of the Pb (II) insoluble complexes. Caffeic acid is considered atypical collector because the chain is non linear (C>8) and has more polar groups. Using of CA as collector reagent has considered the fact that it is present in the plant (medicinal plants (Carissa spinarum L. Root, Ixora javanica flowers (Bunga Soka flower), Centaurium umbellatum Gil (Tintaura), fruits, vegetables and spices) in the products obtained from the processing in

pharmaceutical purposes and it is extracted from the plant debris. Also were made laboratory experiments in order to establish acute toxicity indices of the caffeic acid and of the effluents with Pb(II) that were resulted from the flotation process made for removal of Pb (II) ions from aqueous solutions on aquatic organisms (fish Cyprinus Carpio; Crustaceans: Daphnia Magna; Algae: Selenastrum Capricornutum; Bacteria: Vibriofischeri; Other bacteria gram + and gram -). The obtained results (% R> 99.93) after removal of Pb (II) from aqueous media by flotation with caffeic acid as collector show the decreasing Pb(II) concentration under the legal limit, which confirms the collector quality of the CA.

III-P-12. TRANSPOSITION OF EU ENVIRONMENTAL LEGISLATION FOR PROTECTING WATERS IN BULGARIA

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The chronology and the extent to which Republic of Bulgaria laws in water protection field correspond to EU legislation is presented in the paper. The key issues and opportunities for prevention, quality control and river waters protection from different types of contaminants are analyzed.

SECTION IV

PRESENTATION OF COMPANIES AND/OR PRODUCTS, APPARATUS AND EQUIPMENT IN THE ENVIRONMENTAL PROTECTION FIELD

- oral presentations

- ORAL PRESENTATIONS -

IV-O-1. BUREAU VERITAS SUPPORTS CLIENTS AND ENVIRONMENT THROUGH ENMS CERTIFICATION PROMOTION

Cristi Prescornita – Sales & Marketing officer

BUREAU VERITAS ROMANIA CONTROLE INTERNATIONAL S.R.L.

Bureau Veritas helps its clients to improve their performances by offering services and innovative solutions in order to ensure that their products, infrastructures and processes meet standards and regulations.

A quick word on Bureau Veritas with details about geographic footprint, worldwide organization, products portfolio - focus on "Sustainability & Climate change Portfolio**"** and "Resource Management" – containing ISO 50001.

Everything or almost about Energy Management Systems:

- Introduction on ISO 50001 - genesis of the standard:
  - weight of energy savings versus other technologies;
  - what is the interest of the companies related to energy management systems => competitive advantages and significant savings;
  - why would organizations invest in energy management - **Dow Chemical case study**;
  - the meaning of energy management systems - the comprehensive and systemic approaches of management systems to unlock energy savings;
  - origin and development of energy management systems

    DS 2403:2001 => EN 16001 => ISO 50001;

- Focus on some key requirements of ISO 50001: energy policy; review and baseline of energy consumption; relationships between energy consumption and relevant variables; periodic forecast of energy consumption; energy consumption influence in design and procurement; energy management review.
- Some benefits of operating an energy management system according to ISO 50001: objective and exhaustive vision of energy uses and consumption; understanding the energy consumption and other impacting variables; projection of future consumption and list of savings opportunities - **future improvements = future investments?**; hierarchy of energy uses and consumption; establish a consumption baseline; continuous improvement and savings; awareness and motivational lever for staff, customers, suppliers, collaborators; reporting tool for stakeholders and proof of commitment for sustainability; evolution of necessary investments related to course of cost savings.
- Applicable businesses - **Choice Hotels case study**;
- How to start ISO 50001 (implementation lead time will depend on organization's maturity, processes complexity, means and internal competence in Energy).
- Some references of Bureau Veritas for energy management training and certification.
- **First globally Energy Management System certification** - Reliance Infrastructure Ltd - Dahanu Thermal Power Station – India – **issued by Bureau Veritas 31st January 2011.**

With the hope that I've sparked at least curiosity if not even interest I'm just waiting to meet you!

BUREAU VERITAS

Move Forward with Confidence

IV-O-2. S.C. DFR SYSTEMS S.R.L.

DFR company is operating since 1996 and has as main activity the production and commercialization of the equipments for water treatment and purification. DFR Systems has continuously developing the range of products offered to the clients. DFR has been producing equipments for water disinfection with UV for domestic/industrial use and compact wastewater treatment plants since January 2005.

With the help of suppliers and employees, DFR Systems offers a range of equipment including: compact wastewater treatment plants, water systems with ultraviolet disinfection, grills and screening systems; pumps for clean or industrial waste; pneumatic obturators for intervention; chlorination water systems; modular water tanks. Also, DFR SYSTEMS provides consultancy and training, technical expertise, technical assistance and designing services to the water treatment marketplace and vacuum drainage. DFR Systems is a certified body in accordance with ISO 9001:2008, 14001:2005 and 18001:2008.

The list of clients is already very large, including the majority of Romanian local water authorities and famous companies in all fields of work (hotel, business/construction, food, alcoholic, beverages and soft drinks, industrial).

