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I

Ebullioscopic apparatus for study of mixtures of liquids. W. Swietoslawski. *Roczniki Chem.* 9, 508-13 (614 French) (1929).—See *C. A.* 24, 1. J. Kučera

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The heats of combustion of camphor, azobenzene and hydrazobenzene. W. Świętosławski and J. Bobińska. *Roczniki Chem.* 9, 723-30(730 French)(1929).—The heats of combustion of camphor, azobenzene and hydrazobenzene are in cal.$_{15}$ per g., in air: 9280.7, 8483.8, 8024.3; *in vacuo:* 9248.7, 8477.0, 8017.4. The mol. heats of combustion, *v* const. (air): 1408.8, 1544.9, 1587.9, *p* const. (air): 1410.8, 1545.8, 1589.1; *p* const. (vacuum): 1409.0, 1544.6, 1587.8. W. A. Roth's opinion of the non-homogeneity of Lemoult's data is confirmed (*C. A.* 20, 2445). J. K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

CA

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Briquetting of coke and semicoke powders with coal as the binder. II. W. Swietoslawski, B. Roga and M. Chorazy. *Przemysl Chem.* 13, 465-72(1929); cf. C. A. 23, 2012.—The higher the coking properties of coal the better it acts as a binder. The nature of the semicoke, depending on whether it came from a coking or a non-coking coal, plays a minor but significant part in briquetting. A min. of 30% coal dust is necessary to produce mechanically strong briquets. The temp. to which the mixt. of coal dust with coke or semicoke dust must be heated before pressing varies between 380° and 440°, depending on the coal dust used as the binder. A pressure of 200-300 kg./sq. cm. is sufficient to produce good briquets. A résumé of over 27 patents on briquetting compiled from international sources is given. A. C. Z.

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Methods of ebullioscopic and tonometric research. W. Świętosławski. *Bull. intern. acad. polonaise* 1929A, 434–90 (in French).—See *C. A.* 23, 3380. J. Wiertelak

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Heat of combustion of camphor, azobenzene and hydrazobenzene. W. Świętosławski and J. Bobińska. *Bull. intern. acad. Polonaise* 1929A, 621-30(in French). See C. A. 24, 1790.

J. Wiertelak

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Application of the differential ebullioscope for the study of azeotropic mixtures of ethyl alcohol and water. W. Swietoslawski and I. Zlotowski. *Roczniki Chem.* **10**, 298-302 (302-3 French); *Collection Czechoslov. Chem. Communications* **2**, 315-29 (1930). A device composed of an ordinary and a differential ebullioscope was made for the study of azeotropism of mixts. of alc. and water. The variation of the boiling temps. with the compn. of the mixt. was examd. within the limits of water concn. of 0 to 7% under varying pressures from 760 to 1000 mm. Hg. Azeotropic concns. and depressions of the mixts. alc.-water were detd. for 6 pressures 765, 1025, 1270, 1500, 1740 and 1900 mm. Hg. Tables were compiled contg. the differences between the b. ps. of alc. and of the mixts. alc.-water for these 6 pressures and tables contg. the differences between the b. ps. of abs. alc. and the mixts. alc.-water permitting the *detn. of traces of water* in anhyd. alc.

Jaroslav Kucera

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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205. Rate of Evaporation of Liquids from a Heated Platinum Surface. W. Swietoslawski and S. Bakowski. *Acad. Polonaise Sci. et Lettres, Bull. 4a-6a. pp.* 191-194, *April-May,* 1930. *In English.*—Repeating (Mme.) Blaszkowska-Zakrzewska's work (see preceding Abstract) with a cavity lined with platinum, the authors discover a temperature-range of instability over which a liquid drop (*e.g.*, alcohol-ether mixture) may take only 5 sec. or alternatively as long as 30-35 sec. to evaporate. The lower value corresponds to a maximum rate of evaporation and is constant over a wide range of temperature, the upper tends to fall slowly at higher temperatures. Thus over the range 210°-270° C. the spheroidal state may or may not be assumed, a result (peculiar to platinum) which the authors attribute to surface irregularities. L. V. C.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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K

1956. Differential Ebullioscope with Fractionator. W. Swietoslawski. *Acad. Polonaise Sci. et Lettres, Bull.* 9-10. *A. pp.* 504-517, *Nov.-Dec.*, 1930.—The apparatus is intended to measure the difference between the temperature of ebullition and the temperature of condensation of a liquid, whether a simple compound or a constant-boiling mixture. Examples of results obtained with it are given, and modifications are also described which use only about 30 gm. and only 5 or 8 respectively. Methods of filling the apparatus receive particular attention, and its value in studying the purity of a liquid is emphasised and illustrated with examples. J. H. A.

METALLURGICAL LITERATURE CLASSIFICATION

2

Principal phenomena in azeotropic mixtures composed of several components. W. Swietoslawski. *Roczniki Chem.* 10, 97-112; 112-4 (French)(1930). A system composed of a substance A and of components B, B_1, B_2, ... B_n, B_n', B_n'', the constitution and chem. functions of which are similar, is studied. A is called the agent producing azeotropism, the difference Δ_A between the boiling temp t_A of that substance and the temp t_{AB} of the particular system (as $A + B$) is called the *azeotropic depression*. If the A series of curves representing the isobars of the particular mixts. is given. If the boiling temps of the pure components t_B, t_{B_1}, t_{B_2}, ... t_{B_n}, $t_{B_n'}$, $t_{B_n''}$ increase, the azeotropic depression ascribed to A is greater the greater the difference $(t_A - t_B)$. The azeotropic concn. C_A of the agent A in the mixt. increases equally. The phenomenon does not change, if the difference $(t_A - t_B)$ becomes neg. In the limit Δ_A attains a min. (when B_n has a higher boiling temp t_{B_n}). The components B_n' and B_n'' do not form any more azeotropic mixts. with A. The deviations from the Raoult law are found solely for mixts. $(A + B_n')$, $(A + B_n'')$. If one considers any azeotropic mixt. (as $A + B_1$), it is possible to predict the displacement of the min. of boiling temp. as a function of the increase of pressure. Then it is convenient to change the expression

OVER

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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Mechanical resistance of cokes from Upper Silesia. W. Swietoslawski and M. Chorazy. *Przemysl Chem.* 14, 193-204(1930).—The usual drum test for the strength of coke was modified by periodically removing from the drum the smaller lumps produced by grinding, detg. the proportions of lumps (1) greater than 40 mm., (2) between 40 and 10 mm. and (3) smaller than 10 mm. The results are evaluated numerically by plotting the % of each size of lumps against the no. of revolutions of the drum, and measuring the areas under the curves. This method and the "shatter test" were applied to cokes from several Upper Silesian plants of various oven designs. The 2 methods gave concordant results. The modified drum test is, however, the more sensitive one for friable and easily crushable cokes, and is the better suited for cokes of Upper Silesia.

A. C. Zachlin

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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21

Ignition temperatures of Polish powdered coals. WOJCIECH SWIETOSLAWSKI AND MIECZYSLAW GROCHOWSKI. *Przemysl Chem.* 14, 245-9(1930).—By use of app. designed by Swietoslawski and Roga (*C. A.* 22, 2047) ignition temps. were measured on 16 samples of Upper Silesian, Dabrowa and Krakow coals. The ignition temp. of grains of 1.5-2 mm. diam. is usually 330-60°, although an appreciable portion of the samples gave values of 210-70°. All samples which passed through the 1 mm. screen showed ignition temps. of 190-220°. The grains of vitrain and durain possess similar properties. Ignition temps. are lower by 100-50° for the fines regardless of whether the fine subdivision was produced by natural or artificial means. The samples of fusain show low ignition temps., 100-270°, regardless of whether 1.5-2 mm. grains or the fines were used. The explanation is that in Polish, and probably in other coals, fusain occurs in nature in the form of fibers or grains pressed between the other petrographic modifications of coal.

A. C. ZACHLIN

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Physicochemical researches on alcoholic mixtures. I. Introduction. WOJCIECH SWIETOSLAWSKI. *Przemysl Chem.* 14, 337-8(1930).—Compn. by vol., sp. gr. and acidity of mixts. discussed in succeeding instalments are given. **II. The phenomenon of azeotropy in polycomponent mixtures.** *Ibid* 339-45.—Azeotropic mixts. of 2 and 3 components are considered theoretically. The component A that produces an azeotropic mixt. with other components B and B_1 is called an *azeotropizing agent*. The difference between the b. p. of component A and the b. p. of the mixt. producing max. vapor pressure is called the azeotropic lowering of the boiling temp. with respect to the component A (in the case of pos. azeotropy). In a series of binary mixts. of an azeotropizing agent A with B, B_1, B_2, . . . etc. (*e. g.*, hydrocarbons) the concn. of A is greater the smaller the azeotropic lowering of the b. p. In such a series no ternary azeotropic mixt. such as B + B_1 + A is formed, but a series of binary azeotropic mixts. such as A + B, A +

insignificant deviations the vol. of air-% liquid vaporized relationships were straight lines. The losses of liquid, in general, were greater the higher the vapor pressure. **VIII. Dependence of the temperature of clouding of the mixtures on the amount of added water.** W. SWIETOSLAWSKI, J. PFANHAUSER AND S. BAKOWSKI. *Ibid* 497-501.—Clouding and sepn. into 2 phases of the alcoholic fuel mixts. was studied in the relation of temp. to the amt. of water added within the temp. limits of —25° to +30°. A modified form of Alexeyev app. was used. The mixt. PA became turbid the most easily (—18°). Temps. at which the other mixts. sepd. into 2 phases varied from —22.5° to —75°. **IX. Flash points, and burning temperatures of alcoholic fuel mixtures.** W. SWIETOSLAWSKI AND B. KARPINSKI. *Ibid* 501-3.—Abel's app. was used.

