KRATKI SADRŽAJI U DRUGIM ČASOPISIMA OBJAVLJENIH PREDAVANJA

ON THE METHOD OF EXTRACTING AND IDENTIFYING RESIN ACIDS IN WATER AND PLANKTON

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The method of extracting and identifying linked i. e. esterified resin acids is analysed. It has been applied to the samples of lake water and sea plankton taken at different distances from the outlet of pulp industry waste discharge waters. The research was carried out in order to determine the cause of a large number of fish dying in the vicinity of the pulp industry.

The method applied was the following: first the lipids were extracted by means of the chloroform and methyl alcohol mixture (2:1 ratio). Then the alkaline hydrolysis of the lipids was carried out by ethyl alcohol potassium hydroxide and the esterification by methyl alcohol sulphuric acid followed. Fat acids are converted into esters and are therefore easily separated from non-esterified resin acids. Applying the method of thin-layer chromatography, resin acids were obtained by extraction and then esterified by means of diazomethane at 0°C. The gas chromatographic analysis was performed on the »Aerograph 1520« apparatus in EGSS-Y and SE-30 columns of organic silicon polymers.

The results obtained indicate the presence of resin acids in the analysed samples of water and plankton, which fact should be taken into consideration in determining pollution.

POSTUPAK ZA IZDVAJANJE I DOKAZIVANJE SMOLNIH KISELINA IZ VODE I PLANKTONA

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Razrađen je postupak za izdvajanje i identifikaciju vezanih, tj. esterificiranih, smolnih kiselina. Postupak je primijenjen na uzorke jezerske vode i morskog planktona uzimane na različnim udaljenostima od mjesta ispusta otpadnih voda celulozne industrije. Istraživanje je izvršeno da bi se našao uzrok ugibanja ribe u blizini celulozne industrije.

Postupilo se ovako: lipidi su ekstrahirani s pomoću smjese kloroforma i metilnog alkohola u omjeru 2:1. Osim toga izvršena je alkalna hidroliza lipida s pomoću etil-alkoholne kalijeve lužine i esterifikacija s pomoću metil-alkoholne sumporne kiseline. Masne kiseline prijeđu u estere pa se lako odvoje od neesterificiranih smolnih kiselina. Postupkom tankoslojne kromatografije odvoje se smolne kiseline i esterificiraju diazometanom na 0°C. Plinska kromatografska analiza izvršena je s pomoću aparata »Aerograph 1520«, na kolonama organosilikonskih polimera EGSS-Y i SE-30.

Dobiveni rezultati pokazuju da su u istraženim uzorcima vode i planktona nazočne smolne kiseline, pa bi to valjalo uzeti u obzir pri prosuđivanju otrovnosti.

ODREĐIVANJE ŽIVE

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Za određivanje žive u otpadnim vodama i njihovim sedimentima istraživana je metoda akumulacije i anodne oksidacije žive, bezplamena atomska apsorpcija i potenciometrijska titracija uz prisutnost ion-selektivne elektrode. Akumulacija i anodna oksidacija žive na elektrodi načinjenoj od grafitne paste studirana je 1×10^{-4} do 5×10^{-8} M otopina žive u tiocijanatnom osnovnom elektrolitu. Raspravljani su problemi koji se pojavljuju, a dobiveni rezultati uspoređeni su s metodom bezplamene atomske apsorpcije. Nadalje, ispitivana je mogućnost primjene ion selektivne elektrode-srebrni sulfid za potenciometrijsko određivanje žive.

Na temelju dobivenih rezultata može se zaključiti da je metoda atomske apsorpcije najpogodnija za analizu žive.

DETERMINATION OF MERCURY

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For the determination of mercuric ion in waste waters and their sediments the technique of stripping analysis, non-flame atomic absorption and the ion-selective electrode have been investigated. The stripping voltametry at graphite paste electrode (nujol paste and paraffine paste) of mercury(II) in concentration range 1×10^{-4} to 5×10^{-8} M in thiocyanate media was studied. The results and the problems encountered in this work are discussed and compared with the results obtained with non-flame atomic absorption. Furthermore, attempt was made to apply silver sulphide ion-selective electrode for the potentiometric determination of mercury.

On the basis of the results obtained, it can be concluded that atomic absorption spectrophotometry shows priority for the determination of mercury in waste waters and their sediments.

ODREĐIVANJE TEŠKIH METALA U MORU

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Uspoređivani su elektroanalitički postupci za određivanje tragova Zn, Cd, Pb i Cu u morskoj vodi. Pri tom su upotrijebljene sporo kapajuće živine elektroda (SDME), viseća živina kap (HMDE), složena grafit-živa (CMGE) i rotirajuća staklasto-grafitna elektroda (RGCE). Studirana je adsorpcija cinka iz otopina različite kiselosti na pyrex staklo, silikonizirano pyrex staklo i polietilen.

Ustanovljeno je da je polietilen najpovoljniji materijal za ćeliju, te je predložena univerzalna ćelija za određivanje tragova teških metala. Pokazano je da je za određivanje Zn u morskoj vodi najprikladnija metoda kojom se koristi SDME [J. Electroanal. Chem. *9* (1965) 290], a za istodobno određivanje tragova Cd, Pb i Cu ona kojom se koristi RGCE [J. Electroanal. Chem. *27* (1970) 273]. Razmotrene su kalibracijske krivulje za Zn, Cd i Cu u morskoj vodi kod različitog pH.

(*In extenso:* Thalassia Jugosl., u tisku).

DETERMINATION OF HEAVY METALS IN SEA WATER

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To found the most suitable electroanalytical method and the best cell material for the determination of Zn, Cd, Pb and Cu in sea water, the methods employing slowly dropping mercury (SDME), a hanging mercury drop (HMDE), a composed mercury graphite (CMGE) and a rotating glassy-carbon electrode (RGCE) have been compared, and the adsorption of Zn on pyrex glass, siliconized pyrex glass, and polyethylene at different pH values has been studied. The polyethylene was found to be the best material for the cell, and a universal all-plastic cell for the determination of heavy metals is proposed.

It was shown that the most convenient procedure for the determination of Zn in sea water is the method which employs the SDME [J. Electroanal. Chem. *9* (1965) 290] and for Cd, Pb and Cu, the one which employs the RGCE [J. Electroanal. Chem. *27* (1970) 273]. Calibration curves for Zn, Cd, Pb and Cu naturally present in sea water at different pH values are presented and discussed.

(*In extenso:* Thalassia Jugosl., in press)

ELEKTROANALITIČKO ODREĐIVANJE POVRŠINSKIH AKTIVNIH TVARI U RAZRIJEĐENIM VODENIM OTOPINAMA

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Polarografska metoda diskontinuirano promjenjivog potencijala u području frekvencija od 4—128 Hz, poznata kao tehnika Kalousekova komutatora, primijenjena je za određivanje koncentracija nekih površinski aktivnih tvari u razrijeđenim vodenim otopinama. Mjereni su desorpcijski valovi s pomoću živine kapajuće elektrode i viseće živine kapi. Na osnovi koncentracijske ovisnosti »visine vala« izvršeno je analitičko određivanje tritona-X-100, natrijeva lauril sulfata, nekih industrijskih detergenata i masnih kiselina u vodenim kloridnim otopinama. Također su ispitivane smjese ovih površinski aktivnih tvari s namjerom da se odredi utjecaj pojedinačnih tvari u svakoj smjesi.

