Production of concentrates ... S/081/62/000/019/019/053
B144/B180

cone oil), and then conducted through a hydrocyclone and a centrifuge, where the thin fraction is separated. The wash liquid is continuously recycled. Additions of 2-3% by weight sulfur (pyrite) to the coal promote the formation of volatile Ge compounds (GeS, GeS_2). Diagrams of the process are shown. [Abstracter's note: Complete translation.]

Card 2/2

ZAHRADNIK, Lubomir; FORMANEK, Zdenek; STOVIK, Miroslav; TYROLER, Jiri; VONDRAKOVA, Zdena

Refinement of germanium dioxide. Chem prum 12 no.2:60-63 F '62.

1. Ustav nerostnych surovin, Praha.

34687

Z/009/62/000/002/001/002
E112/E453

IR3100

AUTHORS: Zahradník, Lubomír; Formánek, Zdeněk; Štovík, Miroslav; Tyroler, Jiří; Vondráková, Zdena

TITLE: Refining of germanium dioxide

PERIODICAL: Chemický průmysl, no.2, 1962, 60-63

TEXT: For semiconductors extremely pure germanium of 99.99999999999% purity, usually called "eleven nines", is required. The production of this pure metal, carried out by reduction of germanium dioxide and zone refining of obtained germanium, is economical only if an oxide with at least three nines is used as starting material. Therefore, germanium dioxide is refined for the elimination of various contaminants, above all of arsenic. The following preliminary refining methods were studied on a laboratory scale: 1) elimination by reduction with Zn, Al or $SnCl_2$; germanium tetrachloride is unaffected by the above reducing agents, while $AsCl_3$ is reduced to arsenic; 2) absorption of $AsCl_3$ and $GeCl_4$ in carbon tetrachloride, followed by oxidative extraction with HCl and HNO_3. In this procedure $AsCl_3$ is oxidized to the water-soluble H_3AsO_4 which can be extracted with

Card 1/2

Refining of germanium dioxide

Z/009/62/000/002/001/002
E112/E453

water; 3) extraction of crude $GeCl_4$ with HCl + HNO_3; 4) separation by fractional distillation; 5) fractional distillation with simultaneous oxidation or reduction. The authors have now selected the distillation procedure, combined with absorption in CCl_4 as a basis for further experiments on a semi-technical scale. The purity of GeO_2 obtained after hydrolysis of the distillation absorbate in CCl_4 was 99.9%, which is considered satisfactory in view of the fact that ordinary glass apparatus and ordinary distilled water were being used. The material was further refined by oxidative distillation with HCl and HNO_3, using an electrolytic heating arrangement. (Heating in an oil bath proved unsatisfactory because of settling of GeO_2.) The degree of refining was found adequate for the final zone-refining process. It is submitted that further improvements in refining could be achieved by using silica apparatus for the hydrolysis and hard glass for the distillation. There are 2 figures and 3 tables.

ASSOCIATION: Ústav nerostných surovin, Praha
(Institute for Mineral Raw Materials, Prague)

SUBMITTED: January 16, 1961

Card 2/2

COUNTRY : CZECHOSLOVAKIA
CATEGORY : Pharmacology, Toxicology. Different Preparations

ABS. JOUR. : RZhBiol., No. 12 1958, No. 56776

AUTHOR : Bartosova, L., Zahradnik, M.
INST. : -
TITLE : The Treatment of Vitiligo with Psoralene Derivatives

ORIG. PUB. : Ceskosl. Dermatol., 1957, Vol.32, No.5, 295-300

ABSTRACT : Treatment was carried out in 9 patients with vitiligo using a 5% bergaptene cream. Patients were observed for 2 years. Complete repigmentation of the vitiliginous foci occurred in 1 patient, partial in 7, and 1 patient discontinued treatment due to drug intolerance. 3 patients with vitiligo received general and local treatment with ammoidine and ammidine, with the result that complete repigmentation occurred in 1 and partial in 2 patients. -- A.S.Reben

Card: 1/1

ZAHRADNIK, M.

Toxic psychosis following the administration of methyl chloride. Cesk. psychiat. no. 61 no.6:408-411 D '65.

1. Psychiatricka klinika Lekarskej fakulty University P.J. Safarika v Kosiciach.

ZAHRADNIK, M.

Trilafon immenic syndromes. Activ. nerv. sup. 3 no.2:234-235 '61.

1. Psychiatricka klinika v Kosiciach.

(PSYCHOSES MANIC DEPRESSIVE ther)
(PSYCHOPHARMACOLOGY)

CZECHOSLOVAKIA / Chemical Technology, Chemical Products and Their Application. Perfumes and Cosmetics. Essential Oils. H-19

Abs Jour : Ref Zhur - Khimiya, No 5, 1959, No. 16740

Author : Zahradnik, M.
Inst : Not given
Title : Polyvinylchloride and Aluminum Tubing in the Cosmetics Industry

Orig Pub : Obaly, 1957, 3, No 5, 134

Abstract : Discussion of the shortcomings of the polyvinylchloride tubing -- excessive elasticity, permeability to scented substances, hardening of tubing when filled with certain types of products, microbiological polution of products. In view of the above the Czechoslovakian industry has reverted to the use of aluminum tubing, the internal surface of which is covered with lacquer. It was found

Card 1/2

CZECHOSLOVAKIA / Chemical Technology, Chemical Products and Their Application. Perfumes and Cosmetics. Essential Oils. H-19

Abs Jour : Ref Zhur - Khimiya, No 5, 1959, No. 16740

after the second lacquer application the uninsulated surface is reduced by a factor of 3 - 4.

Card 2/2

H-67

COUNTRY : CZECHOSLOVAKIA
CATEGORY : Chemical Technology. Chemical Products and Their Application. Perfumes and Cosmetics. Essential Oils
ABS. JOUR. : RZhKhim., No 17, 1959, No. 62039

AUTHOR : Zahradnik, M.; Pokorna, V.
INSTITUTE : -
TITLE : Determination of Water Content in the Cosmetic Emulsions.
ORIG. PUB. : Prumysl potravin, 1957, 8, No 7, 371-373

ABSTRACT : Proposed is a new analytical determination method of water content in the cosmetic emulsions. 0.1 gr of cream is placed on the preweighed glass plate followed by drying at 70° until its weight remains constant. When temperature is increased to 80° the determination error increases. It is recommended that 5 parallel determinations be carried out simultaneously. The method permits the determination of water in a relatively small sample, and the analysis requires far less time than the method that involves drying with sand. The method is very simple and does not require special apparata nor special reagents. -- S. Voytkevich.

Card: 1/1

ZAHRADNIK, Milan, prom., detsky lekar

Generalized eczema vaccinatum complicating infantile eczema.
Cesk. pediat. 11 no.5:365-369 May 56.

1. Krajsky ustav narodniho zdravi -- krajska detska nemocnice, Pardubice, prednosta prim. MUDr. J. Zimak.
(ECZEMA, in infant and child,
with vaccinia (Cz))
(VACCINIA, in infant and child
with eczema (Cz))

KOPECKY, Antonin, inz.; ZAHRADNIK, Miroslav

Ageing of Cologne water. Prum potravin 14 no.1:26-29 Ja '63.

1. Vyzkumny ustav tukoveho prumyslu, Praha.

ZAHRADNIK, M.

FISER, K.; BINOVEC, J.; FIKER, S.; ZAHRADNIK, M.

Dermal cleansing agents for workers in industry. J. Hyg. Epidem., Praha 1 no.2:172-178 1957.

1. Institute of Hygiene, Dermatological Clinic of the Medical Faculty of Hygiene and the Experimental Division of the Prague Cosmetic Factories, Prague.