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Measuring small temperature effects. W. Swietoslawski. *Chem. Listy* 24, 8-11(1930).—An *adiabatic calorimeter* is described by which small temp. effects are measured when the heat is evolved over a long period. The heat given off in minerals poor in radioactive elements can be measured. It is useful in biology for measuring the heat given off during biological oxidations. It cannot be used for the ordinary run of chemical reactions for the events pass through too rapidly. A modification of an *ebullioscope* is also described.

FRANK MARESH

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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Remarks on the rate of evaporation of liquids from a heated platinum surface. W. Swietoslawski and S. Bakowski. *Bull. intern. acad. polonaise* 1930A, 191-4 (in English).—The rate of evapn. of small liquid drops from heated Pt and other metal surfaces is compared. In the case of Al the results of Blaszkowska-Zakrzewska (cf. *C. A.* 25, 4445) are confirmed. In the case of Pt, however, a temp. interval exists above the temp. at which the time of evapn. attains a min., where simultaneously a very rapid and a very slow evapn. can take place. In this interval points of the slow evapn. lie on the prolongation of the time-temp. curve of the slow evapn. at high temps. The phenomenon is also observed in case of liquid mixts. and may be due to an uneven surface of the Pt dish or to foreign matter on its surface. J. Wiertelak

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Preparation of sulfonic derivatives of naphthoquinonechloroimines and naphthoquinonedichlorodiimines. W. Swientoslawski, A. Pilti and F. Krackiewicz. *Bull. intern. acad. Polonaise* 1931, No. 2A, 148-57(1931) – See *C. A.* 25, 3331. G. G.

Thioquinols. Leonard A. Warren and Samuel Smiles. *J. Chem. Soc.* 1931, 1192-6.—Thio derivs. of 2-$C_{10}H_7OH$ of the general type 1,2-$C_{10}H_6(OH)SAr$ (I) are converted by dil. HNO_3 into quinonitroles (II), 1,1,2-$C_{10}H_6(SAr)(NO_2)$:O. Under the action of heat in solvents the II decomp., yielding complex mixts.; the chief process involved is usually that of hydrolysis, leading to HNO_2 and the thioquinols (III), 1,1,2-ArS(HO)$C_{10}H_6$:O; these have not been isolated, the disulfides resulting from oxidation of the thiols liberated by fission of the III being obtained instead. Concurrently with hydrolysis, migration of the NO_2 group may occur, but the resulting NO_2 derivs. of I have been obtained in only 3 cases. A third type of decompn. (in presence of alkali) involves the removal of the thioaryl group, leaving 1,2-$O_2NC_{10}H_6OH$. *2-Naphthyl 1-nitro-2-keto-1,2-dihydro-1-naphthyl sulfide* (II, Ar = 2-$C_{10}H_7$), m. 116° (decompn.), results from the sulfide (I, Ar = 2-$C_{10}H_7$) and 10% HNO_3 in AcOH; warming in AcOH at 80° gives $(2\text{-}C_{10}H_7S)_2$; EtOH-NaOH gives 1,2-$O_2NC_{10}H_6OH$. The *p-tolyl deriv.* (II, Ar = p-C_7H_7), m. 112° (decompn.); the *o-nitrophenyl deriv.* (II, Ar = o-$O_2NC_6H_4$), m. 105° (decompn.); warm AcOH decomps. this, giving *o-nitrophenyl ?-nitro-2-hydroxy-1-naphthyl sulfide* (IV), yellow, m. 192°. The *p-nitrophenyl deriv.*, m. 116° (decompn.); warm AcOH gives the *p-isomer* of IV, yellow, m. 187°. *1-Nitro-2'-hydroxy-2-keto-1,2-dihydrodi-1-naphthyl sulfide* (V), from 2-naphthol 1-sulfide (VI), m. 116° (decompn.); warm AcOH gives dehydro-2-naphthol 1-disulfide. *2'-MeO deriv.* of V, m. 105° (decompn.); *2'-AcO deriv.*, m. 102° (decompn.), prepd. from the *Ac deriv.* of VI, m. 164°; warm AcOH gives the di-Ac deriv. of 2-naphthol 1-disulfide. Shaking 2-naphthol 1-disulfide with Et_2O and dil. H_2SO_4 in the presence of $NaNO_2$ gives *1-nitro-2-keto-2'-hydroxy-1,2-dihydrodi-1-naphthyl disulfide*, m. 100° (decompn.); 2 *N* NaOH gives 1,2-$O_2NC_{10}H_6OH$. *Di-1-nitro-2-keto-1,2-dihydro-1-naphthyl sulfide*, m. 121° (decompn.); warm aq. NaOH gives a mixt. of Na salts. The corresponding *disulfide*, m. 124-7° (decompn.). 2-Naphthol isosulfide and 1 mol. HNO_3 give 95% of nitrodehydro-2-naphthol 1-sulfide; reaction of HNO_3 with the dehydro sulfide did not yield this nitration product.

C. J. West

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ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

A 53

2488. Adiabatic Microcalorimeter to Determine Specific Heat of Solids and Liquids. W. Swietoslawski, M. Rybicka and W. Solodkowska. *Acad. Polonaise Sci. et Lettres, Bull. No. 4-5A, pp.* 322-335, *April-May*, 1931. *In French.*—Corrections for the heat necessary to heat the contained gas, for loss or gain of heat due to adsorption or vaporisation of water (or other liquid) by or from the walls of the apparatus, and for variation in the surrounding temperature, are deduced for the author's adiabatic calorimeter [see Abstract 389 (1928)], and a modified form described. This consists of the microcalorimeter proper, which is placed in a spherical glass or copper vessel, and the whole in a large receptacle filled with water maintained at constant temperature. The substance is heated electrically at a rate of 0·25-0·45° per hr. For determining specific heats two such calorimeters are used, one of silver or copper of known heat capacity, the other similar and containing the liquid under examination for liquids, but made of the metal concerned for a metal. Determined in this way the specific heat at 17° of aluminium is 0·214, of pyridine 0·400. (See following Abstract.) C. A. S.

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2489. Measurement of Heats of Adsorption and Vaporisation with Adiabatic Calorimeter. W. Świętosławski and (Miss) E. Bartoszewicz. *Acad. Polonaise Sci. et Lettres, Bull. No. 4–5A*, pp. 336–347, *April–May*, 1931. *In French.*—To avoid the effect of variations in the surrounding temperature the galvanometer and commutator are placed in the receptacle filled with water. With this and other modifications (fully described) the adiabatic microcalorimeter (see preceding Abstract) is used for determining heats of adsorption and vaporisation with only a few cgm. of liquid. The heats of vaporisation of H_2O, C_6H_6 and $CHCl_3$ thus determined are 581, 98·2 and 66·8 cal. (± 0·3 %); the molecular heats of adsorption on charcoal (prepared by the action of $ZnCl_2$ on wood) of C_6H_6, EtOH and CCl_4 are 14·4, 15·6, and 15·8 cal./mol. (± 0·6–1·7 %) respectively, all at 20°. C. A. S.