Ovaj problem je zanimljiv zbog daljnjeg studija prirodnih vodenih sustava, gdje se normalno pojavljuju smjese različitih površinski aktivnih tvari, kao što su prirodni produkti te industrijske i urbane nečistoće.

(*In extenso:* S. Stilinović, diplomski rad, Prirodoslovno-matematički fakultet, Sveučilište u Zagrebu, 1973)

ELECTROANALYTICAL DETERMINATION OF SURFACE ACTIVE SUBSTANCES IN DILUTED AQUEOUS SOLUTIONS

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The polarographic method of discontinuously changing potential in the frequency range from 4c/s to 128c/s, known as Kalousek commutator technique, was used for the determination of concentration of some surface active substances in dilute aqueous solutions. The desorption waves were measured with the dropping mercury electrode (DME) and the hanging mercury drop electrode (HDME). On the basis of the concentration dependence of the »wave height« the analytical determination of triton-X-100, sodium lauryl sulphate, and a few industrial detergents and fatty acids in aqueous chloride solutions was carried out. The mixtures of these surfactants were also studied to distinguish adsorption effects of particular substances in each mixture. This problem is of interest for the further study of natural aquatic system which usually contain a mixture of different surfactants, natural products, as well as industrial and urban pollutants.

(*In extenso:* S. Stilinović, B. Sc. Thesis, Faculty of Science and Mathematics, University of Zagreb, 1973)

ODREĐIVANJE STUPNJA ONEČIŠĆENJA MORSKE VODE MJERENJEM POLAROGRAFSKOG MAKSIMUMA KISIKA

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Analizirani su uzorci morske vode polarografskom metodom, koja se osniva na mjerenju supresije polarografskog maksimuma kisika u prisutnosti površinski aktivnih tvari (Thalassia Jugoslavica, u tisku).

Supresija kisikova maksimuma u uzorcima vode sjevernog Jadrana (dubina 5—30 m) ekvivalentna je učinku količine tritona-X-100 od 2 do 3 mg/l.

Nađena je korelacija između vrijednosti »ekvivalenta tritona-X-100« i stvarnog sadržaja površinski aktivnih tvari u morskoj vodi. Razmatra se primjenjivost ove metode za određivanje stupnja onečišćenja mora organskim materijalom.

DETERMINATION OF THE SEA WATER POLLUTION LEVEL BY MEASUREMENT OF THE POLAROGRAPHIC MAXIMUM OF OXYGEN

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Sea water samples were analysed by the polarographic method based on the supression of the polarographic maximum of oxygen in the presence of surfactants. (Thalassia Jugoslavica, in press).

The supression of the oxygen maximum in the sea water samples of the north Adriatic (5—30 m depth) is equivalent to the effect of 2—3 mg Triton-X-100/l.

The »Triton-X-100 equivalent« values are correlated to the actual content of surfactants present in the sea water. The applicability of the method for the determination of the organic pollution level is discussed.

EFEKT GAŠENJA TRIPLETNOG STANJA SUMPORNOG DIOKSIDA KISIKOM I DUŠIČNIM MONOKSIDOM

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Ispitivana je cis-trans i trans-cis izomerizacija butena-2 koja je fotosenzitivirana sumpornim dioksidom pri raznim uvjetima. Energija tripletnog stanja cis i trans butena-2, koje su određene metodom perturbacije kisika iznose 70 ± 2 kcal za cis-izomer i > 76 kcal za trans-izomer. Konstante brzina reakcije gašenja pobuđenog tripletnog stanja sumpornog dioksida s tipičnim gasiteljima tripleta kisikom i dušičnim monoksidom određene su na osnovi cis-trans fotoinducirane izomerizacije butena-2. Dok je nađeno da je konstanta brzine gašenja $^3SO_2$ sa NO reda veličine broja sudara ($7,8 \pm 1,9 \cdot 10^{10}$ 1 $mol^{-1}s^{-1}$), datle je sa O_2 iznenađujuće mala ($2,4 \pm 0,5 \cdot 10^8$ 1 $mol^{-1}s^{-1}$). Raspravlja se o mogućem značenju tih procesa gašenja za onečišćenje zraka.

[*In extenso:* Z. Naturforsch. *27A* (1972) 1401]

THE QUENCHING EFFECT OF OXYGEN AND NITRIC OXIDE ON TRIPLET SULPHUR DIOXIDE

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The sulphur dioxide photosensitized cis-trans and trans-cis isomerization of butene-2 was investigated under a variety of conditions. The triplet energies of cis- and trans-butene-2 were determined by the oxygen perturbation method, and found to be 70 ± 2 and > 76 kcal/mol respectively. The rate constants for the quenching reaction of excited triplet sulphur dioxide with the typical triplet quenchers oxygen and nitric oxide were determined on the basis of the cis-trans photoinduced isomerization of butene-2. Whereas the rate constant for $^3SO_2$ quenching by NO was found to be of the order of the collision number ($7.8 \pm 1.9 \times 10^{10}$ l/mol sec), that with O_2 was surprisingly low ($2.4 \pm 0.5 \times 10^8$ l/mol sec). The possible significance of these quenching processes in air pollution will be discussed.

[*In extenso:* Z. Naturforsch. *27A* (1972) 1401]

VRIJEDNOST SREDSTAVA ZA STABILIZACIJU PRI ODREĐIVANJU ATMOSFERSKOG SUMPORNOG DIOKSIDA

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Osnovni problem pri određivanju sumpornog dioksida u atmosferi jest sprečavanje oksidacije pri sakupljanju i čuvanju uzoraka. Prijašnji podaci dobiveni su sakupljanjem uzoraka u natrijevoj lužini i ta se metoda još uvijek navodi u priručnicima.

U toku primjene ove metode primijetili smo međutim velike gubitke. Provjerom metode sa smjesama sumpornog dioksida i zraka u laboratorijskim uvjetima dobivena je dobra djelotvornost. No ako je plinskoj smjesi dodan i dušikov dioksid, koji se praktički uvijek nalazi u atmosferi, efikasnost metode bila je slaba. Prema tome sredstva za stabilizaciju mogu zaštititi sumporni dioksid od oksidacije kisikom iz zraka, ali ne oksidansima istodobno prisutnim u atmosferi. Zbog tih razloga mogu se svi prijašnji podaci dobiveni ovom metodom smatrati nepouzdanim a svako daljnje navođenje ove metode u priručnicima sasvim nedopustivim.

THE VALUE OF STABILIZERS IN THE DETERMINATION OF SULPHUR DIOXIDE IN THE AIR

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The basic problem in the determination of sulphur dioxide in the atmosphere is to prevent oxidation during the collection and storage of samples. Previous data were obtained by collecting the samples in sodium hydroxide. The method is still reported in handbooks.

While applying the method, however, we observed large losses. We checked it with the mixtures of sulphur dioxide and air in laboratory conditions and obtained a good efficiency. If nitrogen dioxide, which is practically always present in the atmosphere, was added to the gaseous mixture, the efficiency of the method was poor. Consequently, stabilizers can protect sulphur dioxide from oxidation with the oxygen from the air, but not from oxidation with oxidizing agents simultaneously present in the atmosphere. For these reasons all earlier data obtained with this method can be regarded as unreliable and any further reporting of this method in handbooks quite inadmissible.