(DETERGENTS,
dermal cleansing agents for workers in indust.)
(INDUSTRIAL HYGIENE
same)

Zahradnik M.

Zahradník, M.: Základy organické technologie pro barvířský průmysl. Prague: SNTL. 1954. 232 pp. 14.60 Kčs.
Reviewed in *Chem. Listy* 48, 1278 (1954).

Zahradnik, M. Principles of Organic Technology for the Dye

Chem. Listy 48, [illegible]

ZAHRADNIK, M.

Phthalocyanines as dyes. p. 460. CESKOSLOVENSKY HORNIK. (Ministerstvo paliv a Svaz Zamestnancu v hornictvi) Praha. Vol. 5, no. 11, Nov. 1955.

SOURCE: East European Accessions List, Vol. 5, no. 9, September 1956

43007

S/194/62/000/010/008/084
A154/A126

AUTHORS: Hliněnský, Ferdinand, Zahradník, Miroslav

TITLE: A device for converting a graphic recording (image) into an electric voltage

PERIODICAL: Referativnyy zhurnal, Avtomatika i radioelektronika, no. 10, 1962, 19 - 20, abstract 10-1-38ch (Czech. pat., cl. 42d, 3/25; 42d, 1/15, no. 98978, March 15, 1961)

TEXT: A patent is granted for a device for direct conversion of graphic recordings (images), e.g., oscillographic, mechanical or photographic recordings, into an electrical voltage. The device dispenses with the need for mathematical processing and the use of qualified manpower. The essence of this invention (see Figure) consists in the use of a rotary drum (1) whose lateral surface has slits (2) running parallel to the drum's hollow rotating axle (3). The axle (3) is rotated by an electric motor (5) through a transmission mechanism (4). Inside the drum (1) there is a photocell (6) fixed on a holder (7) through which wires (13) are led to the photocell (6). On the mounting board (8) of the de-

Card 1/3

A device for converting a graphic recording ....

S/194/62/000/010/008/034
A154/A126

vice there is an illuminating unit consisting of a lamp (9), a ground-glass screen (10), and a frame (11) serving to hold the image (12). The illuminating unit is enclosed by a casing (14), the drum (1) is covered by a cover (15). The graphic image, taken from the measuring instrument, is made by any suitable method, so that its width corresponds to the distance between neighboring slits (2). The lower part of the image is blacked out, and the upper part is cut around its contour, after which the image is inserted in the frame (11). When the drum (1) rotates, the luminous flux from the lamp (9), falling onto the photocell (6) through the slit (2), is proportional to the ordinate of the graphic (12); the voltage appearing at the photocell output is thus proportional to this ordinate and can be used for any purpose. In a variant of the device it is pointed out that the illuminating unit and the photocell can be mounted inside the drum, external mirrors being used for reflecting the rays coming from the image onto the photocell. There are 2 figures.

I.P.

[Abstracter's note: Complete translation]

Card 2/3

Z/059/62/000/003/001/007
B101/B301

AUTHOR: Zahradník, Miroslav

TITLE: Measuring the stress on main-rotor and tail-rotor blades of a "HC-3" helicopter in flight

PERIODICAL: Zpravodaj VZLÚ, no. 3, 1962, 83-89

TEXT: The article describes the mounting, wiring, calibration, and data registration of electrical-resistance strain gages, used by the VZLÚ (Aeronautical Research and Test Institute) for measuring the stress on "HC-3" helicopter rotor blades. To measure the [illegible] and static components of stress, exerted on rotor blades, [illegible] wires, originally fixed to the [illegible] surface, were [illegible] in the [illegible]

Card 1/2

Measuring the stress ...

rotor-leading edges. The active strain-gage twins on the blade form-

Card 2/2

ZAHRADNIK, M.

CZECHOSLOVAKIA / Chemical Technology; - Safety First Technique. H-6
Sanitation Technique; Chemical Products and Their
Application; Part 1.

Abs Jour : Referat. Zhurnal Khimiya, No 4, 1958, 11811.

Author : K. Fiser, J. Binovec, S. Fiker, M. Zahradnik.

Inst : Not given

Title : Detergents for Industrial Workers.

Orig Pub : Pracovni lekar., 1957, 9, No 3, 211 - 213.

Abstract : New detergents (D) containing vaseline oil, glycerin, diethylphthalate, colloid kaolin, condensation products of ethyleneoxide or alcohol, water etc. were studied during production and in a laboratory. The D-s were tried how they wash off lubricating oils, dyes, tar, carbon black for rubbers etc. It was found that the D-s possess a good washing

Card 1/2

88364

Z/004/60/000/012/001/005
A121/A026

26.2190

AUTHOR: Zahradníček, Rudolf, Chief of Technical Service

TITLE: Aircraft Tachometers

PERIODICAL: Nová Technika, 1960, No. 12, pp. 551 - 553

TEXT: Dealing with tachometers produced by the n.p. Mikrotechna (Mikrotechna, People's Enterprise) in Prague-Holešovice the author describes direct tachometers, the measuring system of which is connected to the engine by a flexible shaft, and indirect tachometers at which the engine revolutions are transmitted electrically using a small tacho-alternator. At a conductor section of 0.75 mm^2, a correct operation of indirect tachometers within a 25 mm range is ensured. The LUN 1301 direct tachometer, designed for small single-engine aircraft, has a flexible shaft up to 3 m long. The magnetically damped pointer operates steadily. The tachometer has an automatic transmission mechanism permitting its installation in engines running clockwise or counter-clockwise. The LUN 1318 indirect tachometers are designed for conventional aircraft, and LUN 1321 for jets. LUN 1319 tachometers have a capacity of 1 x 10^9 revolutions for 1,000 hours of operation. The LUN 1315 double-tachometer for twin-engined aircraft indicates engine revolutions on a con-

Card 1/2

Aircraft Tachometers

ventional scale; the LUN 1315.1 with a synchronoscope is used when it is necessary to equalize the engine revolutions. The LUN 1331 double-tachometer, designed for helicopters, indicates engine and rotor revolutions at a ratio of 10 : 1; the built-in synchronoscope indicates non-slipping of engine and rotor. The LUN 1316 tacho-alternator has one pointer or a measuring system with double pointer, while the LUN 1322 type is designed for parallel connection with two pointers or two measuring systems respectively. The following technical data are given: temperature range of pointers -60 to +75°C; tacho-alternators -60 to + 100°C; insulation resistance under normal conditions 25 MΩ; at increased moisture 2MΩ; mimimum insulating resistance 500 v; sensitivity under normal conditions 0.75%, at limit temperatures 2%. Table (page 552) contains data on tachometer types, measuring ranges in rpm, weignts in g, transmission and type of plugs. There are 6 figures and 1 table.

ASSOCIATION: np. Mikrotechna (Mikrotechna, People's Enterprise)

Card 2/2

KOUTECKY, J.; ZAHRADNIK, R.

Physical properties and chemical reactivity of alternant hydrocarbons and related compounds. Pt.3. Coll Cz Chem 28 no.8:2089-2101 Ag '63.

1. Institute of Physical Chemistry, Czechoslovak Academy of Sciences, Prague.

Thermal stability of technical bacterial proteinase. V. Mandelík and R. Zahradník (Prague, Czech.). *Chem. listy* 34, 97-100(1940).—In H_2O soln. the activity of tech. bacterial proteinase is irreversibly destroyed if heated 5-30 min. above 50° and for 6 or more hrs. below 50°. The enzyme activity was detd. on gelatin by viscosimetric method.