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Preparation of sulfonic derivatives of naphthoquinonechloroimines and naphthoquinonechlorodiimines. W. Świętosławski, A. Piltz and F. Kraczkiewicz. *Roczniki Chem.* 11, 40-8(48 in French)(1931).—1,2,4-$C_{10}H_5(NH_2)(OH)SO_3H$ (I), when chlorinated in an aq. suspension with Cl water or gaseous Cl, yields the corresponding quinonechloroimine. The latter, reduced by gaseous SO_2, regenerates I in 45% yield. Similarly, I in a satd. soln. of AcOK, chlorinated at 0° with gaseous Cl, gives K 2-naphthoquinone-1 chloroimino-4-sulfonate, $C_{10}H_5O_4NClSK$. This compd. can be reduced with gaseous SO_2 to I with a 97% yield. K 2-naphthoquinone-1-bromoimino-4-sulfonate is prepd. from a soln. or suspension of I in AcOK by treating with Br water satd. with KCl. K 1-naphthoquinone-2-chloroimino-4-sulfonate (II) is prepd. from 1,2,4-$C_{10}H_5(OH)(NH_2)SO_3H$ by chlorination with a satd. soln. of Cl in satd. KCl during a very short period at —11°. Recrystd. from H_2O it gives bright yellow crystals (yield 45-55%). The product is not sufficiently pure and contains 12.5% of the corresponding naphthoquinone. K naphthoquinone-1,4-dichlorodiimino-6-sulfonate, $C_{10}H_5O_3N_2Cl_2SK$, is obtained in a similar manner from 1,4,6-$C_{10}H_5(NH_2)_2SO_3H$ at 10°. The product is very unstable and cannot be recrystd. It is obtained purer than II, but contains still the corresponding naphthoquinone. J. Wiertelak

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Application of the adiabatic microcalorimeter to the measurement of heats of adsorption and of vaporization. W. Swietoslawski and E. Bartoszewicz. *Roczniki Chem.* 11, 78-89(1931)(89 in French).—A modification of S.'s adiabatic microcalorimeter is described. With this new app. the following values of the heat of vaporization at 20° were found: H_2O 581, C_6H_6 98.2, $CHCl_3$ 66.8 cal./g. The values of the heat of adsorption on activated charcoal at 20° are: C_6H_6 14.42, EtOH 15.50, CCl_4 15.84 cal./mol. The error in the detn. of the heat of vaporization did not exceed 0.3%; that for the heat of adsorption, 0.6-1.7%. J. Wiertelak

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Investigations on the variation of the azeotropic concentration of ethyl alcohol-benzene mixtures as a function of the pressure. W. Swietoslawski and R. Kopczyński. *Roczniki Chem.* 11, 440-8(1931)(448 in French).—The compn. of an azeotropic mixt. changes with variations of the boiling pressure. Such changes of an EtOH-C_6H_6 mixt. were detd. by means of S.'s differential ebullioscope (*C. A.* 23, 3017). The results are as follows (the first figure gives the pressure in mm. Hg, the second the concn. of EtOH, the third that of C_6H_6 in wt. %): 700, 32.52, 67.68; 700, 32.41, 67.59; 854, 33.78, 66.22; 1155, 35.80, 64.14; 1558, 38.82, 61.18; 1743, 42.53, 57.47. J. Wiertelak

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A modification of Engler's distillation flask. W. Swietoslawski. *Roczniki Chem.* 11, 543-4(1931)(544 in French).—The vapors evolved in the distn. flask enter the cooler in the middle portion; thus overheating of the liquefied vapors is prevented.

J. Wiertelak

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Application of differential ebullioscopes for the examination of the degree of purity of individual liquid substances. W. Swietoslawski, J. Usakiewicz and A. Zmaczynski. *Roczniki Chem.* 11, 704-13 (713 in French)(1931); cf. *C. A.* 26, 2087.—Three types of differential ebullioscopes have been used to study the relative purity of so-called "pure" liquids, *viz.*, one with a rectification column and two with dephlegmators of different types. Differences of the b. p. and the condensation temp. ($t_1 - t_2$) of the substance examd. indicate impurities. Many so-called "pure" substances should be classified as "technically pure." The ebullioscopic control of the purity of liquids is recommended. On the basis of detns. made the following standards of purity ($t_1 - t_2$) for liquid substances are proposed: very pure 0.040, sufficiently pure 0.040, relatively pure 0.200, technically pure 0.20-1.00°; for the very pure liquids a rectification column 1 m. in length is used, for the others a dephlegmator 25-7 cm. J. Wiertklak

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Application of the phenomenon of azeotropy to the determination of small quantities of contaminations. W. Swietoslawski. *Roczniki Chem.* 11, 714-18 (in French)(1931). —A method is given by which small contaminations in liquid substances forming ternary azeotropic mixts. can be detd. The precision attains 0.003-0.005%.

I. Wiertelak

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Determination of moisture and the azeotropic factor in ethyl alcohol. W. Swietoslawski and J. Szmigielska. Roczniki Chem. 11, 719-26(726 in French)(1931). The method of S. (C. A. 26, 3158) is applied to admixts. of H_2O, C_6H_6 and gasoline in EtOH. J. Wiertelak

A.S.M. S.L.A. METALLURGICAL LITERATURE CLASSIFICATION

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Bohdan Szyszkowski. Wojciech Swietoslawski. Kosmos (Lwow) 11, 781-5 (1931). An obituary. I. Wiertelak

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Laboratory rotary furnace for continuous action for dry distillation of coal at low temperatures. W. Swietoslawski and H. Narkiewicz. *Przemysl Chem.* 15, 217-21 (1931). This furnace is adapted for working at various temps., amts. of material charged per unit time, and periods of time during which the load remains in the furnace. It is suitable not only for low-temp. carbonization of fuel but also for research with other materials which must be charged and discharged continuously and automatically and heated in the process to different temps. up to 700°. A. C. Zachlin

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Application of the adiabatic microcalorimeter to the measurement of heats of adsorption and of vaporization. W. SWIETOSLAWSKI AND B. BARTOSZEWICZÓWNA. *Bull. intern. acad. Polonaise* A1931, 336–47 (in French).—See *C. A.* 25, 5343 J. W

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Neutronic equilibrium of isotopes. W. SWIETOSLAWSKI. *Nature* 130, 964(1932).—
The emission of α, β or H particles by disintegration, or the entry of α or H particles
of the electrons into the nuclei is unable to explain the existence of every isotope. The
existence of every kind of atom and of all isotopes can be explained by supposing that
the atoms of different elements can emit or incorporate neutrons even under astronomical
conditions. ALBERT L. HENNE

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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5090. Constant-Boiling Mixtures Applied to Analysis of Impurities in Liquids. W. Swietoslawski. *Acad. Polonaise Sci. et Lettres, Bull. No. 1-7A. pp. 74-79, Jan.-July,* 1932.—If a liquid L contains small traces of a dissolved impurity A, the quantity of the latter may be determined by means of boiling-point measurements, provided that a third substance B, also soluble in L but not in A, can be found, such that a constant boiling-mixture of A, B and L exists, and also constant-boiling mixtures of the various pairs. Now if a quantity of the component B is added to the constant-boiling mixture of A and L, the boiling point of the A,B,L mixture is lowered considerably below that of the A,L mixture. In practice, the constant-boiling mixture of B and L is prepared, and A is added a little at a time, the boiling point being observed at each addition. The constant-boiling mixture of B with the liquid under examination is next prepared, and its boiling point immediately shows the quantity of A present. The method attains an accuracy of about 0·003 %. An alternative method of experimenting is also described. [See also following Abstract.] J. H. A.

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1091. Determination of Traces of Water and of Azeotropic Dehydrator in Ethyl Alcohol. W. Świętosławski and (Miss) J. Szczęgielska. *Acad. Polonaise Sci. et Lettres, Bull.* No. 1-7A; pp. 80-87, *Jan.-July*, 1932.—Applies the principles previously developed [see preceding Abstract], to determine the quantity of water, and of the petrol-benzene mixture used to carry off the water, in ethyl alcohol. When the quantity of water is about 0·09 %, it can be determined to about 0·004 %. The method is used up to concentrations of 1·3 %. J. H. A.

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Michael Faraday as a chemist and physical chemist. W. Swietoslawski. *Roczniki Chem.* 12, 1-8(1932). A biography. J. Wiertelak

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Binary azeotropic mixtures. W. Świętosławski, J. Just, L. Wajcenblitt, I. Wuttke and P. Wojtczak. *Roczniki Chem.* 12, 48-57(57 in French)(1932).—C_6H_6 and AcOEt do not form an azeotropic mixt. The azeotropic mixt. of CS_2-acetone b.p. 39.27°. The mixt. contained only small amts. of moisture. The b. p. of C_6H_6-EtOH is 67.93°; that of toluene-EtOH is 76.83°; both are at normal pressure. J. W.