[*In extenso:* Arh. hig. rada, 25 (1974) 27]

NEOPHODNOST DOPUNE I IZMJENE JUS-a M.R4.020 ZA ISPITIVANJE SOBNIH PEĆI NA ČVRSTO GORIVO

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Osim klasičnih konstrukcija sobnih peći, pojavljuju se i kod nas savremene konstrukcije tzv. trajno gorećih peći sa automatskom regulacijom. To su većinom peći stranih licenci, čije tablice nose podatke proizašle iz testiranja sa stranim ugljevima ili malodimnim čvrstim gorivom kakvo mi još nemamo, a u uputstvima se deklarišu kao pogodne i za naše lignite.

Naš JUS M.R4.020 načinjen je modifikacijom DIN-a 18890 koji uopšte ne zadovoljava naše potrebe.

Razlozi za to su:

— što ni DIN ni JUS ne ocjenjuju peći sa stanovišta minimalne emisije čađi i katrana, dok u tu svrhu danas postoji prihvatljiva metoda.

— JUS ne definiše dovoljno precizno uslove ispitivanja, a time ni utvrđivanje kapaciteta i stepena korisnosti što dovodi do proizvoljnih zaključaka. Ovo nije slučaj kod DIN-a.

Iz ovih konstatacija proizlazi nužnost prerade i dopune JUS M.R4.020 jer u protivnom nemamo prihvatljivog kriterijuma za ocjenu sobnih peći na čvrsta goriva, kako u pogledu zagađivanja vazduha, tako i u pogledu utvrđivanja kapaciteta, stepena korisnosti i uputstava za rad.

(In extenso: Bilten Jugoslavenskog zavoda za standardizaciju, u tisku)

NECESSITY TO CHANGE AND SUPPLEMENT THE YUGOSLAV STANDARD JUS M.R4.020 FOR TESTING SLOW COMBUSTION STOVES FOR SOLID FUEL

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Besides stoves of classical design a production of slow combustion stoves with an automatic burning regulator (on foreign licence) has also started in this country. The data supplied with these stoves are based on burning foreign kind of fuel which is not available here. Nevertheless the stoves are recommended for use here too. The Yugoslav Standard JUS M.R4.020 is in fact the modified German Standard DIN 18890 and does not meet our needs. The reasons are the following:

— Neither DIN nor JUS estimate the stoves from the point of view of minimum smoke and tar emission although we have an acceptable test method, which is used for the measuring of domestic stove smoke.

— JUS does not define clearly enough the testing conditions, neither does it define the stove capacity and yield rate. As the result of such an incomplete definition the conclusion cannot be reliable. This is not the case with DIN Standard. Consequently, JUS M.R4.020 should be redone and completed. Otherwise we have not got an acceptable criterion for the value of domestic stoves for solid fuel.

(In extenso: Bilten Jugoslavenskog zavoda za standardizaciju, in press.)

ISTRAŽIVANJE KONCENTRACIJE AEROSOLA PESTICIDA ZA VRIJEME ZAPRAŠIVANJA POLJOPRIVREDNIH KULTURA

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Proučavanje toksičnih svojstava pesticida započeto je u vrijeme nagla porasta njihove primjene. Na žalost, ne pridaje mu se ni izdaleka ono značenje koje zaslužuje. Pored pomanjkanja dovoljnog broja specijaliziranih kadrova za organizaciju i provedbu mjera zaštite bilja, još je veći problem zaštita radnika koji je izložen djelovanju kemijskih preparata.

Da bi se utvrdio utjecaj ovih preparata na zdravlje radnika pri testiranju, potrebno je znati koji su sve činioci prisutni i kojim intenzitetom djeluju.

U ovom radu prikazani su rezultati ispitivanja aerosola iz uzoraka zraka uzetog za vrijeme tretiranja poljoprivrednih kultura s Pepeinom S-50 (djelatna tvar DDT), te prašine pri zaprašivanju sjemena Radosanom (djelatna tvar organski vezana živa). Dobiveni rezultati prikazani su tabelarno.

Iz rezultata se može zaključiti da na mnogim radnim mjestima koncentracija aktivne tvari DDT i organski vezane žive prelazi i nekoliko puta maksimalno dopuštene koncentracije.

(*In extenso:* Sigurnost, 1974, br. 4)

INVESTIGATION OF AEROSOL CONCENTRATION OF PESTICIDES DURING THE TREATMENT OF AGRICULTURAL PRODUCE

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The experts began to study the toxic properties of pesticides at the time of the rapid increase of their utilization. Regretfully, not nearly so great a significance is attached to this study as it deserves. Besides the lack of sufficient number of experts specialized in organization and materialization of plants safety measures, another even greater problem is how to protect the worker exposed to the effect of chemical preparations.

In order to establish the influence of these chemical preparations upon the workers and their health during treatment, it is necessary to know all factors involved and the intensity of their action.

This paper presents the results of investigations of aerosols from the air samples taken during the treatment of agricultural produce with Pepein S-50 (active substance DDT) as well as of dust during the treatment of seed with Radosan (active substance organically bound mercury). The results obtained are given in tables.

On the basis of the results it can be concluded that at many work places the concentration of the active substance DDT and organically bound mercury is even several times higher than the threshold limit values.

(*In extenso:* Sigurnost, 1974, No 4)

JE LI KONSTANTNA KONCENTRACIJA OLOVA U KRVI DOVOLJAN DOKAZ DA ČOVJEK NE AKUMULIRA OLOVO IZ ONEČIŠĆENE ATMOSFERE?

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Nedavno je objavljeno da je količina olova unesena u geosferu veća od one određene njegovom prirodnom brzinom cirkuliranja (M. Imboden i W. Stumm, Chimia, u tisku).

Izvršeni su proračuni na modelu, sličnom krvnom serumu, na osnovi nedavnih rezultata (H. Bilinski i W. Stumm, Chimia, u tisku) i računskog programa [F. Morel i J. Morgan, Env. Sci. Technol. *6* (1972) 58], da bi se pridonijelo objašnjenju činjenica objavljenih u najnovijoj literaturi [L. Hankin, J.

Milk Food Technol. 35 (1972) 86]: a) Koncentracija olova u krvi neovisna je o stupnju onečišćenosti zraka; b) Količina 200 μg Pb/l krvi uzrokuje smetnje u metabolizmu; c) Olovo se akumulira u zubima i kostima. Izgleda da su s pomoću pojednostavnjenog model sistema dobivena prikladna objašnjenja.

IS THE CONSTANCY OF LEAD CONCENTRATION IN BLOOD SUFFICIENT EVIDENCE FOR INFERRING THAT MAN DOES NOT ACCUMULATE LEAD FROM POLLUTED ATMOSPHERE?