Jan Mach

RUDOLF ZAHRADNÍK

Chemical Abstracts
May 25, 1954
Electrochemistry

(3)

Polarographic study of dithiocarbamic acids. Rudolf Zahradník and Libor Jenšovský (Ústav fyz. chemie Karlovy univ., Prague, Czech.) *Chem. Listy* 48, 11-19(1954). The [illegible] and the temp. dependences of the waves of salts of $HSCSNHCH_2CH_2OH$ and $HSCSNHCH_2CO_2H$ were [illegible] anodic wave at pH 11 was [illegible] being a linear function of [illegible] and was suitable for analytical purposes. The analysis of the polarographic curve and [illegible] with a mercury pool electrode indicated that the electrolytic [illegible] $RSH + Hg \rightleftharpoons HgSR + H^+ + e$. The [illegible] with CS_2 was investigated to [illegible] used for the determination of these acids. The [illegible] the half-wave, activation energies and entropies in the pH range 1.70–8.47 were given. E. Erdös

ZAHRADNIK, R.; MANSFELD, V., SOUCEK, V.

Analytical use of the reaction of histidine and histamine with carbon disulfide. Cesk.farm. 4 no.3:119-125 Apr 55.

1. Ustav hygieny prace a chorob z povolani v Praze a Organo farma, n. p., Praha.
(HISTAMINE, determination,
in drugs, use of reaction with carbon disulfide)
(HISTIDINE, determination,
in drugs, use of reaction with carbon disulfide)
(CARBON DISULFIDE, effects,
in drugs, reaction with histamine & histidine as method of determ.)

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001963420018-7"

ZAHRADNIK, R.

Czechoslovakia/Analytical Chemistry - General Questions, G-1

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61799

Author: Kobrle, V., Zahradnik, R.

Institution: None

Title: Partition Paper Chromatography of Higher Fatty Acids. II. Separation of Unsaturated Fatty Acids

Original Periodical: Rozdelovaci chromatografie vyssich mastnych kyselin na papire. II. Deleni nenasycenych mastnych kyselin, Chem. listy, 1954, 48, No 11, 1703-1705; Czech

Abstract: To study the separation of unsaturated and saturated acids by the method of partition paper chromatography vicinal hydroxy- and halogen derivatives of unsaturated acids were prepared and investigated. Values of Rf of dihydroxy-acids differ little from values for saturated acids. Dihalogen derivatives (prepared by treatment with BrJ) have Rf values lower by 0.15-0.28 units than those of unsaturated acids. Listed are Rf values for unsaturated acids

Card 1/2

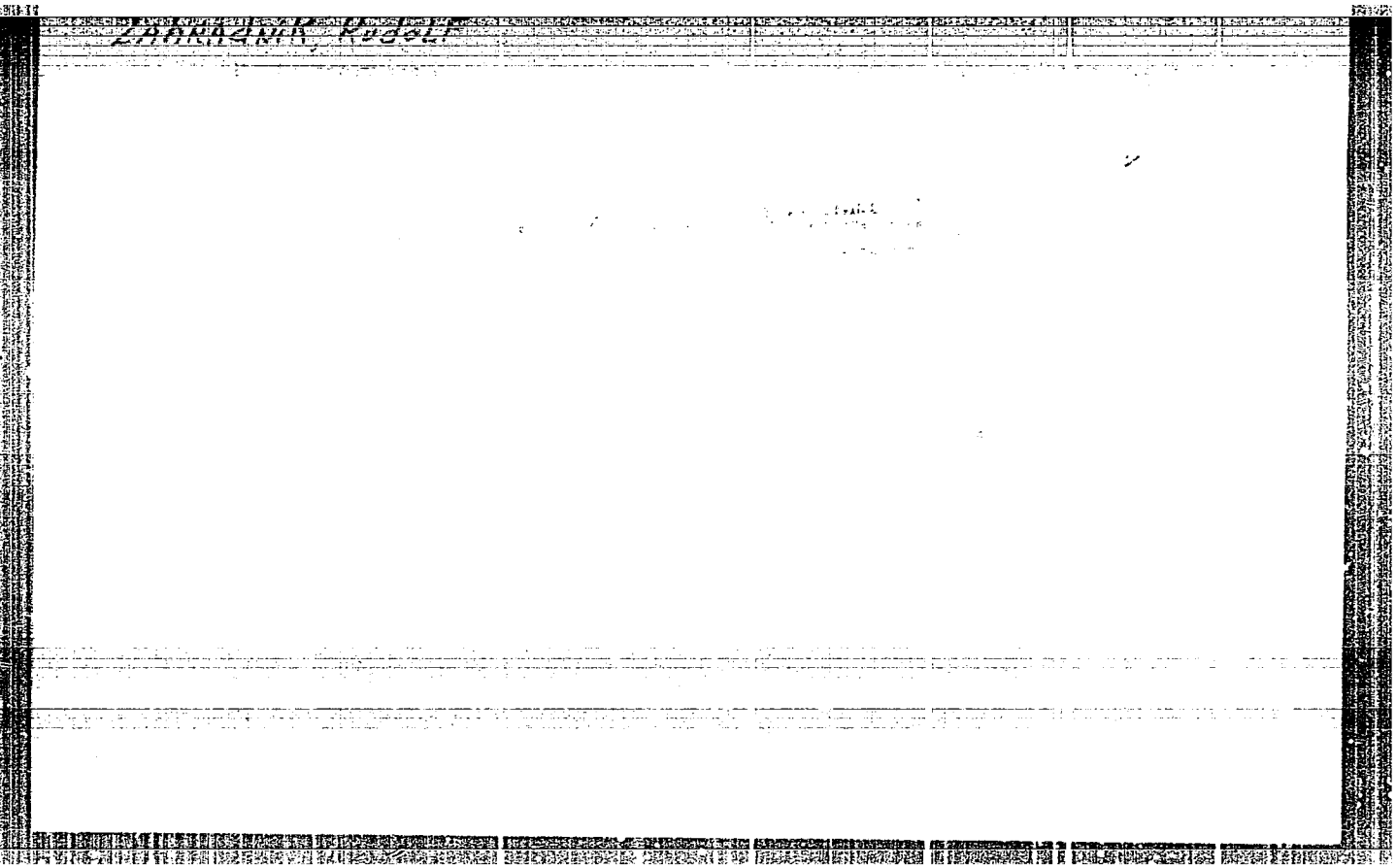
Czechoslovakia/Analytical Chemistry - General Questions, G-1

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61799

Abstract: and their bromiodine derivatives: for undecenoic acid, respectively, 0.85, 0.57; oleic 0.45, 0.22; elaidic 0.39, 0.22; erucic 0.20, 0.05. Preceding communication, see Referat Zhur - Khimiya, 1956, 58490.

Chem. Abstrs., 1955, 49, No 7, 4458.

Card 2/2



ZAHRADNIK, Rudolf Czechoslovakia

"N-NITROSODERIVATE VON PROLIN UND OXYPROLIN," by Rudolf ZAHRADNIK, Institut

ZAHRADNIK, R.

Category: Czechoslovakia B-12

Abs Jour: R Zh--Kh, No 1, 1957, 7696

Author : Zahradnik, R.
Inst : Not given
Title : Reactions of Amino Acids with Hydrogen Sulfide. A Polarographic Investigation of Dithiocarbamic Acids

Orig Pub: Sb. Chekhosl. Khim. Rabot, 1956, Vol 21, No 2, 447-458 (published in German with a Russian summary)

Abstract: See RZhKhim, 1954, 39314; 1956, 13287, 32124.