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Improvement of the quality of Upper Silesian coke. W. SWIETOSLAWSKI, M. CHORAZY AND B. RODA. **I. Characteristics of Upper Silesian coke, and review of earlier investigations on its improvement.** *Przemysl Chem.* 16, 40-60(1932); cf. C. A. 24, 5981.—It is suggested that to improve Upper Silesian coke its mech. strength should first be improved. **II. Physical and chemical properties of Polish coking coals.** *Ibid* 55-62.—All the coals used for coking in Upper Silesia belong to the gaseous caking coals. They have a caking no. as high as that of typical coking coals. The thermal resistance of their bituminous substances is lower, however, and they decomp. within narrow limits of temp. This property is related to the brief period of their plastic state. In coking these coals the plastic state should be reached as rapidly as possible to avoid the decompn. of the bituminous substances below their m. p., because otherwise a very weak cake is obtained. The abs. absence of expansion pressure of these coals is a drawback in these coals, as are also their high volatile fraction and the evolution of gases in the last stages of coking. Degassing takes place in the 3rd stage instead of the 2nd, or at

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...the results of these ... directed. A. C. ZACHLIN

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Improvement of the quality of Upper Silesian coke. VI. W. Swietoslawski, B. Roga and M. Chorazy. *Przemysl Chem.* 16, 188-96(1932); cf. *C. A.* 26, 6102.—The results of lab. investigations were checked with full-scale app. With slow warming *i. e.*, at low temp. of coking, coke is obtained in large pieces, with few cracks, but of low crushing strength. With increased rate of heating, which occurs when the oven is heated to a high initial temp., the strength increases, the coke is compact, but flaky and in small pieces. Heating in two steps improves the quality of coke, especially if poor-grade coal is used. The addn. of semicoke to the coal before coking markedly improves the quality of the coke, as shown by its increased mech. strength. Semicoke with fully defined phys. properties must be used. In certain cases the addn. of non-coking coal acts favorably. VII. W. Swietoslawski, M. Chorazy and B. Roga. *Ibid.* 17, 25-33(1933).—The coking process is divided into 3 phases differentiated by the physicochem. changes which take place. Besides the insignificant visual changes which take place in the first phase up to the plastic state profound changes occur in the primitive colloidal nature of coal. In the coking and gas-forming caking coals the developed surface of the non-melting and neutral material which is to be cemented together by the semi-liquid mass is of utmost importance. Satn. of the developed surface is hindered by the surface tension of the semi-liquid mass and the evolution of gas bubbles. Since the surfaces of the coals are developed to widely varying degrees it is difficult to recognize the phenomena. The condition of cementing the solid particles together by means of the semi-liquid mass is considered by the authors in connection with sand, anthracite, coke, semicoke, etc., of the same fineness. In the third phase of the process the real and apparent sp. gr. of the coal change at different rates depending on the kind of coal. The appreciable quantities of gas which are evolved at 700° can escape only by diffusion and through cracks and fissures produced in the coke.

A. C. Zachlin

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Determination of moisture and the azeotropic factor in ethyl alcohol. W. Swiętosławski and J. Szmigielska. *Bull. intern. acad. polonaise* 1932A, No. 7 (in French).—See C. A. 26, 5513. J. Wiertelak

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1225. **Universal Ebullioscope.** W. Swietoslawski. *Acad. Polonaise Sci. et Lettres, Bull.* 4-6 A, pp. 177-181, *April-Oct.*, 1933. *In French.* —A modified form of differential ebullioscope is described which is designed to meet the requirements of various experiments involving the determination of the boiling or condensation temperature of a liquid. Its applications include the determination of the purity of either a solvent or it dissolved substance. R. W. P.

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The possibility of spontaneous emission of neutrons by some nonradioactive elements. W. Swietoslawski and A. Dorabialska. *Roczniki Chem.* 13, 1-4(1933). Investigations of thermal effects of some chem. elements show the possibility of spontaneous transformation of nonradioactive elements. Analysis of the table of elements and their isotopes shows that transformations α, β, or H cannot explain existing forms of isotopes without hypothesis of emission of neutrons. Isotopes undergo disintegration when emitting neutrons and are in a state of "neutronogenic" equil. In light elements a neutron produces the fall of an electron into the nucleus of an atom (N) and forms an atom ($N-1$), which is an unstable isotope and emits a neutron. Pos. results in expts. proving neutronogenic decompn. of nonradioactive elements were obtained for Sc, Yt, La, As, Sb, Bi and F.

Felix P. Lee

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Classification of zeotropic and azeotropic mixtures. W. Świętosławski. *Roczniki Chem.* 13, 125-9 (in French 129)(1933). Mixts. of liquids are classified according to degree of soly. of constituents in each other. Zeotropic mixts. are those that do not show max. or min. pressures of constituent liquids; azeotropic mixts. form max. and min. pressures. Homozeotropic and homoazeotropic mixts. are those with a single phase; when 2 or more phases appear the mixts. are called heterozeotropic and heteroazeotropic.

Felix P. Lee

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Ternary azeotropic mixtures. I. Application of the differential ebullioscope to the study of the azeotropism of ternary mixtures. W. Swietoslawski. *Roczniki Chem.* 13, 227-34(in French 234-5)(1933); cf. *C. A.* 27, 3049.—Suggestions are given for covering a ternary diagram in searching for the compn. of a homo- or heteroazeotrope.

T. H. Chilton

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Ternary azeotropic mixtures. III. The heteroazeotrope composed of ethanol, water and carbon disulfide. W. Swietoslawski and B. Wardzinski. *Roczniki Chem.* 13, 380-3(1933); cf. *C. A.* 26, 1490.—The modified ebullioscopic app. was applied to the investigation of the system H_2O-EtOH-CS_2. The method of adding successively small portions of one component to the binary mixt. of the 2 others was applied. The mixt. 92.30% CS_2 6.65% EtOH - 1.05% H_2O, b_{760} 41.345°, was found to be the one which would cross the heteroazeotropic line of the binary mixt. CS_2 - EtOH at approx. right angles. The equation best fitting the curve is $x + 1.4y = 101.63$; x = percentage CS_2, y = percentage EtOH; z is found from $x + y + z = 100$. The relation between the coeffs. was found as $dp/dt_{heteroaz.}$; $dp/dt_{H_2O} = 1.05$ (p = 1 atm.).

C. T. Ichniowski

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A study of the degree of purity of benzene and its dehydration by heteroazeotropic distillation. W. Świętosławski and J. Usakiewicz. *Roczniki Chem.* 13, 495-9 (in French 499-500)(1933).—Dehydration was accomplished within 0.001%. Heteroazeotropic distn. was performed by using a differential ebullioscope with a dephlegmator. Relative purities of C_6H_6 as shown by ... are: Merck's (*pro analysi*) 80.089°; triply purified 0.110°; differences between b. p. and condensing points are 0.008° and 0.004°, resp., C_6H_6 forms azeotropic solns. with thiophene. C. T. Ichniowski

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A study of the degree of purity of benzene and its dehydration by heteroazeotropic distillation. W. Świętosławski and J. Usakiewicz. *Roczniki Chem.* 13, 105 (in French 490-500)(1933).—Dehydration was accomplished within 0.001%. Heteroazeotropic distn. was performed by using a differential ebullioscope with a dephlegmator. Relative purities of C_6H_6 as shown by b_{760} are: Merck's (*pro analysi*) 80.089°; triply purified 80.110°; differences between b. p. and condensing points are 0.008° and 0.004°, resp. C_6H_6 forms zeotropic solns. with thiophene. C. T. Ichniowski

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Dehydrated ethanol of high purity. W. Swietoslawski and J. Usakiewicz. *Roczniki Chem.* 13, 540-51(551 in French)(1933).—A method for obtaining dehydrated ethanol is described. The ethanol is first dehydrated to within 0.4% with CaO and then rectified by heteroazeotropic distn.—the system being EtOH-H_2O-CS_2. The degree of purity of the 3 samples of ethanol studied was detd. by means of two ebullioscopes with dephlegmators, 20 and 50 cm., resp., and a 14-bulb rectifying column. Dehydrated ethanol b. 78.320 ± 0.001-0.002°.

T. Lehniowski

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A universal ebullioscope and its applications. W. Swietoslawski. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1933A, 177-81.—A combination of differential ebullioscope with fractionating column is described with directions for its use in detg. the purity of a solvent or azeotropic mixt., the purity of a solute, or the compn. of an azeotropic mixt.

C. D. West

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The ternary heteroazeotropic system composed of ethyl alcohol, carbon disulfide and water. W. Swietoslawski and B. Wardzinski. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1933A, 462-71.—See *C. A.* 28, 15[1].
G. G.

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Classification of zeotropic and azeotropic mixtures. W. Swietoslawski. *Bull. intern. acad. polonaise Classe sci. math. nat.* 1933A, 472-6.—See *C. A.* 27, 3849.

G. G.

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2547. Microcalorimetry. **W. Swietoslawski.** *Acad. Polonaise Sci. et Letters, Bull.* 1–2 A. pp. 61–66, *Jan.–Feb.*, 1934. *In French.*—The paper describes two improvements, both of which are concerned with the elimination of errors due to defects in the thermoelectric circuit used to ensure equality of temperature of the calorimeter and its surrounding mantle. [See Abstract 2469 (1932).] The first device consists in bringing the calorimeter into actual contact with the mantle from time to time and reading the galvanometer under these conditions, when it is certain that calorimeter and mantle are at the same temperature. The second device is concerned with the detection of parasitic e.m.f.'s in the galvanometer circuit. L. G. C.

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Application of the ebullioscope to precise determination of coefficients of esterification. W. Swietoslawski. Roczniki Chem. 14, 98-104(1934); cf. ~~C. A. 27, 2848;~~ 28, 2573[1].—By an ebullioscopic method, which permits the elimination of a no. of sources of error inherent in the analytical methods, slightly higher values are obtained for velocity of formation of EtOAc. B. C. A.