HALKA BILINSKI

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It was reported recently that the most amount of lead added to geophere exceeds its natural cycling rate (M. Imboden and W. Stumm, Chimia in press). Model calculations were performed in a model system similar to blood serum, using recent data (H. Bilinski and W. Stumm, Chimia, to be published) and computer program [F. Morel and J. J. Morgan, Env. Sci. Technol. *6* (1972) 58], to throw more light on facts reviewed in the latest literature [L. Hankin, J. Milk Food Technol. 35 (1972) 86]: a) concentration of lead in blood is independent of the extent of air pollution; b) the amount of 200 μg Pb/l of blood causes metabolic disturbances; c) lead accumulates in teeth and bones. Satisfactory explanations seem to be obtained using a simplified model system.

UTJECAJ METEOROLOŠKIH PARAMETARA NA KEMIJSKI SASTAV OBORINA

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Republički sekretarijat za vodoprivredu SRH i
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Iznose se podaci o kvantitativnom kemijskom sastavu oborina hvatanih svakodnevno na jednom od sjevernih područja grada Zagreba (Higijenski zavod) u razdoblju od 1936. do 1941. godine. Pokušava se naći korelacija s nekim meteorološkim parametrima kao što su količina i vremenska razdioba oborina, grmljavina, temperatura uzduha i smjer vjetra. Analitički podaci odnose se na pH, ione NH_4^+, NO_2^-, NO_3^-, Cl^-, SO_4^- i organsku tvar te topljivi i netopljivi isparni ostatak (prašina).

INFLUENCE OF METEOROLOGICAL PARAMETERS ON THE CHEMICAL COMPOSITION OF RAINFALLS

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Data on the quantitative chemical composition of rain water collected daily in one of the northern areas of the city of Zagreb in the period 1936—1941 are presented. Efforts have been made to find correlations with some meteorological parameters such as amount and temporal distribution of rainfall, thunder, air temperature and direction of wind. The given analytical data refer to pH, NH_4^+, NO_2^-, NO_3^-, Cl^-, SO_4^- ions, organic matter as well as soluble and insoluble residue (dust).

ONEČIŠĆENJE OKOLINE OLOVOM I BIOLOŠKI INDEKSI POVEĆANE APSORPCIJE OLOVA U ČOVJEKA

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Na skupini stanovnika iz okolice topionice olova i kontrolnoj skupini izvršene su analize nekoliko bioloških parametara koji se mogu mijenjati pod utjecajem olova. Koncentracija olova u atmosferi oko topionice bila je za red veličine viša nego u drugim naseljima. Od 74 ispitanika iz okolice topionice, 32 nisu bila prije profesionalno eksponirana olovu (grupa I), dok su 42 ispitanika nekada radila duže ili kraće vrijeme na mjestima s povećanom ekspozicijom olovu (grupa II). U usporedbi s kontrolnom skupinom u stanovnika iz okolice topionice bile su koncentracije olova u krvi i delta-aminolevulinske kiseline u mokraći značajno povišene, dok je aktivnost dehidrataze delta-aminolevulinske kiseline u krvi bila značajno snižena. Za iste parametre utvrđena je statistički značajna razlika između grupe I i grupe II, suglasno s razlikom u ekspoziciji olova. Dobiveni rezultati upućuju na korisnost analize određenih biloških parametara, kao mjere za ekspoziciju olovu iz okoline. Rezultati također pokazuju da se osjetljivost organizma na olovo povećava kod ponavljanih ekspozicija.

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ENVIRONMENTAL LEAD CONTAMINATION AND BIOLOGICAL INDICES OF INCREASED LEAD ABSORPTION

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A group of inhabitants living near a lead smelting plant and a control group were examined for several biological parameters that can be changed under the effect of lead. The atmospheric lead concentration around the lead smelting plant was by one order of magnitude higher in other communities. Among 74 subjects from the vicinity of the lead smelting plant, 32 had never been occupationally exposed to lead (Group I), while 42 subjects used to work in places with the increased lead exposure for a longer or shorter period (Group II). Compared with the control group, in the inhabitants living near the lead smelting plant the blood lead and the urine delta-aminolevulinic acid were significantly increased, while the blood delta-aminolevulinic acid dehydratase was significantly decreased. A statistically significant difference in the same parameters between group I and group II was recorded in accordance with the difference in lead exposure. The results obtained prove the usefulness of the analysis of the above parameters as an indication of environmental lead exposure. They also show that the sensitivity of the organism to lead increases with repeated exposures.

[*In extenso:* Arh. hig. rada, *25* (1974) 39]

STATISTIČKA ANALIZA NEKIH POKAZATELJA ONEČIŠĆENJA DRAVE, MURE I SAVE

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Statistički su obrađeni neki parametri kvalitete vode Drave, Mure i Save u SRH prikupljeni tijekom više godina. Korišteni su rezultati istraživanja na Dravi kod Botova, Donjeg Miholjca i Podravskih Podgajaca; na Muri kod Goričana; te na Savi na granici sa SR Slovenijom, kod Jankomirskog mosta i nizvodno od Zagreba. Analizirani su deficit kisika, potrošnja kisika iz $KMnO_4$, petodnevna biokemijska potrošnja kisika (BPK_5) i suspendirani ostatak. Dobiveni rezultati prilog su poznavanju stanja i mijenjanja kvalitete vode tih rijeka.

STATISTICAL ANALYSIS OF SOME POLLUTION INDICATORS OF THE RIVERS DRAVA, MURA AND SAVA

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Statistical analysis of some data on the water quality of the rivers Drava, Mura and Sava in their course through Croatia was performed. The data, collected for several years, relate to research at Botovo, Donji Miholjac and Podravski Podgajci along the Drava, at Goričani on the Mura, and along the Sava at the frontier with Slovenia, the Jankomir bridge, and from Zagreb downstream. The oxygen deficit, the oxygen consumed from permanganate, a five-day biochemical oxygen demand, and nonfiltrable residue were analysed. The results obtained have thrown considerable light on the knowledge of the condition and changes in the quality of water of the three rivers.

ODNOS NEKIH KEMIJSKIH I BIOLOŠKIH PARAMETARA KVALITETA VODE U PLANINSKOJ TEKUĆICI SA REGULARNIM TOKOM

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Vršena su uporedna biološka i kemijska istraživanja kvaliteta vode rijeke Miljacke. U području intenzivnog zagađivanja riječni tok je reguliran i postoji veći broj vještačkih kaskada. Utvrđene vrijednosti petodnevne biokemijske potrošnje kisika (BPK_5) pokazuju veću opterećenost vode razgradljivim organskim materijama nego što odgovara aktuelnom saprobiološkom stanju. Obrnuto, zasićenost vode kisikom gotovo redovito je veća od očekivane. Iznalaženje direktne korelacije između glavnih pokazatelja kemijske analize i saprobioloških vrijednosti nije bilo moguće. Raspodjela utvrđenih vrijednosti BPK_5 i zasićenosti sa O_2 u odnosu na »saprobne indekse« po Pantle-Bucku i po Rotscheinu pokazuje da se vrijednosti unutar pojedinih saprobnih zona široko prepokrivaju. Korelacija postoji samo na nivou srednjih vrijednosti.