Card : 1/1

Zahradnik Rudolph

CZECHOSLOVAKIA/Kinetics - Combustion. Explosions. Topochemistry. Catalysis. B-9

Abs Jour : Referat Zhur - Khimiya, No 6, 1957, 18590

Author : Rudolf Zahradnik.
Title : Interaction of Amino Acids with Carbon Bisulfide. IV. Dissociation of Dithiocarbamocarboxylic Acids in Acid Medium.

Orig Pub : Chem. listy, 1956, 50, No 5, 808-816; Sb. chekhosl. khim. rabot, 1956, 21, No 5, 1111-1121

Abstract : The dissociation speed of dithiocarbamocarboxyl acids - derivatives of glycine, alanine, threonine, glutamic acid and tryptophan - in 0.005 to 0.200 M HCl was studied. The reaction speed is determined by the dissociation speed of the product of proton addition to dithiocarbamocarboxylic acid; the latter reaction is characterized by the equilibrium constant K. The apparent dissociation speed constant k' is connected to the speed constant k by

Card 1/2

KOUTECKY, J.; ZAHRADNIK, R.

Relationship between chemical reactivity indexes and carcinogenic activity of larger benzenoid hydrocarbons. Coll Cz Chem 28 no. 5: 1256-1265 My '63.

1. Institute of Physical Chemistry, Czechoslovak Academy of Sciences, Prague.

ZAHRADNIK, R.; KOUTECKY, J.

Theoretical study of sulfur heterocyclic compounds derived from nonalternant hydrocarbons. Coll Cz Chem 28 no. 5: 1117-1133 My '63.

1. Institute of Physical Chemistry, Czechoslovak Academy of Sciences, Prague.

ZAHRADNIK, R.

"Toxicology and biochemistry of aromatic hydrocarbons" by W. Gerarde. Reviewed by R. Zahradnik. Coll Cz Chem 28 no. 5: 1353-1354 My '63.

ZAHRADNIK, R.; VYSTRCIL, A.

Study of au[redacted] Pt. 3. Coll Cz Chem 28 no. 5: 1334-1338 My '63.

1. Institute of Physical Chemistry, Czechoslovak Academy of Sciences, Prague, and Department of Organic Chemistry, Charles University, Prague.

ZAHRADNIK, R.

CZECHOSLOVAKIA/Physical Chemistry. Kinetics. Combustion. Explosions. Topochemistry. Catalysis. B

Abs Jour: Ref Zhur-Khimiya, No 22, 1958, 73276,

Author : Rudolf Zahradnik, Oskar Schmidt.
Inst :
Title : An Experiment of Classification and Denotation of Reaction Schemes for Chemical Kinetics.

Orig Pub: Chem. listy, 1957, 51, No 12, 2378-2383.

Abstract: A system of classification and symbolic denotations of complex chemical reactions of all orders is proposed.

Card : 1/1

CZECHOSLOVAKIA / Physical Chemistry. Kinetics. Combustion. Explosions. Topochemistry. Catalysis. B-9

Abs Jour: Ref Zhur-Khimiya, No 8, 1959, 26487.

Author : Zahradnik, R.
Inst : Not given.
Title : Reactions of Amino Acids With Carbon Disulfide. VI. Kinetics of the Formation of Dithiocarbaminocarboxylic Acids. VII. Preparation and Some Physicochemical Properties of Salts of Dithiocarbaminocarboxylic Acids.

Orig Pub: Collection Czechoslov Chem Commun, 23, No 8, 1435-1442, 1443-1450 (1958) (in German with a Russian summary).

Abstract: See RZhKhim, 1957, 63085.

Card 1/1

CZECHOSLOVAKIA / Physical Chemistry. Kinetics. Com- B-0
bustion. Explosions. Topochemistry.
Catalysis.

Abs Jour: Ref Zhur-Khimiya, No 7, 1959, 22538.

Author : Zahradnik, R.
Inst : Not given.
Title : N-Nitroso Derivatives of Secondary Amines.
1. Kinetics and Mechanism of Dissociation in
Strongly Acidic Medium.

Orig Pub: Collect. czechosl. chem. commun., 1958, 23,
No 8, 1529-1539.

Abstract: See RZhKhim., 1958, 52986.

Card 1/1

17

ZAHRADNIK, R.

ZAHRADNIK, R.; SCHMIDT, O.

"An Attempted Classification and Ordering of Reaction Mechanisms Formulated in ... Kinetic Studies." Collection Czechoslov Chem Commun. 23, No 10, 1991 - 1997 , 1958.

(For abstract see RZhKhim, No 22, 1958. 73276.)

CZECHOSLOVAKIA / Physical Chemistry. Kinetics. Combustion. Explosives. Topochemistry. Catalysis. B-9

Abs Jour: Ref Zhur-Khimiya, No 23, 1958, 76707.

Author : Zahradnik, R. and Zuman, P.
Inst : Not given.
Title : Carbamates, Monothiocarbamates, and Dithiocarbamates. VIII. A Polarographic Study of the Kinetics and of the Mechanism of the Decomposition of Dithiocarbamic Acids in Acid Medium.

Orig Pub: Chem Listy, 52, No 2, 231-242 (1958) (in Czech).

Abstract: The mechanism of the decomposition of nine monoalkyl- and nine dialkyldithiocarbamates has been investigated as a function of $[H^+]$. The rate constant k for the decomposition has the form $k' = k[H^+]/([H^+] + K)$, where k' is the apparent

Card 1/2

COUNTRY : Czechoslovakia
CATEGORY : B-9

ABS. JOUR. : RZKhim., No. 23 1959, No. 81371

AUTHOR : Zahradnik, R.; Zuman, P.
INST. : Not given
TITLE : Carbaminate, Monothiocarbaminates and Dithiocarbaminates. VIII. Polarographic Studies of the Kinetics and Mechanism of Dithio- *
ORIG. PUB. : Collect. Czechosl. Chem. Communs., 1959, 24, #4, 1132-1145.
ABSTRACT : See RZKhim, 1958, #23, 76707.

CARD: 1/1

* carbaminic Acids Decomposition in the Acid Medium

ZAHRADNIK, R.

