ABSTRACTS OF THE PHYSICO-CHEMICAL LITERATURE IN JAPAN

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1—GENERAL

Studies on the viscosity of solutions of macromolecular compounds. I—II. K. Kaneko. *Memoirs Ryojun College Eng.* **16**, 1-116 (1934).—As a general formura of viscosity of dilute solns. of macromolecular compds., the author proposes a new one as follows: $\eta_{sp}=a\{c\cdot\varphi/(100-c\cdot\varphi)\}+b\{c\cdot\varphi/(100-c\cdot\varphi)\}^2$, where $a=2.5+f^2/16$ and $b=4.4$. f indicates the axis ratio of the particles. The theoretical meaning of this formula is explained and examples of its application are given. The author measured the viscosity and diffusion velocity of phenolic resins and calcd. their molecular weights. Many interesting suggestions are gained about their magnitudes and structures. Author.

The effect of the electric field on the viscosity of liquid. I. O. Kimura. *Bull. C. S. J.*, **64**, 895–900 (1943).—For the present investigation a special viscosimeter was devised and it was ascertained that nonpolar liquids such as benzene and hexane are not affected by elect. field. Using such liquids as solvents, lauric acid, elastic acid, stearic acid, oleic acid, ethyl alcohol and ethyl cellulose solns. were examined. The effect of elect. field is probably due to orientation of molecules. J. C. L.

The effect of the electric field on the viscosity of liquid. II. O. Kimura. *J. Chem. Soc. Japan*, **64**, 937–940 (1943).—In such liquids whose molecules have little dipole moment, as benzene, hexane, toluene, ethyl benzene and *p*-dichlorobenzene, the viscosity is seldom affected by the elect. field, but in such liquids of large dipole moments as chlorobenzene (6.2, 7.9), bromobenzene (2.8, 5.2), phenetole (1.8, 2.2) *o*-dichlorobenzene (18.2, 46.0), dichloroethane (9.4, 16.8) dibromobenzene (12.6, 23.0) trichloroethylene (1.8, 2.2) tetrachloroethane (7.3, 20.9) the viscosity is markedly affected. (The numbers in the above brackets denote the percentage of the viscosity increase for 20 kV and 30 kV). J. C. L.

Thermal pressure of simple liquids. S. Sisido. *J. Chem. Soc. Japan*, **64**, 883–886 (1943).—From the thermal motion of simple liquid molecule and the derivation of viscosity coeff. is derived a physical amount similar to the thermal press. of liquids. This amount is compared with thermal press. calcd. from the coeff. of expansion, compressibility, specific heat and sound velocities of Hg, Na, K, Ar, Pb, Cd, Sn and Bi. J. C. L.

Studies on the electrolysis of fused salts. II. The method of measuring the densities of fused metal and the observed values. T. Kuroda. *Rept. Electrotechn.*, **126**, 1–108 (1943).—The theory, the apparatus and the method of measuring density are referred to and the observed values given. J. C. L.

Compressibility of natural gas from Taiwan. I. Outi. *Natural gas Res.*, **9**, 1–5 (1942).—$1/Z(=y)$ for natural gas in Brown's $PV=ZRT$ is exptl. calcd. and $y=ap_T^3+bp_T^2+cp_T$

$+dp_T$: reduced press. a, b, c, and d const. values for respective temps. It is found that $y > 1/Z$ for natural gas. J. C. L.

A new method of measuring the specific gravity of particles. T. Simotukasa. *Okayama Medical College*, **55**, 429–436 (1943).—When drops of a salt soln. whose specific gravity is known are suspended in a mixture of petroleum-brombenzol or benzol-chloroform, it is ascertained that there holds a linear relation between the positions where the drops stand and the specific gravity. Using this curve, the specific gravity of a substance is known from the position of the drop contd. in the above mixture. The measurement can be made with 0.02～0.03 cc. only of the soln. The accuracy is 0.1%. This method can be applied to a trace of solid. J. C. L.

A study of iron amalgam by X-rays. N. Kato. *J. Chem. Soc. Japan*, **64**, 1079–1081 (1943).—Expts. were carried out to det. by X-rays the crystal structure of the solid phase of iron amalgam prepared by electrolysis. The liquid is pressed out from the amalgam obtained by the electrolysis of ferrous sulphate. Half-solid residue (iron about 10%) is filled in a celluloid tube, and the Debye photograph taken by a camera (Cr-K rays, 7 m Amp., exposure: 3.5 hours and 10 hours), avoiding its oxidation decompn. as much as possible. (110) belonging to α-iron and other diffraction rays are observed. It is found that in room temp. iron-amalgam contains α-iron in mercury. This presumption is similar to that obtained by Palmaer with respect to iron-amalgam treated with heat for several hours at 300°. J. C. L.