THE RATIO OF CERTAIN CHEMICAL AND BIOLOGICAL PARAMETERS OF WATER QUALITY IN A MOUNTAIN RIVER WITH REGULATED BANKS

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A comparative study was made of the biological and chemical characteristics of water quality in the Miljacka river. In the area of the most intense pollution, the streamflow is regulated and there is a large number of artificial cascades. It was found that the BOD_5 showed a heavier load of degradable organic material than would correspond to the actual saprobiological conditions. On the other hand, the degree of oxygen saturation of the water was nearly always greater than expected. It was impossible to find a direct correlation between the primary indicators of chemical analysis and the saprobiological values. The distribution of the values found for BOD_5 and oxygen saturation in relation to the index of saprobity according to Pantle-Buck and Rothschein shows that the values within individual saprobial zones overlap considerably. A correlation exists only at the level of average values.

HIDROGRAFSKI FAKTORI I ONEČIŠĆENJE SJEVERNOG JADRANA

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Područje sjevernog Jadrana može se smatrati estuarnim zbog obilnih nanosa rijeka sjeverne Italije što u njega utječu. Riječnim nanosima dolaze glavne nečistoće u sjeverni Jadran. Najčešće zahvaćene silaznim tokom stalne jadranske struje, bivaju nošene uz zapadnu obalu Italije prema jugu. Povremeno, kada ojača transverzalna strujna varijanta (W → E), kao što je to bio slučaj prošle godine, znatne količine nečistoća dopiru do zapadne obale Istre. Ovakvo je ponašanje posebno opasno zbog onečišćenja naše obale, a primijećeno je po neuobičajenim promjenama vrijednosti nekih hidrografskih parametara kao: sniženje saliniteta, povišenje pH i alkaliniteta, smanjenju prozirnosti kao i znatnom povećanju koncentracije hranjivih soli. Transverzalna varijanta obično se javlja u proljetno-ljetnom razdoblju, tako da stvara sinergistički efekt s urbanim onečišćenjem priobalnog područja koji je vrlo povećan u turističkoj sezoni. Dolaskom zime aktivira se transport u moru, osobito zbog snažnog utjecaja sjevernih vjerova (»bura«) na Jadranu. U tom se razdoblju pojača cirkulacija i disperzija nečistoća na cijeli Jadran, razrjeđuju se, te se ponovno uspostavljaju prirodni uvjeti. Sve je to moguće dok se ne prijeđu kapaciteti prirodnih procesa uklanjanja nečistoća iz tog najugroženijeg područja u Jadranu.

HYDROGRAPHIC PARAMETERS AND POLLUTION OF THE NORTH ADRIATIC

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The north Adriatic can be considered an estuarine region owing to the large amount of river water from northern Italy that empties into it. Most of the pollutants are carried into the sea by there rivers. Owing the permanent descendent Adriatic current system, polluted waters are usually taken along the east Italian coast toward the south. Periodically, when the transversal current (W → E) becomes dominant, as it was last year, great quantities of pollutants reach the west coast of Istria. Such a situation is very dangerous because of the pollution of our coast. It is observed by the unusual variation of some hydrographic parameters such as a decrease in salinity, an increase of pH and alkalinity, a very high turbidity as well as an increase in the concentration of nutrients. The coincidence between the transversal current (usually appearing during spring and summer) and the increased coastal pollution because of the tourist season results in synergetic effects. During the winter time, the transport in the sea is very pronounced especially because of the strong north wind (»bura«) on the Adriatic. During this interval, the circulation and dispersion of pollutants is increased in the whole Adriatic, the dilution of the contaminants can take place and conditions are established again. All of this is possible as long as the capacity of the natural processes for the removal of pollutants from this most jeopardized Adriatic region is not exceeded.

ISTRAŽIVANJE PROCESA ADSORPCIJE I DESORPCIJE DDT-a NA MORSKIM SEDIMENTIMA. I. METODIKA I KINETIČKA ISTRAŽIVANJA

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Pomoću **DDT**-a obilježenog s ^{14}C istraživana je njegova interakcija s vapnencom, kvarcom te s prirodnim i na različite načine tretiranim morskim sedimentima.

Razrađene su metode mjerenja DDT-a obilježenog s ^{14}C s pomoću tekućih scintilatora u heterogenim sistemima, npr. morskoj vodi te u smjesi morske vode i vapnenca, kvarca, prirodnih i tretiranih morskih sedimenata. Prikazan je utjecaj upotrebe slijepe probe na izračunavanje distribucije DDT-a između tekuće i krute faze u kinetičkim istraživanjima.

Rezultati kinetičkih istraživanja pokazali su da je adsorpcijski proces u mediju morske vode brz u slučaju prirodnih i tretiranih morskih sedimenata. Ravnoteža se postiže u ovim slučajevima unutar jednog sata. Brzina adsorpcije DDT-a na vapnencu malo je manja, dok je značajno manja u slučaju kvarca. Za uspostavljanje ravnoteže distribucije DDT-a između morske vode i kvarca potrebno je miješanje sistema više od 5 sati.

INVESTIGATION OF PROCESSES OF DDT ADSORPTION AND DESORPTION ON MARINE SEDIMENTS. I. METHODS AND KINETIC INVESTIGATION

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The interaction of **DDT** with natural and treated marine sediments as well as with limestone and quartz was investigated by means of a radiotracer technique.

The methods for ^{14}C labelled DDT counting by means of liquid scintillators in heterogeneous systems such as sea water and in mixtures of sea water and limestone, quartz, natural and treated marine sediments were developed.

The influence of the use of blanks on calculation of DDT distribution between liquid and solid phase in kinetic investigation is described. The results indicate that adsorption processes in the sea water medium are very fast in the case of natural and treated sea sediments. In such cases the equilibrium is reached within one hour. The rate of DDT adsorption in the case of limestone is slightly lower, while it is significantly lower in the case of quartz. For equilibrium distribution of DDT between sea water and quartz, the mixing of the system for over five hours is required.

ISTRAŽIVANJE PROCESA ADSORPCIJE I DESORPCIJE DDT-a NA MORSKIM SEDIMENTIMA. II. RAVNOTEŽNA DISTRIBUCIJA DDT-a IZMEĐU TEKUĆE I KRUTE FAZE

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Ravnotežna distribucija DDT-a između tekuće i krute faze istraživana je s pomoću prije opisane radiotreserske metode. Prikazan je utjecaj načina mjerenja koncentracije DDT-a u tekućoj, odnosno u krutoj fazi na izračunavanje njegove ravnotežne distribucije između spomenutih faza. Proučavan je utjecaj koncentracije DDT-a na nivo njegove adsorpcije na raznim krutim fazama, a rezultati su prikazani u obliku adsorpcijskih izotermi. Desorpcijski eksperimenti upućuju na to da su ti procesi reverzibilni. Desorpcija DDT-a veća je s kvarca u usporedbi s vapnencom a značajno je manja s morskih sedimenata. Istraživanje ravnoteže distribucije DDT-a između morske vode i istraživanih površina upućuje na to da DDTA u istraživanim sistemima najvjerojatnije egzistira u obliku koloidne disperzije. Rezultati su prodiskutirani iz aspekata onečišćenja mora, te su dane sugestije za daljnji rad.

INVESTIGATION OF PROCESSES OF DDT ADSORPTION AND DESORPTION ON MARINE SEDIMENTS. II. EQUILIBRIUM DISTRIBUTION OF DDT BETWEEN LIQUID AND SOLID PHASE

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Equilibrium distribution of DDT between liquid and solid phase in the sea water medium was studied by means of the previously described radiotracer technique. The influence of the mode of measuring DDT concentration in liquid and solid phase on the calculation of its equilibrium distribution between the two phases is described.