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Several improvements in the adiabatic microcalorimeter. W. Swietoslawski. *Roczniki Chem.* 14, 188-89(1934); cf. *C. A.* 28, 3943[4].—The improvements were introduced to avoid systematic errors occurring from e. m. f. changes arising in the thermocouple. The compartment in which the calorimeter is suspended is so constructed as to contain in its base a conical nest the exact size of the calorimeter. At the beginning of the expt. or as the need arises the calorimeter is lowered by means of a weighted thread into the nest to det. the uniformity in temp. (a zero galvanometric reading). A switch is added to the set-up to permit an external control of the thermocouple if there is no e. m. f. These improvements give good results in detg. thermal changes in the setting of cement. C. T. Ichniowski

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Ice calorimeter for measuring small continuous thermal effects. W. Swietoslawski, A. Zmaczynski, I. Zlotowski, J. Salcewicz and J. Usakiewicz. *Roczniki Chem.* 14, [illegible]-8(1934).—A description of the construction and manipulation of a new ice calorimeter applicable to detns. of small continuous thermal effects of the order of 1 cal./hr. and with an accuracy of 0.05-0.1 cal./hr. C. T. I. 6

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Application of the ice calorimeter to determination of the heat evolved by pitchblende. W. Swietoslawski, I. Zlotowski, J. Salcewicz, J. Usakiewicz and A. Zmaczynski. *Roczniki Chem.* 14, 301-3(1934).—The results obtained for pitchblende are higher than those obtained by other authors using different calorimeters; the discrepancy is ascribed to the comparatively high exptl. error (more than 10% for heat effects of the order of 7×10^{-4} cal. per hr.).

B. C. A.

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Ignacy Moscicki as a practical chemist. W. Swietoslawski. *Roczniki Chem.* 14, 339 51(1934). **Ignacy Moscicki.** Lech Suchowiak. *Ibid.* 353 70.—A biography. **Ignacy Moscicki [Bibliography].** *Ibid.* 371-4.

J. F. Matejczyk

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Application of V. Meyer's method to determinination of moisture content. W. Swietoslawski, H. Brzustowska and M. Krakowski. *Roczniki Chem.* 14, 633 (1934). The H_2O content of various products can be rapidly and conveniently detd. by measuring the vol. of vapor evolved when the sample is heated at the appropriate temp. in a modified V. Meyer app. H. C. A.

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Abnormal thermal effects evolved from certain minerals and certain chemical compounds. II. Experiments made with the ice calorimeter. W. Swietoslawski, A. Zmaczyński, I. Zi[illegible]owski, J. Usakiewicz and J. Salcewicz. *Rocsniki Chem.* 14, 1474-8(1934); cf. *C. A.* [illegible], 4208[1].—Study of the thermal effects of As_4S_4 and monazite with the ice calorimeter showed that no energy changes resulting in thermal effects greater than 5×10^{-6} cal./g./hr. could be detected. The same results were obtained when As_4S_4 was placed in the calorimeter along with compds. of La, Y, and Sc. C. T. Ichniowski

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Total quantity of vapors and gases evolved during the thermal decomposition of coal and of its petrographic varieties. W. Swietoslawski and H. Brzustowska. *Przemysl Chem.* 18, 571-4(1934).—The evolution of gases and vapors from coals of a low content of volatile constituents (I) (not more than 20%) proceeds at a const. velocity from 370° to 440°, above which it proceeds at a rate proportional to the temp.; the length of the period of const. evolution diminishes with increasing I, and is zero for gas-flaming coals. The vol. of gaseous products evolved from petrographic varieties diminishes in the order vitrain, durain, fusain. B. C. A.

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Permeability of metallurgical coke as a characteristic property. W. Swietoslawski and M. Chorazy. *Przemysl Chem.* 18, 574-9(1934).—The permeability (*P* = no. of cc. of N_2 passing per min. through 1 sq. cm. of coke under a pressure gradient of 1 mm. Hg) of coke from French coking coal is 243 and 932, from Westphalian coking coal 90 and 406, and from Silesian caking gas coal 10.7 and 42.7, resp., for samples taken from the center of the oven and from the vicinity of the walls. The *P* of coke from noncaking coal and pitch briquettes is 310, from peat semicoke and pitch briquettes 10, from peat briquettes 70, from unpressed peat 1442 and for alder charcoal 550. B. C. A.

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Production of semicoke and coke from noncaking coal. I. W. Swietoslawski and M. Chorazy. *Przemysl Chem.* 18, 579-80(1934).—The mech. properties of coke from briquettes made from noncaking coals and pitch have been studied with reference to the temp. and pressure of briquetting, to the relative proportions of the constituents, and to the type of coal taken. The permeability to gases, combustibility, reactivity and mech. strength of coked briquettes prepd. under appropriate conditions may be greater than that of Ruhr basin cokes. Raising the pressure to greater than 150 atm. has little effect on the mech. strength of the cokes. B. C. A.

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Heat setting of cement. W. Swietoslawski and S. Rosinski. *Przemysl Chem.* 18, 500-4(1934).—The rate of evolution of heat on mixing cement with H_2O attains a max. value after a time characteristic of a given cement (8-15 hrs.).

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Some improvements in an adiabatic calorimeter used to measure very small thermal effects. W. Swietoslawski. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1934A, 64 .—The improvements result in the attainment of a proper zero reading and in the elimination of extraneous e. m. f. F. D. Rossini

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Abnormal thermal effects produced by certain minerals and certain chemical substances. I. Experiments made with an adiabatic calorimeter. W. Swietoslawski and E. Bartoszewicz. *Bull. intern. acad. polonaise Classe sci. math. nat.* **1934A**, 69-72.—Neither metallic Sb nor As_2O_3 produces a thermal effect as large as 0.00005 cal. per g. per hr.

F. D. Rossini

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The application of V. Meyer's method for determining moisture in solid substances. W. Swietoslawski, H. Brzustowska and M. Krakowski. *Ann. acad. sci. tech. Varsovie* **1**, 115(1935); *Fuel* **14**, 305-6(1935); cf. C. A. **29**, 6171[1].—Meyer's vapor-d. method was used to det. moisture in coals, cokes and tobacco. A detn. can be made in 10 min., and the results agree with those obtained by standard methods. D. A. Reynolds

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3750. Succinic Acid as Secondary Calorimetric Standard. W. Świętosławski, M. Wojciechowski and E. Sapiro. *Acad. Polonaise Sci. et Lettres, Bull.* 9–10A. pp. 531–539, *Nov.–Dec.*, 1935. *In English.*—The universal ebulliometer with several dephlegmators is applied to the determination of the quantity of water in a sample of succinic acid used by Keffler for thermochemical measurements. The amount of water in this sample was found to be only 0·002 %. The influence of the temperature on the degree of decomposition of succinic acid is studied when heated to 80° C. As the acid slowly decomposes the amount of water (after 9 hours heating in a closed tube), increasing to 0·004 %. When heated to 130° for 8 hours the water content attains 0·018 %, on heating to 180° C. the substance decomposes and becomes yellowish. [See Abstract 4350 (1934).]

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Specific heat of minerals and of rare earth salts. W. Świętosławski, J. Salcewicz, J. Usakiewicz, A. Zmaczynski and J. Złotowski. *Roczniki Chem.* 15, 12–14(1935).—By use of an ice calorimeter, av. values for the sp. heat c_t were obtained for the following: Ag, c_t = 0.05532; Sb, c_t = 0.04745; johannite, $c_{t\text{-}t}$ = 0.1290; thorite, c_t = 0.1320; samarskite, c_t = 0.1018; monazite, $c_{t\text{-}t}$ = 0.1024; $SiF_4.3NH_4F$, $c_{t\text{-}t}$ = 0.4283; Y nitrate, $c_{t\text{-}t}$ = 0.2752; La nitrate, $c_{t\text{-}t}$ = 0.2718; Y oxalate, $c_{t\text{-}t}$ = 0.4640; La oxalate, $c_{t\text{-}t}$ = 0.2641; cane sugar, $c_{t\text{-}t}$ = 0.2774, c_t = 0.2610, dc/dt = 0.00113 and c_0 = 0.2680.

J. F. Matejczyk

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A new type of calorimeter for the measurement of continuous heat effects. W. Swietoslawski. *Roczniki Chem.* 15, 343-9 (in French 349-50) (1935).—A flow calorimeter suitable for the detn. of such continuous heat processes as the hardening of cement is described. In principle the calorimeter consists of a labyrinth of concentric tubes through which water or other calorimetric liquid circulates from the outside to the middle, to avoid loss of heat. The system evolving heat is placed in the central portion and the temps. of the liquid at the entrance and exit are measured. The effect is calcd. from the temp. difference and the amt. of liquid flowing. M. W.