A study by X-rays of ferrous oxide and ferric oxide precipitated in alcohol. T. Kita. *Sc. P.*, **40**, 123–124 (1942).—Ferrous oxide and ferric oxide were pptd. from methyl alcohol or ethyl alcohol soln. The volume of the product thus pptd. is larger than that of the product obtained from the soln. not contg. alcohol; and the product which is ordinarily magnetic becomes non-magnetic in the presence of alcohol. The object of the present investigation is to elucidate by X-rays the difference in the structure caused by the magnetic character of the ppt. 5 cc. of 1 N $FeSO_4 + 3$ N $FeCl_3$ dissolved in 45 cc. of (a) water, (b) methyl alcohol, and (c) ethyl alcohol resp. was added to 45 cc. of the above solvents contg. 5 cc. of 75 N NH_4OH. The ppt. of (a) is magnetic, that of (b) is non-magnetic and that of (c) becomes magnetic in 2 hours. The ppts. obtained were held in slender glass tubes and the Debye-Scherrer photographs were taken, using K line of Fe. The results are as follows: The ppt. of (a) has the same structure as that of Fe_3O_4, i.e. body-centered cubic lattice, and those of (b) and (c) are of non-crystalline structure. This shows that the presence of a hydrophile substance retards the crystal formation of Fe_3O_3, so that it disturbs the magnetization of the ppt. J. C. L.

Physical property of aliphatic sulphide and its chemical reaction. III—IV. S. Isida. *J. Chem. Soc. Japan*, **64**, 235–241, 242–249 (1943).—For the sulphides reported in I and II, their preparation, boiling point, specific gravity, index of refraction and velocity of decompn. with hydrogen peroxide are here reported. The sulphides treated are as follows: (1) Dialkylsulphide (alkyl: methyl, ethyl, propyl, isopropyl, butyl, isobutyl, iso-amyl), (2) Dibenzylsulphide, (3) alkyl-β-chlorethyl sulphide (alkyl: methyl, propyl, butyl, isoamyl), (4) $\beta \cdot \beta'$-dichlordiethyl sulphide, (5) β-chlorethyl-β-chlorpropyl-sulphide, (6) $\beta \cdot \beta'$-dichlordipropylsulphide, (7) $\gamma \cdot \gamma'$-dichlorpropyl-sulphide, and (8) β-chlorethyl-$\beta' \cdot \gamma$-dichlorpropylsulphide. **V.** *ibid.*, **64**, 380–386 (1943).—The ultraviolet absorption curves of alcohol solns. of $S(CH_3)_2$, $S(C_2H_5)_2$, $C_2H_5S \cdot C_2H_4Cl$ and $S(CH_2CH_2Cl)_2$ are examined, and the absorption bands of 17 kinds of aliphatic sulphide vapour measured.

$S(CH_3)_2$ presents the 1st and 3rd absorption bands, whose wave numbers are 43,000–47,000 and 50,400–52,400 cm^{-1} resp., each consisting of 10 and 4 slender lines. The 2nd absorption band does not show slender structure. The distance between these lines is a multiple of 250 or 330 cm^{-1}. The distance of the first absorption band of diisopropylsulphide, the lowest iso-sulphide compd., is a multiple of 265 and 320 cm^{-1}. In this case, however, the 3rd absorption band is not observed. In the case of a higher compd., the curve becomes simpler, the 1st and 2nd absorption bands approaching each other. J. C. L.

A study of streaming double refraction of a highly polymerized lyophile solution. K. Kanamaru, T. Tanaka, T. Tanioku and M. Yamamoto. *J. Ind. C. S. J.*, **45**, 478–481, 482–484, 484–486 (1942).—I. Studies on streaming double refraction. II. The apparatus and some results obtained. III. The effect of the concn. on streaming double refraction. - The effect of concn. on optical anisotropy is observed in nitric acid soln. of cellulose. There holds the following relation between concn. c, velocity G, and optical anisotropy (λ : deviation of angle of extinction χ from $\pi/4$: Δn the absolute value of double refraction) : $\lambda=c^2G/(ac^2G+b)$ and $\Delta n=c^3G/(k_1c^2G+k_2)$, where a, ab, k_1 and k_2 are consts. J. C. L.

The space-charge effect of the metal particles diffused in liquid paraffin. R. Torigai and J. Yamaguti. *Denki-Gakkai Zassi*, **63**, 292–293 (1943).—When direct elect. current is passed in increasing press. to liquid paraffin in which Ag, Ca, and Se have been diffused, the space-charge effect is produced. J. C. L.

The reaction velocity by a thermal diffusion reaction vessel. K. Hirota and O. Kimura. *J. Chem. Soc. Japan*, **64**, 756–759 (1943).—In the case of thermal diffusion tube used as the reaction tube the theoretical formula giving the velocity const. and the heat of activation from the increase in press. is proposed. This formula is applied to the polymerization of acethylene, and the heat of activation is found to be 4.40 Cal. and the velocity consts. κ at 500 and 700°, 8.7, 0.020/ atm. press./sec. J. C. L.

The exchange reaction of oxygen molecule between phosphorous anhydride and sulphuric anhydride in liquid. T. Titani and S. Nakata. *Proc. Imp. Acad., Tokyo*, **19**, 77–79 (1943).—When phosphorous anhydride in which heavy oxygen is condensed is dissolved in liquid sulphuric anhydride, a rapid exchange reaction occurs at room temp. The mech. of this reaction is represented by the reaction : $(SO_3)'' + SO_3 \leftrightarrows SO_3 + (SO_3)''$. It is to say that $(SO_3)''$ and neutral sulphuric anhydride ion exchange their electrons.