Reaction kinetics and properties of nonaromatic compounds in homologous series. I. Reactions of alkyl isothiocyanates with hydroxyl ions. R. Zahradník (Ústav pracovního lékařství, Prague). *Collection Czechoslov. Chem. Communs.* 24, 3407-24(1959).—Nucleophilic addn. of OH ions to alkyl isothiocyanates (I) is of 1st order in respect to the OH ions, and is the rate detg. step in the transformation of I to alkyl thiocarbamates (II). The reactivity of I increases with decreasing vol. and increasing electrophilicity of the alkyl groups. B.p./mm. of I and velocity consts. of I + OH^- in a borate buffer contg. 2% dioxane at 25.0° and in 46% aq. EtOH contg. 2% dioxane at 25.55°, are given: Me, 117-19°/740, 3.76, 6.85; Et, 132-4°/738, 2.14, 1.29; iso-Pr, 135°/740, 0.91, 0.43; *tert*-Bu, 139-41°/736, 0.016, 0.0013; Pr, 139-41°/738, 1.07, —; iso-Bu, —, 1.05, —; Bu, 164°/724, 1.61, 0.87; Am, 91-4°/28-30, 1.24, 0.61; C_6H_{11}, 130-8°/68, —, 0.60; n-C_8H_{17}, —, —, 0.55; cyclohexyl, 152-4°/98, 0.69, 0.198; allyl, 140-61°/738, 3.85, 4.86; DL-α-methallyl, —, 2.32, —; β-methallyl, —, 3.89, —; *trans*-crotyl, —, 3.94, —; 3-butenyl, —, 1.89, —; benzyl, 130°/20, 5.05, 6.12; DL-α-phenethyl, —, 0.79, —; $MeS(CH_2)_2$, —, 2.14, —; Ph, 215°/740, 7.10, 3.30. The Taft consts. δ of the first 9 members are: 0.000, −0.100, −0.200, −0.320, −0.115, −0.125, −0.190, −0.162, −0.165. **II. The rate of the reaction of alkyl isothiocyanates with butylamine and that of alkylamines with methyl isothiocyanate.** *Ibid.* 3422-33.—The formation of substituted thioureas from alkyl isothiocyanates (I) and alkylamines (II) involves the amines in the form of the bases whose concn. is detd. by the dissocn. preceding the proper addn. reaction. The nucleophilic addn. is the rate detg. step of the formation of the thioureas. The effect of the structure of the alkyls on the reactivity of both I and II is apparent from the measurements of the velocity consts. of the reaction of I with BuNH$_2$, and of II with MeNCS. Velocity consts. of the reaction with BuNH$_2$ in a borate buffer of pH 10.1 contg. 2% dioxane at 25° are: Me, 3.6; Et, 1.64; iso-Pr, 0.68; *tert*-Bu, 0.054; Pr, 1.51; sec-Bu, 1.24; Bu, 1.42; iso-Am, 1.38; Am, 1.15; cyclohexyl 0.74; allyl, 5.50; DL-α-methallyl, 3.11; β-methallyl, —; *trans*-crotyl, 6.60; 3-butenyl, 2.01; $PhCH_2$, 5.80; DL-PhMeCH, 3.10; $MeS(CH_2)_2$, 2.04; $MeS(CH_2)_3$, 2.20; $MeS(CH_2)_4$ 1.25. For II (b.p./mm.), R, % content of II free base in 60% EtOH, velocity const. of the reaction with MeSCN in a borate buffer in 60% EtOH contg. 2% dioxane are given: Me, 90, 3.25; Et, 88.5, 2.24; iso-Pr, 83 (744), 91, 1.33; *tert*-Bu (45-6°/744), 88.5, 0.222; Pr (48°/760), 93, 1.41; Bu (76-6.5°/730), 92, 1.84; iso-Am (91°/747), 93.5, 2.20; Am (100-2°/744), 93.5, 2.18; n-C_6H_{13} (129°/744), 93.5, 1.93; n-C_8H_{17} (170-2°/747), 95, 1.67; cyclopropyl (49-50°/750), 99, 0.486; cyclobutyl (81-2°/750), 98, 1.17; cyclopentyl (103-8°/760), 93, 0.98; cyclohexyl (152°/744), 94.5, 1.16; cycloheptyl (54-6°/9), 92.5, 0.65; benzyl (of 163°, nt. 162.5-3°), 93, 0.92; norbornyl, 97, 0.74; allyl (53-4°/730), 98, 1.40; $PhCH_2$, 99, 0.91, Ph, 100, 0.104.

M. Hurdálek

Participation of 3d orbitals in the sulfur bond in aromatic compounds. Study of dibenzothiophene by the M.O.-L.C.A.O. method. J. Koutecký, K. Zahradník, and J. Paldus (Czechoslov. Acad. Sci., Prague). *J. chim. phys.* 56, 455–60 (1959).—Two models of the dibenzothiophene (I) mol. are considered: that of Longuet-Higgins (*C.A.* 43, 5382c), which assumes participation of the 3d orbitals of S in the form of hybridized $3pd^2$ orbitals, and makes the —S— analogous to —CH:CH—, and that of Berthier and Pullman (*C.A.* 45, 4501h) for dibenzocyclopentadiene, which is made applicable here by replacing $—CH_2—$ by —S—. The calcns. predict approx. the same reactivity for C 2, 3, and 4 in electrophilic substitution for the 1st model, but a smaller reactivity for C 3 compared to C 2 and 4 for the 2nd model. Exptl. data favor the 2nd model, but not conclusively. The 2nd model also predicts a larger value for the bathochromic shift of the electronic transition $N \rightarrow V_1$ on going from thiophene to benzothiophene to I. H. Newcombe

4

4E3d

299 (NB)

4E2c (j)

ZAHRADNIK, R.

Reaction kinetics and properties of nonaromatic compounds in homologous series. IV. Spectral and polarographic properties and dissociation constants on N-alkylthiourea. In German. Coll.Cz.Chem. 24 no.11:3678-3687 N '59. (EEAI 9:5)

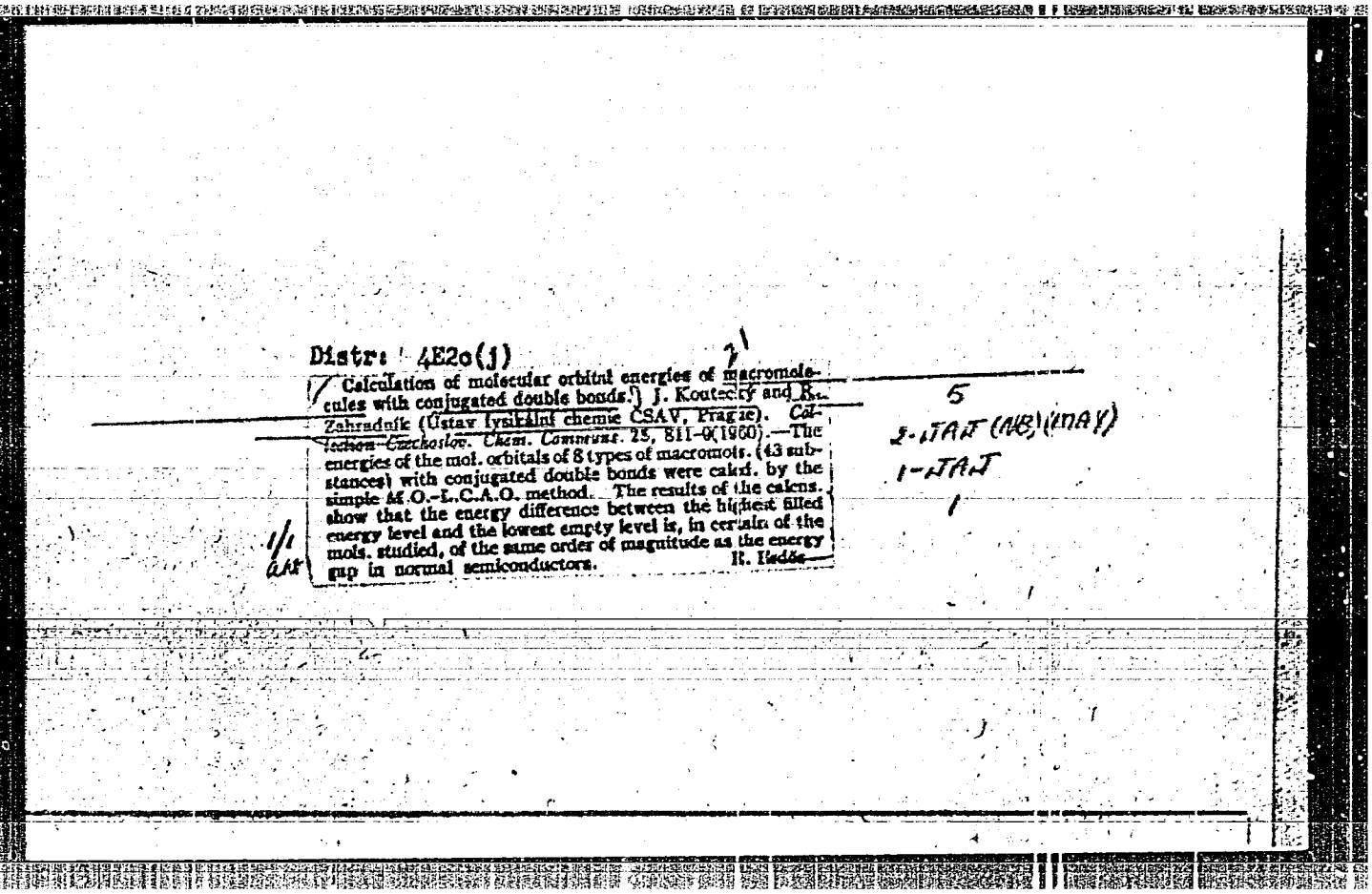
1. Institut für Arbeitshygiene und Berufskrankheiten, Prag.
(Homologous series) (Alkyl groups) (Spectrum analysis)
(Polarograph and polarography) (Bissociation) (Thiourea)