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Purification and determination of the degree of purity of toluene. W. Swietoslawski and E. Ramotowski. *Roczniki Chem.* 15, 422-9(1935).—Toluene, obtained in the "fifth degree of purity" (cf. *C. A.* 29, 4985[9]) by (1) distn. through a rectification column of 20 bulbs and arranged for slow distn. and (2) by use of a multidephlegmator, has d_{20} 0.86606, n_D^{20} 1.49613, and most probable b. p. of 110.612-0.614°. The changes of b. p. and Δt (difference between b. p. and the condensation temp.) are functions of introduced contaminants; Δt varies with the concn. of the contaminant. Toluene undergoes practically no change in b. p. when contaminated with a mixt. of C_6H_6 and *m*-xylene in the ratio 1:1 by wt. but Δt increases in proportion to the amt. of mixt. introduced; a 0.0024% concn. of the adulterant mixt. in toluene increases Δt by 0.001°. C. T. Ichniowski

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A flow calorimeter for investigating the heat of setting of cement. W. Swietoslawski. *Przemysl Chem.* 10, 181-6(1926).—A flow calorimeter of the new labyrinth type and its application to the study of the reaction of cement with water are described. The plot of heat evolved against time shows the existence of a min. and of a max. When the proportion of water to cement is decreased, the max. is displaced toward the origin. A. C. Zachlin

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The determination of small quantities of water in solid organic substances. W. Swietoslawski and S. Miernik. *Bull. intern. acad. polonaise, Classe III, math. nat.* 1935A, 23-8.—An improved universal ebulliometer (C. A. 25, 230) with one dephlegmator is described. When an abso-lutely anhyd. solid, such as $PhCO_2H$, is added to an azeotropic mixt. of C_6H_6 and EtOH in the ebulliometer the temp. of condensation, *t*, at the top of the dephleg-mator is not affected. However, if there is any H_2O in the solid, *t* will drop. The procedure is to det. *t* for the azeo-tropic mixt., add a known wt. of solid, det. *t* again, and then add known wts. of H_2O dissolved in C_6H_6 and EtOH, detg. *t* each time. Δt per mg. H_2O can now be calcd. and from the drop in *t* when the solid was added the per-centage of H_2O in the solid is calcd. By using over 15 g. of solid as little as 0.001% H_2O can be detected. Some results were: com. $PhCO_2H$, 0.13% H_2O; $PhCO_2H$, Merck, for calorimetry, 0.016%; same, dried over P_2O_5, 0.003%; same, heated to b. p. *in vacuo*, 0.002%; com. salicylic acid, 0.050%. John F. Miller

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Ebulliometric measurements of the moisture content in standard benzoic acid. W. Swietoslawski, M. Wojciechowski and S. Miernik. *Bull. intern. acad. polonaise, Classe sci. math. nat.* **1935A**, 59–64; cf. preceding abstract.—A somewhat more complicated app. was used in this case than in the preceding. The ebulliometer had 2 dephlegmators. A sample of standard benzoic acid (sample 48-a, prepd. by the Bureau of Standards at Washington) was found to contain 0.0047 ± 0.0008% H_2O. A pellet of $PhCO_2H$ contg. 0.002% H_2O was placed in satd. H_2O vapor at 25° for 3 hrs., after which it was found to contain 0.012% H_2O. Therefore, the error in calorimetric detns. caused by the absorption of H_2O on the $PhCO_2H$ pellet while the bomb is being prepd. (15-30 min.) is not over 0.1 cal. and may be neglected.

John E. Millbery

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Ebulliometric investigation of the impurities of succinic acid, proposed as a secondary standard for calorimetric measurements. W. Swietoslawski, M. Wojciechowski and E. Sapiro. *Bull. intern. acad. polonaise, Classe sci. math. nat.* 1935A, 311 9.—Succinic acid, when crystd. from water and dried for 8 hrs. at 80°, contains not more than 0.003% of moisture; when crystd. from Me_2CO and dried for 5 hrs. at 80°, the acid contains not more than 0.02% of Me_2CO; when heated to 80° for 9 hrs., the acid slowly decomposes, the water content increasing to 0.004%; when heated to 130° for 8 hrs., the water content increases to 0.018%; when heated to 180°, the acid obviously decomposes. F. D. Rossini

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*On the Thermal Effects Which Appear During the Phenomenon of Ageing Aluminium Alloys.** W. Świętosławski and J. Czochralski (*Wiadomości Instytutu Metalurgji i Metaloznawstwa* (*Warszawa*), 1936, 3, (2), 59–67).—[In Polish, with German summary.] It has long been supposed that heat effects occur during certain transformations which take place during the recrystallization or ageing of light alloys; at high temperatures such effects have already been observed and by the aid of a specially constructed micro-calorimeter similar effects have now been detected during natural ageing at room temperature. The experiments were made on a 580 grm. block of an alloy of aluminium with copper 4·2, iron 0·66, manganese 0·33, silicon 0·54, and magnesium 0·63% after quenching from 510° C. in cold water. After storage for 22 hrs. at room temperature a rapid evolution of heat occurred which gradually decreased with lapse of time but did not entirely cease until 11 days had elapsed; the total heat evolution between the 22nd and 260th hour was 273·3 grm.-cal. equivalent to 0·4712 grm.-cal./grm. of alloy.—A. R. P.

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•2714. Critical Temperatures of Individual Liquids and their Mixtures. W. Swietoslawski and S. Pieszczek. *Acad. Polonaise Sci. et Lettres, Bull.* 1-2A, pp. 72-80, Jan.-Feb., 1937. *In English.*—A comparative method of measuring critical temperatures of liquid individual substances and mixtures is described. An apparatus suitable for simultaneous measurements of critical temperatures of several substances is described. A series of mixtures composed of CS_2 and acetone is examined by this method and the most probable composition of the azeotrope (72·1 % of acetone) at critical conditions is reported. It is shown that under these conditions the lowering of critical temperature is 3·2° C., when compared with that of acetone. When the critical temperature of acetone as a reference liquid is taken as 237·5° C., the critical temperature of the azeotropic mixture of CS_2 and acetone is equal to 234·3° C. AUTHORS.

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Purification and determination of the degree of purity of liquids. W. Swietoslawski. *Trav. congr. jubilaire Mendeléev* 2, 285-97(1937); cf. *C. A.* 30, 5101[1]. Ebulliometric methods are described. B. C. A

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***Preliminary Measurements of the Heat Produced by the Internal Deformation of a Block of Lead Influenced by Its Own Weight.** W. Swiętosławski, L. Keffler, and J. Salcewicz (*Bull. Internat. Acad. Polon. Sci. Lettres*, **1937**, [A], (9/10), 540-554).—[In English.] A lead block weighing 18·4 kg. was suspended in an atmosphere of dry nitrogen by means of steel wires attached at three points on the upper surface and, after insertion in a thermostat, temperature variations at several points in the block produced by self-deformation were measured by means of thermocouples over a period of days. The amount of heat evolved was found to decrease from $4 . 10^{-6}$ grm.-cal./grm./hr. on the first day to $2 . 10^{-6}$ grm.-cal./grm./hr. on the 21st day, and was shown to be due entirely to deformation of the metal under its own load.—A. R. P.

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Characterization of coals by agglutination index curves of binary mixtures. W. Swietoslawski. *Tech. Acad. Sci., Poland* 1937; *Fuel* 16, 204-7(1937).—S. proposes to classify caking, feebly caking and noncaking gas coals by comparison of the curves of the agglutination indexes of binary mixts. of: (1) coals and coke or anthracite; (2) coals, of which one is a coking standard; (3) coals and pitch. The agglutination indexes are detd. by measuring the strength of crucible cokes in a lab. drum (Roga's test method). The coking quality of a sample is obtained by comparing the index curve of one of the binary mixts. with that for a coal typical of the field being studied. Practical use of the method may be made in com. plants in the selection of optimum blends. D. A. Reynolds

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Effect of expansion of vapors on the efficiency of distillation. W. Swietoslawski and K. Ramotowski. *Roczniki Chem.* 17, 201-8(in French 207-8)(1937). —Adiabatic expansion has a great effect on the efficiency of distn.

M. Wojciechowski

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/

5 Thermoregulators and thermostats used for measuring heat effects which last a long time. W. Swietoslawski and J. Pomorski. *Roczniki Chem.* 17, 254-61 (in English 261) (1937).—The authors have described a thermostat with precise mercury and toluene thermoregulator and the cathode relay. The advantage of the described system is its high precision in keeping the constancy of the temp. within ±0.001° for several days. A thermoregulator is also described which keeps the constancy of the temp. of the calorimetric room within ±0.06° to 0.1°. M. W.

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Device for automatic registration in investigations of heat effects which last a long time. W. Swietoslawski and J. Pomorski. *Roczniki Chem.* 17, 203-8(in English 208) (1937).—Devices are described for automatic registration of the amt. of water flowing through app., difference in temps. and the time intervals during the measurement.

M. Wojciechowski

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Calorimetric investigations of long-lasting transformations. W. Swietoslawski. *Roczniki Chem.* 17, 200-83 (1937)(in French).—The app. and the methods of measurements used in the Inst. of Phys. Chemistry of the Warsaw Polytechnic, Poland, are described. M. W.