J. C. L.

Hydrogenation and polymerization of acetylene. III. A study of polymerization mechanism by means of the thermal diffusion tube. O. Kimura and K. Hirata. *Bull. C. S. J.*, **18**, 45–53 (1943).—In a kinetical study of thermal polymerization of C_2H_2, the method of thermal diffusion is adopted for retarding the thermal decompn. and separating the reaction product from the reaction system. W is most ideal as a heating wire in the thermal diffusion tube because it has no catalytic activity. The exptl. results show that the reaction consists only of the polymerization. The degree of the reaction is known from the fall of press. The difference X between the initial P_0 and the press. at the reaction should be proportional to the amount of reaction of C_2H_2. Hence, if the polymerization of C_2H_2 is of the 2nd order according to Taylor, $X/[tp_0(p_0-x)]=k$ should be const. The apparent energy of activation obtained from the reaction velocity const. is found to be 44.8 Cal. (Taylor : 41.3 Cal.).

J. C. L.

The influence of some inorganic substances upon the combustion of paper. T. Tatibana. *J. Chem. Soc. Japan*, 63, 924–928 (1941).—Paper can more easily catch fire, when contg. some inorganic substances such as alkali hydroxides, alkali and alkali earth carbonates, heavy metal sulphates, ferric oxide or platinum black, etc. The action of these substances is comparatively estimated by the measurement of the ignition temp. and fire propagation speeds. This phenomenon results from the catalytic action of the substances upon the ignition of combustible gases or carbonaceous products formed by the decompn. of cellulose. Author.

A method of measuring the velocity of the flame propagation. R. Goto and M. Suzuki. *This Journal*, 16, 65–68 (1942).

The explosion of Al-powder. I. N. Sata and Y. Harizaki. *Bull. C. S. J.*, 18, 21–30 (1943).—With respect to the explosion of Al powder, the relation between the amount of the powder and the mode of ignition is studied. Elect. spark of high temp. is not adequate for ignition. It is found that the heating area is more important than the temp., and white-hot nichrome-wire is used. The less the amount of the powder is, the larger the igniter should be and the smaller the distance should be. In the case of a given amount of the powder, the press. of evolution is maxim. at an adequate distance of ignition. The condition of the minim. explosion is that the amount of powder is 30 mg., the size of igniter 100 cm. × 10.75 mm. the distance for ignition 1 cm. and the temp. 805°.
J. C. L.

2—SUB-ATOMICS, RADIOCHEMISTRY AND PHOTOCHEMISTRY

The life of neutral mesotron. Y. Tanikawa. *Proc. Phys.-Math. Soc. Japan*, III, 24, 610–612 (1942).—Neutral pseudoscalar mesotron naturally begins to collapse when it turns into 2 photons. Its natural life is found to be 10^{-16} sec. or 10^{-13} sec. by taking pseudoscalar reciprocal action to be 0 or cutting the momentum. J. C. L.

The life of pseudoscalar mesotron. S. Sakata. *Proc. Phys.-Math. Soc. Japan*, III, 24, 843–844 (1942).—There are some questions found in the previous assumption. The term detg. the life of β decay is of δ function type and such a term is ascribed to unlimited application of a theory. If the application is limited, this term is removed and therefore it is difficult to explain the nuclreus force, β decay and the life of mesotron in the theory of pseudoscalar mesotron only. This leads to the conclusion that the Fermi theory should be adopted or the existence of two kinds of mesotrons be assumed.
J. C. L.

Theory of mesotron. II. R. Miyazima and S. Asanaga. *Sc. P.*, 40, 21–67 (1942).—In the new method of observing the state of mesotron around heavy particle as proposed in the preceding report, the reaction is taken into account, the wave function being calcd., according to the Hartree method. In this report, the parameters in the wave function expressing the mesotron field around heavy particles is increased in number to make the method more accurate. The probability of forming many mesotrons by the collision of fast protons with heavy particles, is so low that it seems improbable that cosmic ray is caused by protons. J. C. L.

The theory of mesotron and nucleus force. R. Miyazima and S. Asanaga. *Sc. P.*, 40, 274–310 (1943).—The system consisting of the nuclei and the surrounding mesotron field is explained according to Asanaga's theory, and the force of nucleus is examined. The mesotron fields calcd. are those of charged mesotrons, neutral pseudoscalar mesotron, and pseudoscalar mesotron. J. C. L.

On the scattering of fast neutrons. II. The cross sections of inelastic scattering of D-D neutrons. I. Nonaka. *Tôsibakenkyûjihô*, **18**, 6, 293–300 (1943).—The absolute number of gamma-ray quanta emitted from a known number of Cu nuclei by the action of D—D neutrons (2.52 MeV) was measured by Geiger-Müller counters of known efficiencies, and the number of incident neutrons was measured by a high press. ionisation chamber filled with hydrogen and nitrogen. Thus the cross section of inelastic scattering of D—D neutrons by Cu nuclei was obtained to be $\sigma_{inel}=(1.9\pm0.2)\times10^{-24}$ cm^2. By taking this value of Cu as standard, σ_{inel} of other elements could be detd. from their known relative values. Author.