The Compact wastewater treatment plants (named Compact WW) developed by DFR Systems are realised via a new and innovative concept (incorporating the MBBR process concept). In order to protect this newly equipment, DFR Systems has a patent. During several yeas of R&D, DFR Systems has developed theoretical and experimental researches for realization of the Compact WW range. Also, SC DFR Systems SRL has 2 patent requests for a flotation installation and 2 registred marks (Compact WW and MyUV).

DFR Systems is collaborating with a number of other contractors in various development projects. DFR has a dynamic R&D team and it is always interested in developing new products and services for it's clients. DFR Systems has been participating in research projects since 2007. DFR contracted four projects in the last years, three of which DFR is the Lead Partner.

IV-O-3. NOVAINTERMED S.R.L.

Novaintermed was established in 1994 to supply with the medical equipment the health care sector which was poorly endowed.

During time will developed and improved our product ranges and solutions on additional fields like control quality in different kinds of industries, environment, veterinary.

Its major areas of expertise are:

- Consultancy and implementation of Turn- Key Projects
- Distribution of industrial and clinical laboratory equipment and reagents and of hospital equipment
- Technical service for industrial and clinical laboratory and for hospital equipment

A professional team of doctors, biochemists and engineers carry the activity.

Novaintermed is an ISO certified company by the reputable German TUV Turingen Certifying Body.

It is ISO 9001; ISO 14001; ISO 18001 and ISO 28000 certified.

Briefing of Turn –Key Projects Romania and abroad between 500.000 EUR and 5.000.000 EUR

2005 - Harmonization of the energy efficiency Acquis –supply Romania

2005 - Supply of equipment for Central Laboratory for Phytosanitary Quarantine Equipment (ICB02) Final beneficiary was the **Central Laboratory for Phytosanitary Quarantine Bucharest Romania**

2007 - ICB1 - Medical Equipment for Emergency Room of ICU

2009 - Supply of specialized equipment for endowment of 150 school laboratories and workshops, Lot 1 and Lot 9

2010 - Supply of equipment for support to NCU/PCA and twinning activities in Azerbaijan

2010 - Equipment for paraclinical Pediatric Respiratory Medicine in the Field / CCMRP Lot 2 - line of analysis and cultivation of stem cells for County Hospital Sibiu, Romania

2011 - Establishment of Mobile Laboratories for Pathogens up to Risk Group 4 in combination with CBRN Capacity Building in sub-Saharan Africa.

2011 - Supply of laboratory equipments for National Veterinary Institute, in Zagreb, Croatia.

2011 - Supply of field equipment for National Natural Reservations for the Ministry of Environment, Romania.

2011 - Supply of rabies vaccines and equipment for surveillance of animal diseases to The Veterinary Institute of Serbia, EU 09SER01/07/11.

2012 - Supply of laboratory equipments for water analysis to the Water&Sewer Institution from Galati, Romania.

2012 - Supply of laboratory equipments for precious metal testing for the Laboratory of precious metal testing from the Authority of Consumer Protection, Bucharest, Romania.

2012 - Supply of semi-automatic ELISA systems to the Institute of Transfusional Hematology from Bucharest, Romania.

IV-O-4. NITECH S.R.L.

Nitech – your partner in laboratory field

Nitech is one of the top Romanian suppliers of high-technology instruments for general laboratory, diagnostic and research purposes.

Company profile

Nitech was founded in 2001 in Bucharest. Using our many years of experience and collaboration with our suppliers as well as our customers, we have designed a custom made support to suit all requirements and budget.

Nitech supplies laboratory equipment including necessary services for commissioning, installation, putting into operation, training, sales and after sales service for numerous applications in production, research and development.

We are acting on public and private market sectors in the following industries:

- Life Sciences – Environmental (Water & Air monitoring)
- Agriculture (Food, Feed & Dairy, Oenology) – Plant Pathology
- Pharmaceutical – Medicine – Bioscience – Research and Education
- Petroleum and Petrochemical Industry – Mining – General Laboratory Needs

Nitech provides: 100% coverage of Romanian territory, 24/24 h sales and technical assistance, maintenance and service facilities, warehouse, conference hall.

Our Product Managers and Service Engineers have been trained in Romania and abroad (Europe, USA) in order to provide specialized technical support, product selection and training to all our customers.

Nitech offers to all its customers the most competitive price/quality ratio and guarantees and certifies that all offered services comply with ISO 9001:2008, OHSAS 18001:2007, ISO 28001:2007, ISO 14001:2005 and ISO 13485:2004 standards.

Equipment for water and environment quality control laboratory:

- air quality monitoring
- gas liquid chromatography
- liquid chromatography
- accelerated solvent extraction system
- solid phase extraction systems
- nitrogen analysis by Dumas method
- mass spectrometric measurement of isotope relations (IRMS) of stable isotopes 15N, 13C, 34S, 18O or 2H in connection with elemental analysis
- purifying systems
- MS gas analyzer
- noise maps evaluation
- determination of temperature/humidity/light intensity
- meteorological stations
- microbiological water determination
- heavy metal analysis
- chemical oxygen demand of microorganism
- molecular absorption and atomic absorption spectroscopy
- microwave digestion systems
- TOC analysis

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