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—Calorimetric studies of thermal transformations of nitrocellulose powders. W. Swietoslawski, T. Urbański, H. Calus and M. Rosiński. *Roczniki Chem.* 17, 444–53 (in English 452–3) (1937).—A calorimeter devised for measuring very small heat effects evolved in processes of long duration was used. Old nitrocellulose powder after previous heating to 75° showed a heat effect, which slowly disappeared; after a second heating to 75° the process of decompn. proceeded with increasing velocity. Freshly prepd. gun powder showed a very small heat effect, which disappeared after some time; a second exposure to the air caused its reappearance. Further contact with air or even with oxygen caused the heat effect to disappear.

M. Wojciechowski

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2/

Agglutinating ability of coal or rosin in two- and three-component systems containing other coals or neutral diluting media. W. Swietoslawski and G. Hantke. *Przemysl Chem.* 21, 106-10(1937).—By use of the tumbler method of Roga (cf. *C. A.* 26, 4440) for evaluating the strength of samples of coke prepd. by the crucible method a series of two- and three-component mixts. was investigated in which agglutinating coal or rosin was the plastic and binding material, and anthracite, coke or non-agglutinating gas coals were the diluents. In all cases the relationship between the agglutinating value of the mixt. and the concn. of the binding materials was detd. Generally with the greater concns. of agglutinating coal pos. deviations from the mech. strength of the mixt. calcd. on the basis of the additive principle appeared in both the two- and the three-component mixts. Neg. deviations from such values appeared when the proportions of diluents were very great, and especially when the mixt. consisted of very slightly agglutinating coal with coke or anthracite. The addn. of rosin to agglutinating coals acted adversely on the strength of coke, but its addn. to slightly agglutinating coals resulted in a gain in strength. While the results do not necessarily reflect the results which would be obtained if the given mixt. were put into a coke oven they nevertheless give an indication of the method of choosing the components whose properties in a mixt. do not obey the additive law. A. C. Zachlin

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Characterization of gas coals on the basis of curves representing the agglutination values of two-component mixtures. W. Swietoslawski. *Przemysl Chem.* 21, 116-20(1937).—See C. A. 31, 7022[a]. A. C. Zachlin

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Application of a comparative method of measurements to the determination of critical temperatures of individual liquids and their mixtures. W. Świętosławski and S. Piesiecki. *Bull. intern. acad. polon. sci., Classe sci. math. nat.* 1937A, 72-80(in English).—Several capillary tubes contg. different substances or their mixts. are placed in the same app. and the crit. phenomena occurring in each tube are observed at various temps. One tube contains a reference substance. The crit. temp. of an azeotropic mixt. of CS_2 and acetone (72.1% of acetone) is 243.3° with that of acetone as 237.5° as a reference.

R. E. DeRight

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2

Study of critical phenomena. W. Świętosławski. *Bull. intern. acad. polon. sci., Classe sci. math. nat.* 1936A, 304-15 (in French).—The phenomena called critical take place within a relatively wide interval of temp. and pressure. The temp. at which the vapor (under a pressure such that mist no longer appears when it is passed) is transformed into liquid without formation of mist is that which corresponds with the crit. temp. An app. is described. It consists of capillary tubing of sufficiently stout walls to withstand the pressures developed bent into the form of an oval; after it is filled to one-third of its vol. and the air above the liquid is displaced, the tube is sealed off. One side is heated electrically (the other condensing the vapor) and the change in the meniscus can be observed until the meniscus disappears completely and a mist develops, and finally even this disappears. This is the crit. temp. The temps. are measured by means of a thermocouple placed in the interior of the non-heated arm. The crit. pressure is measured by connecting a N_2 tank by means of a glass spiral which is entirely filled with the liquid under examn. On heating the crit.-temp. tube up to the crit. temp. the vapor liquefies in the cooling arm without formation of mist. On successively decreasing the pressure a value of the pressure is reached at which there is formation of mist, which corresponds to a dispersion of liquid in the vapor. On further diminution of the pressure the mist becomes more dense and finally is quite white, opalescence disappears and at a still lower temp. the fog disappears completely. The phenomenon may also be run in the opposite direction by gradually increasing pressure and it is found that the appearance and the disappearance of the mist occur within the same pressure limits. Louis Waldbauer

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Critical, precritical and postcritical phenomena. W. Swietoslawski. *Roczniki Chem.* 19, 375-81(1939); cf. *C. A.* 33, 3647[a].—App. for observation of the crit. state of liquids is described. The precrit. state is that of co-existence of liquid with mist, and in this state the surface tension of the liquid is only slightly greater than zero, and its d. greater than that of the vapor. At the crit. point the mist disappears. The existence of a postcrit. state is postulated at temps. and pressures greater than the crit.

R. T. P. K.

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The simple and differential cryometers and their uses. Wojciech Świętosławski. *Roczniki Chem.* 21, 94-107 (1947); cf. *C.A.* 38, 513.—This is the first in a proposed series of articles on cryometric measurements. A static method for the detn. of the solid-liquid equil. temp. is described. The construction of a differential cryometer and of devices for the dehydration and degasification of a sample is shown. The application of the differential cryometer to the detn. of the relationship between percentage of unfrozen liquid and the equil. temp. and its use for the purification of a sample by fractional crystn. are shown.

H. H. Szmant

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Phase rule and the action of gravity. W. Swietoslawski (Inst. Technol., Warsaw, Poland). *J. Chem. Education* 24, 606-8(1947).—In no system contg. liquids or solids is it possible for the pressure to be everywhere the same. This will lead to the disappearance of the less dense condensed phase if solid, liquid, and vapor are held isothermally at the triple point and layering of the phases with change in temp. if they are mixed at the triple point and protected adiabatically. John Howe Scott

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Distillation and crystallization as completing methods of purification. W. Świętosławski. *Przemysl Chem.* 26, 33-6(1947); cf. *C.A.* 24, 2036; 39, 2692[2], 3140[1]; 40, 195[4].—The difficulties of azeotropic distn. of benzene and naphthalene-contg. mixts. are discussed. A series of curves is given representing the isobars of azeotropic mixts. of component A with components B, B_1, B_2...B_{n-1}, B_n, B_{n+1}. Azeotropic distn., however, even with the most efficient columns, will not yield completely pure aromatics. It is suggested that crystn. and app. for it be perfected and utilized with azeotropic distn. J. Skarbek

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Ethylbenzene purity test. Wojciech Świętosławski. *Przemysł Chem.* 26, 149-53(1947).—The purity of ethylbenzene cannot be detd. accurately by its b.p. During the heating, particularly when air is not excluded from the app., there is some oxidation of the sample and the products formed cause rise in the b.p. Two methods of calcg. the quantity of diethylbenzene present from the relationship between the percentage of sample distd. and the rise in b.p. are given but when 0.550% was added one method gave 0.507% and the other 0.501%. J. S.

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Michal Chorazy. Wojciech Swietoslawski *Przeglad Chem.* 6, 205-7(1948). An obituary with portrait and bibliography.

Adam Sporzynski

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534. **Dilatometric cryometer.** W. Swietoslawski. (*Bull. Int. Acad. Polon. Sci.*, 1948, No. 7—10A, 113—126).—General modified forms of a dilatometric cryometer are described which enable changes in vol. (and thus relative amounts of solid and liquid) and in temp. to be followed during partial or complete freezing or melting of a substance. The cryometer can also be used for determining the purity of substances by accurate f.-p. determinations. Samples of impure benzene (0·009, 0·06, and 0·16% of impurity) are examined and m.-p. differences compared with those for 100% pure benzene by calculation. R. A. Cresswell.