Scattering of thermal neutrons by solid. I.—II. I. Kimura and R. Hasiguti. *Proc. Imp. Acad.*, **18**, 652–654 (1942), **19**, 26–28 (1943).—I. The change of scattering cross-section by the treatment of metals at room temp. By being completely annealed, the scattering cross-section of Cu is enlarged by the heat treatment and the values would be maxim. only in consequence of such a treatment as the reduction of the thickness by several %, while that of Al remains unchanged. This suggests that annealing causes the extinction of 1st order, which would be reduced by the treatment at room temp. The mosaic crystals of the annealed samples of Armco-iron, electrolytic iron and Cu are supposed to be 5×10^{-4}, 3.6×10^{-4}, 5.8×10^{-4} cm. resp. **II.** The effect of heat distortion in the diffraction scattering by quartz. The scattering body consisted of 11 single-crystal quartz plates, each being 3 mm thick. The plates were heated unevenly with nichrome wire inserted between them. The amount of neutrons passing through these plates were measured. The said amount is decreased with heating elect. current (c. 3 Amp.) and several minutes after cutting off the current the decrease in amount was not recovered. The decrease may be explained as due to the failure of the primary of secondary extinction caused by the inner distortion produced with uneven heating. J. C. L.

The scattering of neutrons in iron-nickel alloy. Y. Honda. *Proc. Phys.-Math. Soc. Japan*, **16**, 148–152 (1942).—The change in scattering of slow neutrons through heavy grating for the atomic concn. and the long range order is examined by the method of Poerantschuk. J. C. L.

Breakdown of heavy proton nucleus by neutron. T. Isizu. *Proc. Phys.-Math. Soc. Japan*, **III**, 24, 828–842 (1942).—Considering 'Wirkungs-querschnitt' of the process of a heavy proton nucleus being broken by fast neutron into 2 neutrons and 1 proton, as the transition of heavy proton from its standard state to the continuous energy state by the reciprocal action between heavy proton nucleus and neutron, it was calcd. Within the approximate range of Born. J. C. L.

Spectra of the γ-rays of ^{52}V and ^{56}Mn. Laboratory of Atomic Nuclei, Osaka, Imp. Univ. *Proc. Phys.-Math. Soc. Japan*, **III**, 24, 818–820 (1943).—The spectra of γ-rays of ^{52}V and ^{56}Mn were studied by means of the magnetic spectrometer having high analytical power. The γ-ray of ^{52}V is single and its energy is 1.44 ± 0.02 MeV; that of ^{56}Mn consists of three lines, having energy of 0.866 ± 0.0008, 1.83 ± 0.02, and 2.11 ± 0.02 MeV. The intensity ratio of these rays is 5.5 : 1.5 : 1. J. C. L.

The electric discharge in Geiger Müller counting tube. R. Minakawa. *Proc. Imp. Acad., Tokyo*, **18**, 468–473 (1942).—The mech. of the elec. discharge in the counting tube is discussed, and it is exptl. found by means of an oscillograph that the elec. discharge does not require the discharge of the photoelectron from the metal wall.

J. C. L.

The measurement of radioactivity by Geiger-Müller counting tube. K. Miyazaki and T. Sato. *Jap. Elect. Res. Inst.*, **2**, 155–159 (1942).—Five different kinds of Geiger-Müller counting tubes have been devised for the measurement of the activity of radioactive substances present in a highly absorptive body and the tubes are examined and compared with one another by measuring the amount of thoria contd. in thorium-tungsten and black sand contg. thorium. It is possible to use an adequate tube within the error of a few %. J. C. L.

The measurement of atomic mass by means of mass-spectrograph. K. Okuda. *Bull. Inst. Chem. Research*, **21**, 1–17 (1942).—The atomic mass of ^{12}C, ^{14}N, ^{23}Na, $^{32,\,34}S$, $^{35,\,37}Cl$, ^{40}A, ^{46}Ca, $^{46,\,47,\,48,\,49,\,50}Ti$, ^{56}Fe, and $^{58,\,60,\,61,\,62,\,64}Ni$ is calcd. by means of the apparatus devised for the analysis of mass-spectrograph of Bainbridge-Jordan type. J. C. L.

Isotopic weights of sulphur and titanium. T. Okuda and K. Ogata. *Proc. Phys-Math. Soc. Japan*, **25**, **3**, 374–375 (1943).—With the mass-spectrograph of Bainbridge-Jordan type, the isotopic weights of sulphur and titanium were measured by the doublet method. 1) Sulphur: a) ^{32}S: By the elect. discharge through the mixt. of oxygen and a trace of ethylmercaptane (C_2H_5SH) vapour, we obtained well matched doublets $^{16}O_2$—^{32}S and $^{12}C\,^{16}O_2$—$^{12}C\,^{32}S$. These two mass differences being quite in good agreement with each other within the exptl. error, we take the weighted mean of these results for the mass difference $^{16}O_2$—^{32}S as follows: $^{16}O_2-{}^{32}S=191.\pm 0.7$. From this difference, the following isotopic weight as well as packing fraction of ^{32}S can be obtained: $^{32}S=31.98089\pm 0.7\times 10^{-4}$; packing fraction of $^{32}S=-5.98\pm 0.02$.

b) ^{34}S: The $^{32}S\,^{1}H_2$—^{34}S doublet is obtained by the ordinary discharge through the vapour of ethylmercaptane, and the mass difference obtained as follows:

Doublet	Difference in mass ($\Delta M\times 10^4$)
$^{32}S\,^{1}H_2-{}^{31}S$	200.4 ± 3.2

From the results thus obtained and also from the above value of ^{32}S and $^{1}H=1.008131\pm 0.033\times 10^{-4}$, the following isotopic weight and packing fraction of ^{34}S can be obtained, $^{34}S=33.97711\pm 3.3\times 10^{-4}$; packing fraction of $^{34}S=-6.73\pm 0.10$.