The influence of DDT concentration on its adsorption in several solid phases was studied and results are given as adsorption isoterms. Desorption experiments indicate that these processes are reversible. Extension of desorption is larger from quartz than from limestone, while it is significantly lower than from sea sediments.

Examination of the equilibrium distribution of DDT between sea water and the examined surfaces suggested that DDT in the investigated systems exists as a colloidal dispersion. Results are also discussed from the point of view of marine pollution. Suggestions for the future work in this field are given.

OSTACI TRIAZINSKIH HERBICIDA U TLU

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Tijekom tri godine ispitivani su ostaci triazinskih herbicida u tlu. Pratila se degradacija manje i veće dozacije simazina i atrazina u kulturi kukuruza u voćnjaku i u vinogradu u dvije dubine tla. Nadalje su određivani ostaci atrazina i atrazina s prometrinom kada su aplicirani različiti oblici formulacija. Primijenjena je plinskokromatografska metoda s alkalijskim plamenoionizacijskim (CsCl) detektorom. Najbrža i podjednaka razgradnja simazina i atrazina ustanovljena je u intervalu do mjesec dana nakon tretiranja, dok je brža za atrazin u narednim mjesecima. Migracijom simazina i atrazina iz gornjeg sloja u dublji sloj izjednačile su se koncentracije 2—3 mjeseca nakon aplikacije. Razgradnja je bila sporija u manje obrađivanom tlu. Brzina razgradnje atrazina i atrazina s prometrinom u formulacijama močivih prašiva, tekućih suspenzija, mikrogranulata nije se bitno razlikovala.

RESIDUES OF TRIAZINE IN THE SOIL

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Residues of triazine in the soil were examined for three years. Degradation of atrazine and simazine in different dosages in maize fields, orchards and vineyards was studied in two depths of soil. Residues of atrazine and atrazine with prometrine after application of different formulations (wetable powder, microgranulates and liquid) were also examined. The method of gaschromatography with AFID/CsCl detector was applied. In the first month after application degradation was the quickest both of atrazine and simazine. In the following months degradation of atrazine was quicker. Two to three months after application the concentration of atrazine and simazine was similar in the upper and lower layer. Degradation in the less cultivated soil was slower. Differences in residues of atrazine and atrazine with prometrine applied in different formulations were not apparent.

TOKSIČNOST EKATINA I NJEGOVO DJELOVANJE NA PROFESIONALNO EKSPONIRANE RADNIKE

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Insekticidi iz grupe organofosfornih spojeva još su uvijek sredstva koja se najčešće upotrebljavaju za suzbijanje štetočina u poljoprivredi, šumarstvu, javnom zdravstvu i veterinarstvu. Istražena su inhibitorna svojstva tiometona [S-2-(etiltio) etil dimetil fosforoditioat] — djelatne tvari organofosfornog insekticida Ekatina — *in vitro* na kolinesterazama krvi ljudi kao i toksični učinci tog spoja na laboratorijskim životinjama. Ujedno su prikazani i rezultati kontrole radnika zaposlenih na proizvodnji Ekatina. Inhibitorni učinak tiometona jače je izražen prema kolinesterazi plazme ($I_{50} = 2.8 \times 10^{-4}M$) negoli

prema eritrocitnoj kolinesterazi ($I_{50} = 4.0 \times 10^{-4}$M). Rezultati akutne peroralne toksičnosti na štakorima pokazali su da je koncentrat, korišten u proizvodnji Ekatina bio toksičniji ($LD_{50} = 74,9$ mg/kg) negoli se očekivalo prema podacima dobivenim o toksičnosti aktivne materije ($LD_{50} = 130$ mg/kg). Nađena je snižena aktivnost kolinesteraze krvi u nekolicine radnika, ali osim prolaznih subjektivnih tegoba nisu registrirani zamjetljivi štetni učinci.
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THE TOXICITY OF EKATIN AND ITS ACTION ON OCCUPATIONALLY EXPOSED WORKERS

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The insecticides from the group of organophosphorus compounds are still the tools most frequently used in the fight against pests in agriculture, forestry, public health and veterinary science. The inhibitory properties of thiometon [S-2-(ethylthio)ethyl dimethyl phosphorodithioate] — an active component of the organophosphorus insecticide Ekatin — were studied in vitro on human blood cholinesterases while its toxic effects were studied on laboratory animals. The results of the control check-up of workers employed in the production of Ekatin are also presented. The inhibitory effect of thiometon was more pronounced towards plasma cholinesterase ($I_{50} = 2.8 \times 10^{-4}$M) than towards erythrocyte cholinesterase ($I_{50} = 4.0 \times 10^{-4}$M). The results of acute oral toxicity to rats showed that the concentrate used in the production of Ekatin was more toxic ($LD_{50} = 74.9$ mg/kg) than was expected from the data obtained on the toxicity of the active matter ($LD_{50} = 130$ mg/kg). The lowered cholinesterase activity level was found in the blood of several workers, but apart from transient subjective complaints no noticeable noxious effects were recorded.

ISPITIVANJE ISPIRANJA DEPONIJA OTPADNIH TVARI OBORINSKOM VODOM I NJIHOV UTJECAJ NA KVALITET PODZEMNIH VODA

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Uklanjanje otpadaka iz naselja i industrije sve je veći problem u gusto naseljenim krajevima zbog prirasta specifične količine otpadnih komponenata, troškova transporta, troškova uništavanja, konačne dispozicije i porasta opasnosti za okoliš.

Iako je spaljivanje otpadaka estetski i higijenski ispravna metoda, ne može se opravdati neekonomično gospodarenje materijalima koji se još mogu upotrijebiti u bilo kojem kružnom procesu (recycling). Jedan oblik konačne ali neispravne dispozicije otpadaka jest spaljivanje i naknadno deponiranje pepela i šljake. U većini slučajeva smanjuje se volumen otpadaka spaljivanjem na 10% početnog volumena a pepeo i šljaka mogu se smatrati sterilnim. Pri spaljivanju otpadaka dolazi do prekida pogona ili kvarova na incineratoru i prema tome do nepotpunog spaljivanja. Na taj način dolazi na deponiju materijal koji je i nadalje štetan za okoliš. Utjecaj ovakvih deponija šljake i nepotpuno spaljenih otpadaka na podzemnu vodu ispitivan je na malim deponijama površine 19 m² iz kojih je oborinska voda ispirala organske i anorganske komponente. Nakon iskustva s modelima deponija izvedena su ispitivanja u tehničkom mjerilu u koju svrhu je bilo ugrađeno 6000 m³ šljake u sloju od 10 m visine. Analize procijeđene oborinske vode (eluata) pokazuju da koncentracije rastu s vremenom retardacije, tj. u sušnom razdoblju i kod opadajuće količine procijeđene vode. Na taj je način dokazano da pri odabiranju lokacija deponija i prema sastavu deponija, ima površina i dubina deponiranog materijala odlučnu ulogu i da su štete na podzemnim tokovima uslijed pogoršanja kvalitete potencijalnih hvatišta pitke vode u dogledno vrijeme ireverzibilne. Kemizam podzemnih voda s hidrološkog stanovišta podvrgnut je istom dinamskom procesu kao i sve ostale eksponencijalne pojave onečišćenja atmosfere, površinskih voda i tla, uzrokovane djelatnošću civiliziranog čovjeka.