Distr: 4E2c(j)/4E3d

A study of benzodithiylium by a simple M.O.-L.C.A.O. method. J. Koutecký, J. Paldus, and R. Zahradník (Ú. ústav fysikální chemie ČSAV, Prague). *Collection Czechoslov. Chem. Communs.* 25, 617–24 (1960).—The benzodithiylium mol. was studied by the M.O.–L.C.A.O. method in the Hückel approxn. while using the Longuet-Higgins model for expressing the character of the S bond in this mol. The calcn. of the delocalization energies indicates the possible existence of a dithiylium cation. The great reactivity of the 2 position as compared with the 4 and 5 positions follows from the mol. diagrams and the values of the at. localization energies of the mol. in the form of a cation, free radical, and anion.

E. Erdös

6
1- BW(BW)
2- Prof(NB)(Prague)
2



Distr: 4E2o(j)

Calculation of molecular orbital energies of macromolecules with conjugated double bonds. J. Koutecký and R. Zahradník (Ústav fysikální chemie ČSAV, Prague). *Collection Czechoslov. Chem. Communs.* 25, 811–6(1960).—The energies of the mol. orbitals of 8 types of macromols. (43 substances) with conjugated double bonds were calcd. by the simple M.O.–L.C.A.O. method. The results of the calcns. show that the energy difference between the highest filled energy level and the lowest empty level is, in certain of the mols. studied, of the same order of magnitude as the energy gap in normal semiconductors. R. Hedde

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CZECH/8-53-1-20/20

AUTHOR: Zahradník, Rudolf

TITLE: Kinetic Equations of Homogeneous Reactions

PERIODICAL: Chemické listy, 1959, Vol 53, Nr 1, pp 56 - 103

ABSTRACT: The table of contents is as follows:

1) Introduction (p 56)
2) Classification and grouping of reaction schemes (p 56)
   2.1 Presentation of information on reaction schemes (p 58)
3) First-order reaction (p 59)
   3.1 Review of the treatment of reaction schemes (P 59)
   3.2 First-order reaction schemes (p 61)
4) Second-order reaction schemes (p 78)
   4.1 Review of the treatment of reaction schemes (p 78)
   4.2 Second-order reaction schemes (p 80)
5) Third-order reactions (p 96)
   5.1 Review of the treatment of reaction schemes (p 96)
   5.2 Third-order reaction schemes (p 96)
6) Conclusions (p 98).

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Kinetic Equations of Homogeneous Reactions

This review is basically concerned with reaction schemes of velocities of processes occurring in a homogeneous fashion in isochoric and isothermal systems. The major part is based on velocity equations of chemical reactions occurring in solution. The reviewer sees the task of his review as being that of surveying reaction schemes which have to be solved from the kinetic viewpoint and special attention is paid to the mode of determination of the velocity constant. The presentation was determined by the fact that in contrast to the majority of other chemical problems, it is sufficiently difficult to obtain information on the kinetic treatment of specific reaction schemes from abstract journals or monographs. The reason for this being the case with such abstract journals as Chemical Abstracts and Chemisches Zentralblatt lies, on the one hand, in the difficulty of conveying adequately the majority of complicated reactions in a condensed form and, further, in the fact that quite a number of solutions are scattered through the texts. Monographs tend to give incomplete information.

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Kinetic Equations of Homogeneous Reactions

Other reviews: Refs 53, 101, 165. Basic schemes: Ref 119.2. Classification and grouping of reaction schemes adopted by the reviewer were previously suggested by him in Ref 211. Various other methods are to be found in Refs 41, 153, 11-13, 26, 27.

First-order Reactions Bases: linear systems, cyclic systems; combination of two linear systems.

Linear systems - Nr 1 is allocated to that substance on the edge of the system which is formed and then suffers maximum change during the reaction. This substance is then said to have maximum "disturbance". For example, substance A⇄ has priority in allocation of index 1 to substance A→ and this, in turn, has priority over A← . Numbering of other substances is carried out in a systematic way. Further principles arise from the steps taken to allocate the "disturbed" position (in the sense of the above) the lowest number. This principle must be respected in all the following systems, as well.

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Cyclic systems. Nr 1 is allocated to the substance with maximum "disturbance" (e.g. substance $\rightleftarrows A \rightleftarrows$ has precedence over substance $\rightarrow A \rightleftarrows$, substance $\leftrightarrows A \Rightarrow$ has priority over $\rightleftarrows A \Leftarrow$, etc.)

Combination of two linear systems. After selecting the longest linear system the rules given above are followed and in addition the side chains are numbered from the main system in the direction of the free end after the main chain has been numbered. The designation of reaction scheme is derived by writing the existing processes in the given reaction scheme. Each elementary reaction (reaction of type $A_m \rightarrow A_n$) is described by the double symbol m-n. A set of elementary reactions forming the given reaction scheme is written as a set of double numbers: the arrangement of the double numbers m-n (smaller numbers have precedence over higher numbers, e.g. 1-2 has precedence over 2-1; 2-7 has precedence over 3-4, etc.) gives, in the main, the designation of the reaction scheme. In the case where the substances yield double numbers (e.g. in a twelve-component system n = 12) the

Kinetic Equations of Homogeneous Reactions

index is designated with a bar $(\overline{12})$. The complete symbol of the reaction scheme is obtained by placing the set of dual numbers in brackets and the order of reaction is designated by a Roman numeral and the number of reacting substances in Arabic numeral in heavy type. Example:

$$A_1 \rightleftarrows A_2 \rightarrow A_3$$

is designated $I_3(1-2, 2-1, 2-3)$. I shows that the reaction is first order; 3 - the number of substances participating in the system and the numbers inside the brackets show that substance 1 gives rise to substance 2, substance 2 to substance 1, as well as substance 3.

Classification of reaction schemes. With a reaction of the given order the symbols are grouped in the first place, according to the number of substances; the symbols describing the systems with fewer substances have precedence.

Kinetic Equations of Homogeneous Reactions

In the classification of symbol groups of the reaction schemes of a given order and a given number of substances, the rule that symbols dealing with a larger number of processes have precedence over symbols dealing with a smaller number of processes applies. This means, in practice, that we proceed from the more complete to the less complete systems. For the same number of processes the size of the first dual number is decisive, as long as they differ, or the i-th dual number, if the (i - 1) dual number coincides. In this case, the lower dual number has precedence over the higher dual number.

Reactions of the Second Order. In the case of second- and higher-order reactions (as in combinations with first-order reactions), the relationships are more complex. As in the case of first-order reactions the numbering of all components of the reaction system is carried out progressively, so that the numbering of components is commenced at the "end" of the longest linear system so that the "interfering" positions are assigned the lowest number.