2) Titanium: As to detn. of all five isotopic weights of Ti, we obtained by the discharge through the vapour mixt. of titan-tetrabromide, normal pentane and ethylmercaptane the following doublets.

Doublet	Difference in mass ($\Delta M\times 10^4$)
$^{12}C\,^{32}S\,^{1}H_2-{}^{46}Ti$	349.0 ± 9.5
$^{12}C\,^{32}S\,^{1}H_3-{}^{47}Ti$	444.2 ± 9.4
$^{12}C_4-{}^{48}Ti$	521.6 ± 4.6
$^{12}C_4\,^{1}H-{}^{49}Ti$	588.3 ± 5.1
$^{12}C_4\,^{1}H_2-{}^{50}Ti$	6694.6 ± 3.6

By using these results, together with the above values of ^{32}S and ^{1}H, $^{12}C=12.003871\pm 0.33\times 10^{-4}$, the titanium masses detd. are given below:

Isotopic weight	Packing fraction
$^{46}Ti=45.96612\pm 9.5\times 10^{-4}$	-7.36 ± 0.21
$^{47}Ti=46.96473\pm 9.5$	-7.50 ± 0.20
$^{48}Ti=47.96332\pm 4.8$	-7.64 ± 0.10
$^{49}Ti=48.96479\pm 5.3$	-7.19 ± 0.11
$^{50}Ti=49.96229\pm 3.8$	$-7.54\pm 0.08.$

Authors.

Standard vibration of polyatomic molecules. I.–II. T. Simauti. *Bull. Inst. Phys. Chem. Research*, **21**, 825–833, 834–842 (1942).—I. General treatment of the standard vibration of methane derivatives: the following formula expressing the potential in a molecule

$$V=\sum \tfrac{1}{2}k_{\gamma i}\,(\Delta\gamma_i)^2+\sum_{i<j}\tfrac{1}{2}k_{aij}\,(\Delta a_{ij})^2,$$

where γ is the distance of atomic valency and a is the angle of atomic valency, gives the vibration number of a molecule which is approximate to the expt. value of the term of the force of atomic valency $\Delta\gamma_i\cdot\Delta\gamma_j$ and the value of the term of reciprocal action of the atomic repulsion $\Delta\gamma_i\Delta a_{ij}$ is added to it. Nevertheless, the physical meaning of the term of the reciprocal action is not clear. According to E. B. Wilson, the secular equation of the standard energy of a molecule is $|GF-E\lambda|=0$, where G is the series of kinetic energy, F series of potential energy, E unit series, and $\lambda=4\pi^2c^2\nu^2$, ν vibration number. G and F of $CX_IX_{II}X_{III}X_{IV}$-type molecules being made and simplified and the symmetry of the molecules, taken into account the secular equation for the standard vibration numbers of CX_4, CX_3Y, and CX_2Y_2 are proposed. II. Considerations on vibrational spectra of CCl_4, CCl_3Br, CCl_2Br_2, $CClBr_3$ and CBr_4: according to the secular equation in Report 1, the consts. $f_{\alpha ClCl}$, $f_{\gamma Cl}$, f_{qClCl} and h_{qClCl} of force necessary for vibration on the basis of the vibration number of the 4 Raman rays in CCl_4 and CBr_4 solns. of the CX_4 type are calcd. $h_{\alpha ClBr}$, $f_{\alpha ClBr}$, h_{qClBr}, and f_{qClBr}, the consts. of the force between Cl and Br, are detd. from the above consts. and the vibration numbers thus obtained agree well with the results of J. Lecomte obtained by the Raman spectrum.

J. C. L.

Dielectrics from the viewpoint of quantum construction of conductive electron. H. Mie and T. Matumoto. *Electricity*, **3**, 357–359 (1943).—With the thin films of KCl, NaCl, NaBr, KBr, KI, SrO and BaO prepared in vacuum, the emission of secondary electrons by the impact of primary electrons at low elect. press. (1–40 V) is minutely observed. The ratio between primary electron flow and secondary flow is gradually increased with accelerating elect. press. of primary electron and reaches a maximum. In the case of KBr the emission of secondary electrons is examined by giving a retarding press.

J. C. L.

The force between gas molecules and the equation of state. R. Miyako. *Sinkyo Engineering Univ.*, **1**, 2–12 (1942).—The force between the hydrogen molecules at low temp. is quantum-mechanically examined. In the wave equation of relative motion of two molecules, the values are calcd. by integration by using Jennard-Jones's potential between the molecules. The second coeff. obtained is found to be −89 at 20°K. This is far smaller than that obtained by Nijhoff-Keesom; and by using de Boer-Michels's potential, the coeff. is −111. Those 2 potentials do not seem to be correct. Comparing the calcd. value with the exptl. one, the author proposes the following formula: $V(\gamma)=(843/\gamma^{12}-1.323/\gamma^{6})\times10^{-11}$ ergs. J. C. L.