INVESTIGATION OF LEACHING SLAG AND ASH DUMPS AND THEIR INFLUENCE ON GROUND WATER QUALITY

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The pollution of ground water by solid waste materials from municipalities and industries tends to become a more and more growing problem. The reasons are: increasing quantities of specific waste substances, costs of transportation, costs of ultimate disposal and environmental impacts. Although incineration is aesthetically and hygienically a justified method of solid waste handling, it is an uneconomic way which prevents the recycling of raw materials. Incineration connected with dumping of slag and ashes is the most consequent procedure for ultimate disposal of refuse, since the volume reduction achieved is as low as 10% and the materials deposited are in proper hygienic condition.

Due to incomplete thermal processes during periods of malfunctioning of incinerator for refuse components are only partially oxidized. By dumping slags substances are exposed to elutriation which will seriously endanger groundwater quality. The processes involved have been investigated at small model deposits with an area of 19 m² each. The results obtained enabled us to construct a sanitary landfill of 6000 m³ for slags only. Analytical values of the drainage water indicate increasing concentrations with time, during dry weather periods and with decreasing percolation rate. Location and depth of the fill seem to be decisive parameters, especially because the changes of ground water quality due to this type of pollution will be irreversible. The chemical alterations in ground water composition will undergo dynamic processes similar to those of the exponentially increasing pollution of atmosphere soil and surface waters.

MODEL KONTINUIRANE BAKTERIJSKE OKSIDACIJE OTPADNIH VODA

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Mješovite bakterijske kulture izolirane iz tvorničkih taložnica mogu u kontinuiranom aerobnom postupku pročistiti otpadne vode tvornice etanola i sniziti kemijsku i biološku potrošnju kisika (KPK i BPK$_5$) za 96—98% prema početnoj vrijednosti. Određeni su parametri kontinuirane biooksidacije: specifična brzina rasta mikroorganizama, brzina razrjeđenja, specifična potreba kisika, pH i temperatura. U reaktoru je određena brzina apsorpcije kisika. Bakterijska je biomasa izdvojena, te ispitan sadržaj aminokiselina, vitamina i pepela. Biomasa ne sadržava patogene bakterije niti toksine. Tok bakterijske oksidacije otpadne vode prikazan je grafički. Izračunata je bilanca materijala procesa.

MODEL OF CONTINUOUS BACTERIAL OXIDATION OF WASTE WATERS

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Mixed bacterial cultures isolated from decanted sludge were used in a continuous aerobic process to purify the waste waters from an alcoholic fermentation factory. The chemical and the biological oxygen demand (i. e. COD and BOD$_5$, respectively) were lowered by 96—98% of the initial value. The following parameters of the continuous bioxidation were determined: the specific growth rate of the mixed bacterial culture, the dilution rate, cell concentration in the fermenter, the specific oxygen demand, pH and temperature optima. The oxygen absorption rate of the reactor was measured. The bacterial biomass was separated and analyzed for aminoacids, vitamins and ash content. The biomass contained neither pathogenic bacteria nor toxins. A scheme of continuous bacterial oxidation is presented. The material balance of the process was calculated.

USPOREDBA RAZGRADNJE RAVNOLANČANIH I RAZGRANATIH ANIONSKIH TENZIDA S POMOĆU BAKTERIJA

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Ispitana je biološka razgradnja ravnolančanih anionskih tenzida: lauril sulfata, Na-dodecil benzen sulfonske kiseline (Na-DBS), alkil benzen sulfonske kiseline (ADS) i razgranatog tenzida tetrapropilen benzen sulfonske kiseline (TBS) pomoću mješovitih bakterijskih kultura izoliranih iz otpadne vode tvornice detergenata. Razgradnja tenzida praćena je metodom nastajanja kompleksa s metilenskim modrilom (MBAS) i određivanjem biokemijske potrošnje kisika (BPK).

Nakon indukcije potrebnih enzima bakterije su dobro rasle na umjetno priređenoj otpadnoj vodi i dobro razgrađivale linearne tenzide za razliku od onih razgranatih; nakon šest dana uzgoja razgrađeno je 94% Na-DBS a samo 22% TBS. Lauril sulfat uspješno i brzo razgrađuje jedan soj iz mješovite bakterijske kulture, dok ostale ravnolančane tenzide razgrađuju samo mješovite bakterijske kulture.

(In extenso: III jugoslavenski simpozij za površinski aktivne materije, Novi Sad, 1973. Zbornik radova, Savez inženjera, tehničara, tehnologa i hemičara Srbije, Beograd.)

COMPARISON OF BACTERIAL DEGRADATION OF STRAIGHT AND BRANCHED CHAIN ANIONIC SURFACTANTS

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The biodegradation of different straight chain anionic surfactants: sodium lauryl sulphate (SLS), sodium dodecyl benzene sulphonate (Na-DBS), alkyl benzene sulphonate (ABS) and the branched chain tetrapropylene benzene sulphonate (TBS) with mixed bacterial cultures was studied.

The bacterial cultures were isolated from the waste waters of a detergent factory. Biodegradation was determined using the standardized methylene blue active substance (MBAS) analysis and the biological oxygen demand (BOD). After enzyme induction the mixed bacterial cultures degraded well all tested straight chain surfactants but not the branched ones; after a six-day cultivation period 94% Na-DBS was degraded but only 22% of TBS.

SLS was quickly degraded by a single bacterial strain from the mixed culture, all other straight chain surfactants were degraded only by the mixed bacterial culture.

ZAJEDNIČKI TRETMAN GRADSKIH OTPADNIH VODA S OTPADNIM VODAMA PROIZVODNJE CELULOZE

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Na osnovu kvalitativnih i kvantitativnih pokazatelja otpadnih voda proizvodnje celuloze, razmatraju se mogućnosti njihovog zajedničkog tretmana sa gradskim otpadnim vodama. Dati su osnovni parametri za izbor sistema kod konkretnih slučajeva.

ZUSAMMENBEHANDLUNG DER KOMUNAL- UND ZELLSTOFFABWÄSSER

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Auf Grund der qualitativen und quantitativen Kennzeichen der Zellstoffabwässer werden die Möglichkeiten ihrer Zusammenbehandlung mit Kommunalabwässern betrachtet. Die Grundparameter, die zum Systemauswahl in konkreten Fällen benötigt sind, werden gegeben.

OBRADBA OTPADNIH VODA POSTUPKOM REVERZNE OSMOZE

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Dan je pregled najnovijih rezultata reverznoosmotske obradbe različitih otpadnih voda. Upozoreno je na važnost fizikalno-kemijskih kriterija za reverznoosmotsku separaciju različitih organskih tvari iz višekomponentnih otopina, kao i na mogućnost primjene tih kriterija na praktične probleme reverznoosmotskog čišćenja otpadnih voda. Tipični primjeri reverznoosmotske obradbe otpadnih voda, koje sadržavaju fenole, gradskih otpadnih voda, otpadnih voda iz tvornica papira, otpadnih voda prehrambene industrije, otpadnih voda iz pogona za elektroplatiranje, iz petro-kemijskih pogona, iz tvornica za razvijanje fotomaterijala, iz industrijskih praonica i sl. pokazuju velike, još nerazvijene mogućnosti procesa reverznoosmotske separacije.