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2

Preliminary experiments on the applicability of the comparative method for determining the coefficients of the change of the melting temperature with pressure. W. Świętosławski and W. Tomassi. *Roczniki Chem.* 22, 105-11(1948).—To measure the coeff. dt/dp of the m.p. of C_6H_6, the m.p. was detd. in a closed U-shaped tube in which the solid (in the short leg of the tube) was sepd. by a column of Hg from a column of liquid C_6H_6. The upper part of the tube contg. the liquid was heated and thus the m.p. was detd. under the pressure of the satd. vapor. The m.p. of C_6H_6 varied with pressure (atm.) as follows: 5.6° (1.0); 5.9° (10.0); 5.95° (11.0); 6.7° (33.0); 6.7° (34.9); and 7.1° (47.0). The av. coeff. was 0.033°/atm. H. H. Szmant

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1

Dilatometric cryometer. W. Swietoslawski. *Bull. intern. acad. polon. sci., Classe sci. math. nat.* 10A, 113-20 (1949); cf. *C.A.* 43, 4800e.—Several modifications of the cryometer are described and illustrated, and purity determinations of C_6H_6 in it are discussed. Ernst M. Cohn

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2

Binary eutectics formed by two series of homologs. W. Świętosławski. *Roczniki Chem.* 23, 1-6(1949).—A discussion of purification by crystn. with diagrams of the formation of eutectics between members of two homologous series. H. H. Saman

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Binary solid solutions formed by a series of homologs with one component. W. Świętosławski. *Roczniki Chem.* **23**, 7-12(1949).—A discussion of the formation of solid solns. between a solvent and members of a homologous series.
H. H. Semant

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The quaternary azeotrope n-heptane-benzene-ethanol-water. I. W. Swietoslawski and K. Zieborak (Central Inst. Ind. Chem. Research, Warsaw). *Bull. intern. acad. polon. sci., Classe sci. math., et nat. Ser. A.* 1950, 9-12(in English).—The quaternary azeotrope, C_6H_6(I)-C_7H_{16}(II)-EtOH(III)-H_2O(IV), b. 64.79°, contained 62.4 I, 12.1 II, 18.7 III, and 6.8 wt.-% IV and consisted of 2 phases: the lower, d_4^{20} 0.8772, n_D^{20} 1.3789, was 17.2 vol.-% or 17.85 wt.-% at 20° of the total and contained 11.8 I, 0.9 II, 54.4 III, and 32.9 wt.-% IV; the upper, d_4^{20} 0.8385, n_D^{20} 1.4640, contained 73.5 I, 14.5 II, 11.0 III, and 1.0 wt.-% IV. The quaternary azeotrope was detd. by filling a differential ebulliometer with the lower-boiling ternary azeotrope (I-III-IV) and adding small amts. of the higher-boiling ternary azeotrope (II-III-IV), detg. the boiling and condensation temp., and plotting against the compn. of the mixt. The quaternary azeotrope was also prepd. by distn. **II. The quaternary azeotrope benzene-ethanol-water-isoöctane.** *Ibid.* 13-14.—The quaternary azeotrope, I-isoöctane (V)-III-IV, b. 64.69°, contained 61.4 I, 14.1 V, 17.7 III, and 6.7 wt.-% IV and consisted of 2 phases: the lower, d_4^{20} 0.8766, n_D^{20} 1.3782, was 17.0 vol.-% or 17.80 wt.-% of the total at 20° and contained 11.5 I, 1.2 V, 54.6 III, and 32.7 wt.-% IV; the upper, d_4^{20} 0.8203, n_D^{20} 1.4595, contained 72.2 I, 17.0 V, 9.9 III, and 0.9 wt.-% IV. **III. The quaternary azeotrope composed of benzene, ethanol, water, and cyclohexane.** K. Zieborak. *Ibid.* 15-18.—The quaternary azeotrope, I-III-IV-cyclohexane (VI), b. 62.19°, contained 54.0 VI, 21.5 I, 17.4 III, and 7.1 wt.-% IV. **IV. Tangent and nearly tangent isobars limiting the formation of two-, three-, and four component azeotropes.** W. Swietoslawski. *Ibid.* 19-28.—By use of the isobar curves of an azeotropic agent, A, with a series of homologs, B_0, B_1, B_2 . . B_n (cf. *Ebulliometric Measurements*, 1945, p. 115 (*C.A.* 39, 2692[4])), the azeotropic range is defined as the extreme b.p. limits of the corresponding homologs which form tangent or nearly tangent isobars (i.e., the upper and lower limits of azeotropy). The formation of ternary azeotropes of A and C with a series of homologs, B, B_1, B_2, etc., or their isomers, depends upon the smaller azeotropic range of A with B's and C with B's, although the ternary azeotrope range may be somewhat larger than the smaller binary azeotrope range by virtue of the nearly tangent isobars of the binary system. The formation of quaternary azeotropes is limited by the azeotropic capacity of the binary systems (A with B's having the smallest range; all 3 agents (A, C, and D) should form azeotropes with each other and with the series of homologs (B, B_1, B_2, etc.) within a certain range; the quaternary azeotrope range may be somewhat larger than the smallest binary range by virtue of nearly tangent isobars of the binary system. In a similar manner, it is concluded that a 5-component azeotrope might exist, although the probability of such formation is small, and its isolation would be difficult since the azeotropic depression with respect to the low-

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est-boiling quaternary azeotrope would be small. V. **Nearly tangent zeotropes and their influence on the formation of ternary and quaternary azeotropes and zeotropes.** W. Świętosławski. *Ibid.* 29-33.—In the distn. of I with a small amt. of hydrocarbons, b. 93-100°, the temp. vs. compn. curve has one section corresponding to the formation of nearly tangent binary azeotropes, a transition point from nearly tangent azeotropes to nearly tangent zeotropes, and a section representing the distn. of the zeotropes. If to the ternary azeotrope, I-III-IV, b. 64.85°, is added gasoline (contg. mostly isomeric heptanes and octanes), b. 93-100°, distn. will yield the quaternary azeotrope and the ternary azeotrope, and a somewhat similar distn. curve is obtained. Thus, there is a similarity between the distn. of binary tangent and nearly tangent azeotropes and zeotropes and the distn. of a complicated polycomponent system. The following rule was deduced: If substance B forms with 1 part of a homologous series nearly tangent azeotropes and with another nearly tangent zeotropes, the addn. of a 3rd or 4th azeotropic component leads to the formation of ternary or quaternary azeotropes, resp., whose boiling-temps. differ slightly from each other. These mixts. of ternary or quaternary azeotropes or zeotropes cannot be sepd. by practical distn. Also in *Roczniki Chem.* 25, 88-113(1951).

Herman Skolnik

SWIETOSLAWSKI, W.

Swietoslawski W.

Swietoslawski W. "On the Classification of Sorbents and Ion-Exchangers." (W sprawie klasyfikacji sorbentow i jonitow). Przemysl Chemiczny, No. 1, 1950, pp. 41-43.

The author suggests a classification of sorbents and ion-exchangers into: perfect and imperfect groups. To the first belong all sorbents and ionites with one single function, while the other comports those which, in addition to being sorbents also play the part of ionites and vice versa. A suggestion is made to divide ionites into one-, two-, three-, and multi-function groups. The swelling of ionites interferes to some degree with the proposed grouping. There follows a characterization of the secondary processes occuring on non-ideal sorbents and ion-exchangers. A number of Polish terms are proposed for practical use.

SO: Polish Technical Abstracts - No. 2, 1951

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Classification of sorbents and ion exchangers. W. Świetosławski. *Przemysł Chem.* 6, (29), 41-8(1950).—A classification of sorbents and ion exchangers is suggested which divides them into two groups: ideal and nonideal sorbents and ionites (ion exchangers). All sorbents and ionites which are characterized by one function only (i.e., sorbents possess adsorption capacity and ionites the ability of ion exchange) are classified in the first group. On the other hand, the nonideal sorbents comprise those which possess either acidic or basic groups or have them absorbed or adsorbed. In both cases the sorbents take part in the ion-exchange process. The ionites may possess the ability of adsorption or absorption of mols. from the soln. and therefore may act as ion exchangers as well as sorbents. It is suggested that the phenomena of swelling of ionites and of some sorbents (assocd. with the absorption of relatively large quantities of H_2O) does not interfere with the proposed classification. If sorption of other mols. in addn. to the solvent takes place, the nonideal nature should be stressed. The term chromatography should be retained, though selective adsorption is a more reasonable term. It is suggested that the ionite is in equil. with the soln. when the compn. of the effluent is the same as that of the influent.

Frank Gonet

P. I. A.

Chemistry & Chemical Technology

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541.12.017.3 : 541.123.61

Swięlesławski W., Zięborak K. Quaternary Azeotrope Composed of Ethanol-Benzene-Water and Normal Heptane.

„O azeotropie czteroskładnikowym utworzonym z benzenu, etanolu, wody i n-heptanu". Przemysł Chemiczny. No. 7–8, 1950, pp. 420, 2 tabs.

Quaternary azeotrope composed of ethanol-benzene-water and normal heptane has been obtained. It has been characterized by boiling temperature 64.78°C and by the following percentage weight composition: benzene 62.4, ethanol 18.7, water 6.8 and normal heptane 12.1. Composition, densities and the refractive indexes of both the lower and the upper phases are given. The percentage volume of the lower phase at 20°C is 17.2, which corresponds to 17.85 percent of the percentage weight.

P.T.A.

Chemistry + Chemical Technology

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541.12.017.5 : 541.123.61

Świętosławski W., Zięborak K. Quaternary Azeotrope Composed of Benzene-Ethanol-Water and Isooctane.

„O azeotropie czteroskładnikowym utworzonym z izooktanu, etanolu, wody i benzenu". Przemysł Chemiczny No 7-8, 1950, pp. 420--421, 2 tabs.

The existence of the quaternary heteroazeotrope composed of benzene — ethanol — water and isooctane (2,2,4 -- trimethyl-pentane) has been demonstrated. The boiling point of the heteroazeotrope at one atmosphere 64.63°C, and the percentages weight composition are as follows: benzene 61.5%, ethanol 17.7%, water 6.7% and isooctane 14.1%. The densities and the refractive indexes of both the liquids have also been determined