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Kinetic Equations of Homogeneous Reactions

In the case of consecutive reactions the index of the substances is progressively assigned so that the rule that the "interfering" positions are given the lowest number is taken into account. In the case of first- and second-order side reactions the rule applied is that second-order reactions have precedence in the assignation of indices. Of course, with first-order reactions, two numbers suffice for the simplest reactions, e.g. $A_1 \rightarrow A_2$ has the symbol $I_2(1 - 2)$ but in the description of second-order reactions at least four numbers, grouped into pairs, are required, e.g. $A_1 + A_2 \rightarrow A_3 + A_4$ has the symbol $II_4(12 - 34)$. II indicates the order of reaction, 4 the number of substances involved in the reaction; the contents inside the brackets indicate that A_1 and A_2 give rise to A_3 and A_4 . Reactions systems which are built up from a number of first-order reactions

Kinetic Equations of Homogeneous Reactions

and only one second-order reaction are classified together with second-order reactions; reactions of the first-order being written formally as reactions of the second order, e.g. a first-order reaction $A_m \rightarrow A_n$ which forms part of a second-order reaction system has the symbol m0 - n0. Reactions of the second order of type $2A_1 \rightarrow A_2$ possess the symbol 11 - 20.

Classification of reaction schemes. In the case of second-order reactions classification proceeds in a completely similar way to that for symbols of first-order reaction schemes. This means that the scheme symbol is arranged first of all according to the number of substances describing the scheme; scheme symbols with fewer substances have precedence over those scheme symbols involving more substances. Further, in groups of symbols describing a certain number of components, the completeness of the system (the more complete system having precedence) is the deciding factor and with schemes of the same completeness the deciding factor is then the size of the

first of the four numbers (again smaller numbers have precedence). The arranging according to size of the first of the four numbers is retained in the case where the number of products is larger than two, e.g. with $A_1 + A_2 \rightarrow A_3 + A_4 + A_5$ has the symbol $II_5(12 - 345)$, the arrangement 12 - 34 is the deciding factor. In principle, it is possible to classify and group third-order reaction schemes in the same fashion.

2.1 Presentation of information on reaction schemes.

The respective and its symbol is given first of all. The velocity equation in its differential form is usully given only when it is required for the presentation of principles or when it is used directly for calculation. The initial conditions are also presented and finally remarks on the solution are also given. The preparation of the velocity equation in its differential form does not encounter the usual difficulties (but c.f. Refs 29, 30, 37 and 147) because it is possible to write the velocity equation:

Kinetic Equations of Homogeneous Reactions

$a_1A_1 + a_2A_2 + \ldots, + a_iA_i + \ldots + a_nA_n \rightarrow$ products in the general form:

$$d[A_i]/dt = -\prod_{i=1} k[A_i]_i^a .$$

In this equation $[A_i]$ denotes the concentration of the substance. It is permissible to use the statement of concentration on the assumption that the reacting substances exhibit ideal behaviour and this tacit assumption is, as a rule, accepted (for the general formulation of the velocity equation, viz. Refs 5, 30). Finally, the solution of a system of differential equations is given, as a rule, in the form of a function of the dependence of concentration on time. Attention is then usually paid to the determination of the velocity constant from experimental data. (A specially detailed account (Ref 101) is given in the Vol 8 of "Technique in Organic Chemistry", as well as in Refs 16, 17, 46-48, 53, 64, 80, 81, 86, 148, 154-156, 175, 184, 188 and the

Kinetic Equations of Homogeneous Reactions

special use of nomograms in Refs 50, 109, 126-128, 204, as well as the method of least squares (Refs 34, 120, 145, 197, 200)). For reasons given above, certain schemes are, in addition, presented in a figure (variation of concentration with time) and, in certain cases, tables are given which aid the calculation of the velocity constants, etc. The different reactions are then considered in detail.

3. First-order Reactions

3.1 Review of the treatment of reaction schemes of the first order. Table headings: Number of Substances; Scheme; Symbol; Page.

3.2 First-order reaction schemes. The schemes listed in the preceding table (pp 59 - 60) are discussed at length.

Legends. Figure 1: Change with time of molar fraction (x_1, x_2, x_3) of substances A_1, A_2, A_3 versus θ in the reaction $A_1 \rightleftarrows A_2 \rightleftarrows A_3$. If $[A_2]_0 = [A_3]_0 = 0$,

Curve - is valid; for $[A_1]_0 = [A_3]_0 = 0$, Curve -- is valid (Ref 187).

Figure 2: Change of concentration of substances $A_1(1)$, $A_2(2)$ and $A_3(3)$ with time in the reaction $A_1 \rightleftarrows A_2 \rightarrow A_3$, for $k_{12} = 2$, $k_{21} = k_{23} = 1$ (dimension of k : time $^{-1}$). Concentrations of substances A_1, A_2 and A_3 are expressed as fractions of the initial concentration A_1 (Ref 113).

Figure 3: Change of concentrations of substance $A_1(1)$, $A_2(2)$ and $A_3(3)$ with time in the reaction $A_1 \rightleftarrows A_2 \rightarrow A_3$ for $k_{12} = 0.05$; $k_{21} = 0.1$; $k_{32} = 0.1$ (dimension of k : time $^{-1}$). Concentrations of substances A_1, A_2 and A_3 are expressed as fractions of initial concentration A_3 (Ref 38).

Kinetic Equations of Homogeneous Reactions

Figure 4: Dependence of $[A_2]$ on time in the reaction $A_1 \rightarrow A_2 \rightarrow A_3$ for $[A_1]_0 = 10$ and for various absolute values of k_{12} and k_{23}. Ratio $k_{12}:k_{23}$ is of the order 0.5, 1 and 2 (Ref 40).

Figure 5: Change of $[A_1]$, $[A_2]$ and $[A_3]$ with time in the reaction $A_1 \rightarrow A_2 \rightarrow A_3$; $k_{12} = 0.1$ min^{-1}, $k_{23} = 0.05$ min^{-1} (after Ref 53).

Figure 6: Dependence of relative concentrations α_1, α_2, α_3 and α_4 on $(1 - \alpha_1)$ and $\varkappa$ (Ref 53).

Figure 7: Percentage of converse reaction $A_1 \rightarrow A_2 \rightarrow A_3$ versus τ and $\varkappa$ (Ref 53).

Figure 8: Course of hydrolysis of 2 isomeric alkyl halides (with branched alkyl groups) with time. The course of reaction is followed by the change in concentration of the

common products. The deviation from linearity of the graph of log $([A_2]_\infty - [A_2])$ versus time is evidence of various velocities of hydrolysis of both isomers and it allows the calculation of the velocity constants k_{12} and k_{32} (c.f. Figure 9 and Ref 31).

Figure 9: Treated data from Figure 8. Two straight lines (A_I, A_{II}), using semilogarithmic coordinates, are obtained by separation of the change with time of both components. The velocity constants k_{12} and k_{32} can be calculated from the slope and the intersections with the ordinate axis give the inital concentrations A_1 and A_3 (Ref 31).

4. Second-order Reactions

4.1. Review of the Treatment of Reaction Schemes. The table following lists second-order reactions under the headings: Number of Substances; Scheme; Symbol; Page (in that order).

Kinetic Equations of Homogeneous Reactions

4.2 Second-order Reaction Schemes. The exhaustive list of schemes given in the preceding table is then considered in some detail.

Legends: Table 1: Type of functional dependence of the expressions $k_1 t_{max}$ and $[A_2]_{max}/[A_1]_0$ on initial concentration A_1 for second-dgreee consecutive reactions of various orders (Refs 182, cf 183).