REVERSE OSMOSIS TREATMENT OF WASTE WATERS

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Recent developments in the reverse osmosis method for the water pollution control purposes are reviewed. The importance of the physico-chemical criteria for the reverse osmosis separation of various organic substances from multicomponent solutions is emphasized, and a possibility of their application in the practical problems of reverse osmosis water renovation is discussed. Typical examples of the reverse osmosis treatment of waste waters containing phenols, sewage waters, paper mill wastes, effluents from the food processing plant, electroplating wastes, waste streams from petrochemical plants, wash waters from photographic processing plants and laundry waste waters illustrate the vast potentialities of reverse osmosis process.

KOPIČENJE ANTIBIOTIKOV TETRACIKLINSKE VRSTE NA POŽIVLJENEM BLATU

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V modelnih laboratorijskih čistilnih napravak smo proučevali biološko čiščenje otpadnih vod, ki nastanejo pri proizvodnji antibiotikov tetraciklinske vrste. Poizkuse smo vodili tako, da je bila volumska obremenitev naprav od 0,5 do 2,0 kg BPK$_5$/m^3/d, obremenitev poživljenega blata pa od 0,1 do 0,5 kg BPK$_5$/kg/d suhe snovi. Pri zadostni količini raztopljenega kisika v napravi (nad 2 mg O$_2$/l) je bilo čišćenje nad 95% z ozirom na BPK$_5$. Ugotovili smo, da se biološko težko razgradljivi antibiotiki tetraciklinske vrste kopičijo na poživljenem blatu, vendar njihova prisotnost ne moti delovanja mikroorganizmov. Biološka razgradnja odpadnih vod proizvodnje antibiotikov poteka normalno, ne glede na to, ali je iz odpadne vode odstranjen pretežni del antibiotikov s predhodno kemijsko obdelavo, ali pa če je odpadna voda predhodno samo nevtralizirana.

ACCUMULATION OF ANTIBIOTICS OF THE TETRACYCLINE GROUP ON ACTIVATED SLUDGE

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The biological waste water treatment resulting from the production of antibiotics of the tetracycline group was studied on a laboratory model equipment. The experiments were performed so that the input loading of the equipment ranged from 0.5 to 2.0 kg BOD$_5$/m^3/d, and the daily sludge loading from 0.1 to 0.5 kg BOD$_5$/kg/d of sludge solids. At a sufficient quantity of dissolved oxygen in the equipment (not less than 2 mg O$_2$/l) the BOD$_5$ removal amounted to above 95%. It was found that the antibiotics of the tetracycline group, which do not readily decompose, accumulate on activated sludge; their presence, however, does not interfere with micro-organism activities. The biological decomposition of waste waters resulting from the production of antibiotics takes a normal course, regardless of whether the predominant part of antibiotics was removed by previous chemical treatment, or, the waste water was only neutralized before.

UTICAJ DERIVATA NAFTE NA PROCES SAMOČIŠĆENJA GRADSKIH OTPADNIH VODA

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Promjene koje nastaju u otpadnoj vodi naselja unošenjem derivata nafte praćene su ispitivanjem njihovog uticaja na proces biokemijske potrošnje kisika. Kod svih ispitivanih uzoraka otpadne vode naselja, koji su uglavnom sadržavali prosječni teret organskih tvari (petodnevna biokemijska potrošnja kisika, BPK$_5$, od 60 do 200 mgO$_2$/l) pri dodatku određene količine derivata nafte, potrošnja kisika mjerena preko BPK$_5$ pokazivala je nagli porast, tako da je kod pojedinih uzoraka BPK$_5$ bio dva do pet puta veći od BPK$_5$ te iste vode bez dodatka naftnih derivata. Doza kod koje je zapažena ova interesantna pojava karakteristična je za pojedine derivate nafte i značajno je da se ona kreće upravo u granicama njihove topljivosti u vodi

Ujedno može se pretpostaviti da se derivati nafte u koncentraciji »stimulativne« doze nalaze otopljeni u stanju molekulske disperzije i da kao takvi ne vrše mehaničke ni toksične uticaje na biocenozu otpadne vode naselja, koja je sposobna da u tim uvjetima izvrši njihovu razgradnju.

INFLUENCE OF MINERAL OIL DERIVATIVES ON THE SELFPURIFICATION PROCESS OF URBAN WASTE WATER

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The changes which occur in municipal domestic sewage water owing to the introduction of mineral oil derivatives and the process of biological breakdown were studied. All samples tested had a load of organic matter between 60 and 200 mg BOD$_5$/l, and showed a sudden increase in BOD$_5$ after addition of certain amounts of mineral oil derivatives, so that certain samples had a BOD_5 2 to 5 times as high as the BOD_5 of the same samples without the addition of mineral oil derivatives. The dosage followed by this interesting phenomenon is characteristic of individual mineral oil derivatives, and it is significant that it ranges exactly within the limits of its solubility in water.

It can therefore be supposed that the mineral oil derivatives in the concentration of a »stimulative dose« exist in a dissolved state of molecular dispersion and as such they do not have the mechanical or toxic effect upon the biocenosis of municipal domestic sewage water.

PRILOG POZNAVANJU SASTAVA SIROVE BELANČEVINE ŠEĆERNE REPE

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Ispitivan je kvantitativni aminokiselinski sastav sirove belančevine šećerne repe u uzorcima dehidratizovanim apsolutnim eterom odnosno alkoholom i u nerastvornom ostatku sirove belančevine dobivenom pri njenom rastvaranju u 0,1 M TRIS-HCl puferu pH = 8,2. Pored 16 aminokiselina, cistin je nađen u tragovima samo u uzorku koji je dehidratizovan apsolutnim eterom, dok se triptofan verovatno razložio za vreme kiselinske hidrolize. Rastvor sirove belančevine šećerne repe u 0,1 M TRIS-HCl puferu pH = 8,2 je frakcionisan na Sephadex G 100, a približna molekulska težina dobijenih frakcija A, B i C određena je po Whitakerovom metodu ($M_{tA} > 83.000$, $M_{tB} = 42.000$ i $M_{tC} = 23.000$). N-terminalne aminokiseline određene su po Sangeru DNFB metodom i hromatografijom na tankom sloju.

CONTRIBUTION TO THE KNOWLEDGE OF THE COMPOSITION OF RAW SUGAR BEET PROTEIN

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The quantitative amino acid composition of raw sugar beet protein was investigated in samples dehydrated with absolute ether, alcohol and in the insoluble residue left over after dissolving of raw protein in 0.1 M TRIS-HCl buffer pH = 8.2. Beside 16 amino acids, cystine was found in traces only in the sample dehydrated with absolute ether. Tryptophan probably decomposed during the acid hydrolysis. The raw sugar beet protein solution in 0.1 M TRIS-HCl buffer pH = 8.2 was fractionated on Sephadex G 100. The approximate molecular weight of the fractions was determined by the method of Whitaker ($M_{wA} > 83.000$, $M_{wB} = 42.000$ and $M_{wC} = 23.000$). N-terminal amino acids were determined by the FDNB-method of Sanger, and were identified by means of thin layer chromatography.