A study of hydrocarbon and its substitution product from the theory of molecule. VII. Rotatory isomeride of 1.2-Dichlorätban. N. Yamaguti, Y. Morino, K. Watanabe, and S. Mizusima. *J. Chem. Soc. Japan*, **64**, 830–834 (1943).—The elect. diffraction of 1.2-Dichlorathane (gas) is observed and the values [$S=(4\pi/\lambda)\sin(\theta/2)$; λ the wave length of the electron-rays: θ angle of incidence for the maximum and minimum intensity of radiation are as follows: maximum: 3.205 (+), 4.940 (+), 6.003 (−), 7.699 (+), 9.205 (±), 10.598 (−), 12.051 (+), 14.813 (±); minimum: 4.141, 5.902, 6.664, 8.591, 9.993, 11.305, 13.189. These values agree well with the theoretical for a mixture of isomerides of trans-form and intermediate form.

J. C. L.

Theoretical discussion of the scattering of molecular rays in a gas. T. Kihara. *Proc. Phys.-Math. Soc. Japan*, III, **25**, 73–86 (1943).—With respect to the scattering intensity of the molecular rays having either homogeneous or heterogeneous velocity in a gas, the formula of angular distribution is derived, in which the potential between the molecules is taken to be $U(r)=\lambda r^{-n}$.

J. C. L.

The investigation of thin films of organic substances by electron diffraction. III. The theoretical intensity

curves of the three halos. J. Kakinoki. *Proc. Phys-Math. Soc. Japan*, **25**, **5**, 358–367 (1943).—By applying the method of gas diffraction analysis, the theoretical intensity curves for the three halos obtained from thin films of highly polymerised organic substances by electron diffraction were calcd. They account successfully for the observed maxima. By dividing a large number of interatomic distances into three appropriate groups and by means of partial use of the integral form in place of the usual summation form, a good agreement of curves with observations can be obtained, while such simple model as a glucose or a cellobiose unit of cellulose can not give satisfactory results. Author.

The electron emission of single crystal of nickel. H. Kawamura and S. Sato. *Science*, **13**, 254–255 (1943).—The electron emission is observed by attaching BaO to a sharpened nickel needle. When the needle is heated for several hours at about 1000°, BaO crystal is evaporated from the point of the needle, and a single atomic layer remains. In this case, the point of the needle is a single crystal of nickel of 10^{-4} cm. J. C. L.

The first ionization potential of CO. T. Takamine, Y. Tanaka, and M. Iwata. *Sc. P.*, **40**, 371–378 (1943).—The Rydberg absorption series that contract are observed at 884.73 and 868.13 Å. These series belonging to (0.0) and (1.0) vibration series in the $CO+X^2-\Sigma^+ \rightarrow COX^1\Sigma^+$ transition. J. C. L.

On the λ 3065 band of neutral OD. H. Ōura and M. Ninomiya. *Proc. Phys-Math. Soc. Japan*, **25**, **5**, 335–353 (1943).—We photographed (0, 0) band of OD on the Fuji "AI" plate using the 2nd order of 21 foot concave grating in Eagle mounting, which gives a dispersion of about 1.28 Å/mm. The source was gained by the Geissler discharge. The analysis of the band was made: 35 lines were arranged in R_1 branches, 34 in the R_2 branches, 42 in the Q_1 branches, 40 in the Q_2 branches, 43 in the P_1 branches, 43 in the P_2 branches and 55 in the satellite branches. Picking up the lines looking like Watson's satellite branches, we compared them with neighbouring OH lines. For the identification of satellite branches the intensity curves for the normal rotation were traced. We compared them with the curves obtained by expt. to confirm that the rotation we observed was abnormal. For the $^2\Pi$ state we compared with that of (2, 0) band of M. Ishaq, applying the combination principle. Consts. B_0', D_0', B_e', α' and γ' for $^2\Sigma$ state, A, B_0'', D_0'' and the width of Λ doubling for $^2\Pi$ state were calcd. The isotope effect of B_0', α' and D_0' especially that of B_0' were examd., in detail considering the zero point energy. Authors.

On the fine structure appearing in the emission band of crystalline phosphorus. I. Studies on the CaO-Mn phosphor. Y. Utida and M. Ueda. *Bull. Inst. Phys. Chem. Research*, **22**, **6**, 577–582 (1943).—A part of the emission band spectrum of the CaO-Mn phosphor was found by cooling at very low temps. to resolve into some narrower ones, which could be arranged into two series each having almost const. wave-number difference c. 220 cm^{-1}.

These phenomena were interpreted as due to the "forbidden" electronic transition $^2G \rightarrow {}^4F$ in Mn III spectrum accompanied by the simultaneous stimulation of some modes of the elastic oscillation in the CaO-Mn crystal. The upper vibration states were found to be $v'=0$ and $v'=1$.

With these results the theory of crystal excitation of Peierls and Frenkel is criticized.

Some possible electronic transitions are considered for the rest of the emission band not showing structures. Authors.