Order of Reaction	$k_1 t_{max}$	$[A_2]_{max}/[A_1]_0$
1-1	Independent	Independent
1-2	Falls	Falls slowly
2-1	Falls	Falls slowly
2-2	Indirectly proportional	Independent

Figure 10: Graphical solution of Eq (113) is valid in the calculation of $[A_2]_{max}$ for the scheme $A_1 \rightarrow A_2$, $2A_2 \rightarrow A_3$ (Ref 182).

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Table II: Dependence of τ on $\varkappa$ and α_1 (Ref 53).

Figure 11: Dependence of relative concentration α_1 on the change with time τ for a series of values of $\varkappa$ (Ref 54).

Figure 12: Dependence of the relative concentration α_2 on the change with time τ for a series of values of $\varkappa$ (Ref 54).

Figure 13: Dependence of $1/\varkappa$ on time ratio for 60 and 40%, as well as 50 and 20% conversion (calculated with respect to substance A_1 (Ref 54) x = time ratio.

5. Third-order Reactions.

5.1. Review of the treatment of reaction schemes. The table which follows has column headings: Number of Substances; Scheme; Symbol; Page (in that order).

5.2. Third-order Reaction Schemes.

Table III (legend). Solution of the velocity equation of the form:

Kinetic Equations of Homogeneous Reactions

$$dx/dt = k([A_1]_0 - x)^j\left([A_2]_0 - \frac{a_2}{a_1}x\right)^k\left([A_3]_0 - \frac{a_3}{a_1}x\right) ;$$

expressions for half-life and velocity constant dimensions. (After Ref 101). (v = const., t = const.).
The column headings are, in order: Total order j + k + l; Partial order jkl; Stoichiometric coefficients a_1 a_2 a_3; Fixed integral; Half-life; Dimensions of k .

6. Conclusions. The author criticises the presentation in the literature of reaction schemes and failure to state conditions and recommends that this should be avoided and he also draws attention to some recent novelties which may aid simplification, Refs 54, 141, 177, 201. Thanks are stated to be due to Dr. Zuman and Messrs. Dušek and Schmidt for advice and guidance.

Kinetic Equations of Homogeneous Reactions

Symbols: (If special usages have been involved then this is stated in the text).

A_i i-th component of the system;

$[A_i]$ concentration of i-th component of the system;

k_{ij} velocity component of first-order reaction for the change $A_i \rightarrow A_j$;

k_i i-th velocity constant of second-order reaction;

K equilibrium constant of the reaction;

$\alpha_i = [A_i]/[A_1]_0$ relative concentration of i-th substance;

$\varkappa$ velocity constant ratio.

Indices:

r equilibrium amount;
S stationary amount;
0 initial amount.

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Kinetic Equations of Homogeneous Reactions

More recent work and addendum:
This section covers some papers appearing in 1957 and part of 1958 which appeared after the review went to press (Refs 214 - 227).
There are small English and Russian summaries.
There are 13 figures, 3 tables and 227 references, of which 7 are Czech, 2 Polish, 16 Soviet, 2 Japanese, 6 French, 1 Italian, 1 Hungarian, 42 German, 1 Spanish, 1 Brazilian, 9 Dutch and 10 Scandinavian, the remainder being English.

ASSOCIATION: Ústav hygieny práce a chorob z povolání, Praha (Institute for Industrial Hygiene and Disease, Prague)

SUBMITTED: November 12, 1957

Card 19/19

CHVAPIL, M.; ZAHRADNIK, R.

A possibility for the rejuvenation of collagen feber structures.
Cesk.fysiol. 9 no.3:237-238 My '60.

1. Ustav hygieny prace a chorob z povolani, Praha.
(COLLAGEN chem)

ZAHRADNIK, R.; RERICHA, R.; AZAMIT, P.; REZABKOVA, M.; SKRAMOVSKY, S.

Reaction of some cations of heavy metals with slightly soluble calcium compounds. Coll Cz Chem 25 no.1:146-158 Ja '60. (EEAI 9:12)

1. Institut fur Arbeitshygiene und Berufskrankheiten, Prag, und Institut fur anorganische Chemie, Karlsuniversitat, Prag.
(Heavy metals) (Cations) (Calcium)

KOUTECKY, J.; PALDUS, J.; ZAHRADNIK, R.

A study of benzodithiylium by a simple MO LCAO method. Coll Cz chem 25 no.3:617-624 Mr '60. (EEAI 9:12)

1. Institute of Physical Chemistry, Czechoslovak Academy of Science and Institute of Industrial Hygiene and Occupational Diseases, Prague.
(Molecules) (Quantum theory) (Sulfur)
(Benzodithiylium)

KOUTECKY, J.; ZAHRADNIK, R.

Calculation of molecular orbital energies of macromolecules with conjugated double bonds. Coll Cz chem 25 no.3:811-819 Mr '60. (EEAI 9:12)

1. Institute of Physical Chemistry, Czechoslovak Academy of Science, and Institute of Industrial Hygiene and Occupational Diseases, Prague.
(Macromolecular compounds)

DUSEK, K.; ZAHRADNIK, R.

Calculation of the constants of velocity of reactions in which the dependence of concentration functions in time is expressed by total of exponential functions. Coll Cz Chem 25 no. 5:1413-1422 My '60.

1. Forschungsinstitut fur synthetische Harze und Lacke, Paraubice und Institut fur Arbeitshygiene und Berufskrankheiten, Prag.

BUDINSKIY, J.; ZAHRADNIK, R.; CHVAPIL, M.

Spectrophotometric method for the quantitative determination of N-substituted phenothiazines and substances related to them. Apt. delo 10 no. 1:94 Ja-F '61. (MIRA 14:2)
(SPECTROPHOTOMETRY) (PHENOTHIAZINE)

ZAHRADNIK, R.

Metabolism of aromatic polynuclear hydrocarbons and heterocyclic compounds. Pracovni lek. 13 no.2:86-94 Mr '61.

1. Ustav hygieny prace a chorob z povolani v Praze, reditel prof. MUDr. J. Teisinger.

(HETEROCYCLIC COMPOUNDS metab)
(HYDROCARBONS metab)

ZAHRADNIK, R.; KOUTECKY, J.

Contribution to the chemistry of thiadiazols and 1,3-thiazol. Coll Cz chem 26 no.1:156-172 Ja '61. (KEAI 10:9)

1. Institute of Industrial Hygiene of Occupational Diseases and Institute of Physical Chemistry, Czechoslovak Academy of Science, Prague.

(Thiadiazole) (Thiazole)

ZAHRADNIK, R.; BOCEK, K.

Infrared spectra, kinetics of reduction and polarography of aromatic polynuclear nitro compounds. Coll Cz Chem 26 no.7:1733-1748 Jl '61.

1. Institute of Industrial Hygiene and Occupational Diseases, Prague.

(Spectrum, Infrared)
(Reduction, Chemical)
(Nitro compounds)

VLACHOVA, D.; ZAHRADNIK, R.; ANTOS K; KRISTIAN, P.; HULKA, A. CSSR

Institute of Physical Chemistry, Czechoslovak Academy of Science, Prague (for Zahradnik), Institute of Industrial Hygiene and Occupational Diseases, Prague, and Department of Organic Chemistry, Slovak Technical University, Bratislava (for the rest)

Prague, Collection of Czechoslovak Chemical Communications, No 12, 1962, pp 2626-2640

"Kinetics of the Reaction with OH^- Ions and Polarography of Aromatic Isothiocyanates"

5

ZAHRADNIK, Rudolf

"Ultra-violet and visible spectroscopy (Chemical applications)" by C.N.R. Rao. Reviewed by Rudolf Zahradnik. Chem prum 12 no.9:510-511 S '62.

1. Ustav fyzikalni chemie, Ceskoslovenska akadomie ved.

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