The near ultraviolet absorption band spectrum of benzene and its deri-

vatives. VI. Toluene. K. Asagosi and Y. Ikemoto. *Sc. P.*, **40**, 105–111 (1942).—The absorption band spectrum is similar to those of other benzene derivatives. The spectra whose wave-numbers are in the order of intensity 527 (a); 932 (d); 1192 (e), 964 (b), and 752 (c) cm^{-1} are most frequently observed. These vibrations are considered to be totally symmetric vibrations at the superior electronic state, their standard vibration being regarded as corresponding to 622, 1002, 1209, 1032 and 785 cm^{-1} resp. Taking into account the above mentioned intensity, they are classified thus: A series: 37,483 cm^{-1} (Q→o); 38,010 cm^{-1} (Q→a): D-series: 40,275 cm^{-1} (O→3d); B-series; 38,447 cm^{-1} (O→b), 39,407 cm^{-1} (O→2b), E series 38,675 cm^{-1} (O→e), 39,857 cm^{-1} (O→2e), 39,199 cm^{-1} (O→e+a), 40,391 cm^{-1} (O→2e+a); C series: 38,235 cm^{-1} (O→e), 38,985 cm^{-1} (O→2c). All of the double band series are observed.

J. C. L.

The ultraviolet absorption spectrum of azobenzol vapour. N. Imanisi and T. Tazi. *J. Chem. Soc. Japan*, **64**, 521–524 (1943).—The ultraviolet absorption spectra of azobenzol vapour at various temps. were observed and the vapour was found to have an absorption region at 3338–2618 Å and 2303 Å—short wavelength. In the former case a group of uncontinuous absorption band was observed and in the latter case completely continuous one. The wave number of the uncontinuous absorption band is expressed by $\bar{\nu}=298{,}35+220\,n$ within the exptl. error, which shows it to be equidistant molecular vibration spectrum. This means that the azobenzol molecule which does not vibrate at the fundamental electronic state is excited by absorbing light to the only one harmonious vibration which possesses 220 cm^{-1} vibration quantum. It is inferred from the intensity change of various spectra of the n value with temp.

J. C. L.

The effect of hydrogen on the ultraviolet fluorescence of iodine. O. Mabuti. *J. Chem. Soc. Japan*, **63**, 1733–1737 (1942).—The fluorescence spectra caused by the ultraviolet radiation of iodine and various gases in a tube are photographed. When hydrogen of 1∼10 mm. press. is mixed, the Oldenberg series in the spectrum is well quenched; in the case of that of 10 mm. it is quenched up to 1900 Å. In the case of oxygen of 10 mm., fluorescence is nearly all quenched, only the spectrum of the light source being observed. This shows that hydrogen of 4 mm. press. produces the same effect as oxygen of 1 mm. press.

	H_2	Ar	O_2	Air
The ratio of the quenching effect	3	1	1.5	3
Viewed from the kinetic theory of gas:	4.5	1	1.1	1.2

J. C. L.

The molecular spectrum of cadmium vapour. Y. Morimoto. *Mem. Hirosima Univ. of Sci. and Lit.*, **12**, 141–158 (1943).—By agitating Cd vapour by means of a transformer for neon light, Tesla coil, and accumulated elect. discharge, the effects of elect. current, temperature and the press. of an added rare gas is examined. The band spectra have been newly found in 5232–5552 Å and 2144 Å. The 2144 Å band is very weak in its intensity. From the condition under which the band appears it is assumed that the band is due to the transition of the Cd_2 molecules from the 1^1S_0 to 2^3S_1 state. The continuous spectrum in the short wave length region of the 2288 Å resonance caused by elect. stimulation shows that the branching on the potential curve of the $1^1S_0+2^1P_1$ state should be interpreted by Finkelnburg's theory. The 2212 Å glow band is not caused by elect. stimulation but by accumulated discharge, which is considered related to the resonance 2144 Å of Cd*II*, being emitted by the Cd vapour molecules. Similarly the 2272 Å band is correlated to the resonance 2265 Å of Cd*II*. Another continuous spectrum and band spectrum have been observed, which seems to be emitted from the Cd vapour. The intensities of these bands newly observed are increased with the rise of temp. and that of the press. of the rare gas added. J. C. L.

The molecular spectra of mercury vapour by accumulater discharge. Y. Morimoto. *Hirosima Univ.*, **12**, 281–286 (1943).—When elect. discharge is passed through the mercury vapour in a large discharge tube contg. a rare gas, the intensity of the known continuous spectrum observed at 4850 and 3350 Å is decreased and another intense continuous spectrum appear over the visible region. This spectrum extends to the long wave length region farther than that of 4850 Å, its intensity being enhanced with the rise of temp. This appears only in case the density of the mercury vapour and that of the elect. current are considerably high. The maximum intensity is observed in the neighbourhood of 6500 Å. This spectrum does not belong to the $(1^1S_0+2^3P_0)^3O_u$-state and it seems to be due to a highly excited state of Cd_2 molecule or Cd_2^+ molecule. J. C. L.

The effect of temperature on the molecular spectrum of mercury vapour. I. O. Masaki and H. Takeyama. *Hirosima Univ.*, **12**, 269–279 (1943).—Mercury vapour is examined at temp. from room temp. to 1,000°. At low temps. a number of narrow band spectra are newly observed over the range from the visible region to near ultraviolet one. At medium temp. a band having a structure appears in the visible region. This band disappears at higher temps., and a continuous band without any structure is observed at the long wave length part of $2^3S_1—2^3P_{0,1,2}$ lines. J. C. L.

The minute structure of the emission band of a crystalline phosphorescent body. I. Y. Utida and M. Ueda. *Bull. Inst. Phys. Chem. Research*, **22**, 577–582 (1943).—Part of the emission band of a phosphorescent body prepared by adding 1 mol equivalent of Mn to CaO is decomposed into several narrow bands by cooling. It is exptl. confirmed that it is due to the property to the phosphorescent body itself. Each group of these bands is arranged in two series with a definite wave number difference, 220 cm^{-1}. J. C. L.

Phosphorescence of zinc sulphide. I. Phosphorescent spectrum. Y. Uehara and H. Imai. *Tosiba Kenkyu Jiho*, **18**, 243–249 (1943).—Ten samples of zinc sulphide phosphorescent substance were heated for 15 min. at 1,100° and excited by ultraviolet rays of 3650 Å Hg; the spectra of the fluorescence and phosphorescence were taken with spectrograph. J. C. L.

Chemical luminescence of vegetable oil. Y. Tunoda. *Science*, **13**, 129 (1943).—When a vegetable oil is dried, faint chemical luminescence is sometimes observed. Such is the case with a drying oil. When Mg complex salt is added to heated vegetable oil, such luminescence is very marked. When 5 cc. of oil is treated with 2 mg. of the complex salt and heated, the oils of sojabean, cotton seed, and camellia seed show ruby crimson luminescence. Such luminescence is ascribed to the action of peroxides and the admixed complex salt. J. C. L.

Chemical studies on super high cycle electric discharge of flame type. II. S. Mizusima, Y. Morino, and Y. Mizusima. *J. Chem. Soc. Japan*, **63**, 1759–1761 (1942).—By rectifying of high voltage elect. source, elect. discharge of flame type started in carbon monoxide and carbonic anhydride and its spectrum is examined. In the present expt. many kinds of band spectra have been observed. The mech. of the emission of elect. discharge of flame type is in good agreement with the consideration from the molecular theory previously reported. The most important exptl. fact is that the C_2-Swan band is observed in the case of CO, and not in that of carbonic anhydride. From this fact and the energy relation of the reaction is derived the mech. of emission. J. C. L.

Measurement of the amount of X-rays by Röntgen film. M. Akiyama. *Bull. Electrotechn. Lab.*, 7, 110–114 (1943).—In the photographical measurement of X-rays it is necessary for the film to be more than about 0.6 in its degree of blackening. The nature of the rays should be exactly known and the treatment of the film be carefully made. Under these conditions, the amount of X-rays can be measured by comparison of the characteristic curves. J. C. L.

The X-rays fluorescent plate. II.—III. K. Nisikawa and A. Watanabe. *Simazu Review*, 4, 145–147, 148–151 (1943).—II. The colour tone of the luminescence of the fluorescent plate by selective adsorption of the wavelength of lead glass protective for X-rays and camera lens is studied by a spectrograph. The energy loss by transmission is minimum at 5500–5800 Å and it is clearly observed as the energy loss of the luminescence. III. The relation between the size of the crystal particle of a fluorescent substance of zinc sulphide—cadmium system and the blackening phenomenon: it is confirmed that the blackening of the fluorescent plate for indirect X-ray photograph differs according to the size of the crystal particles of the fluorescent substance and its degree of blackening when treated with oxidizing and reducing agents.

J. C. L.

3—ELECTROCHEMISTRY AND THERMOCHEMISTRY

On the cadmium standard cells. Y. Isibasi. *Researches of the Electrotech. Laboratory*, **459**, 1–69 (1943).—The exptl. study of the general characteristics of the cadmium standard cells contg. a neutral or acid electrolyte and of the satd. or unsatd. type is described. Theoretical considerations on the hysteresis and the polarization are also given. The mech. of the change of the mercurous sulphate during the long period is discussed and it is shown that the change of e.m.f. is principally due to the hydrolysis of the salt, not to the oxidation as indicated by W. C. Vosburgh and M. Eppley. The author concludes that the satd. Cd. standard cells with acid electrolyte of 0.05 N or neutral satd. standard cells contg. deuterium oxide prevent the hydrolysis of merc. sulphate and show excellent constancy. Author.

Dielectric loss by polar molecule. I. Measurement of the loss angle of liquid. S. Kubo. *Bull. C. S. J.*, 18, 190–193 (1943).—To discuss the dielect. loss from the theory of molecule, an apparatus to measure it by the method of change of reactance is devised. Its accuracy is less than 0.1×10^{-4}, and 0.1×10^{-4} in dilute soln. for $\tan \delta$ of a solid sample. J. C. L.

Debye's theory of liquid dielectrics. S. Kaneko. *Bull. Electrotechn. Lab.*, 7, 318–319 (1943).—According to Debye the potential energy of the liquid molecule is represented by $A \cos \theta$. The relation between the dielectrics and the temp. is here examined. The observed value does not agree with that calcd. from dielectric coeff. of a gas, and Debye's theory is consistent with thermodynamics. J. C. L.

Studies on hydrocarbon and its substitution products. VIII. The mixing ratio of the dielects. consts. of liquid dichloroethane and rotatory isomerides. K. Watanabe, S. Mizusima and Y. Masuko. *J. Chem. Soc. Japan*, 64, 962–966 (1943).—Using the apparatus of measuring dielect. const. with alternating current source, the dielect. const. of dichlorobenzene at −10, 10, 30 and 50° are found to be 12.83, 11.31, 10.08 and 9.04 resp. From these values the mean dipole moments are obtained and the mixing ratio of the trans form and the meso form is obtained which agrees well with that obtained by the intensity of the Raman rays.

J. C. L.

The dissociation constant of strong electrolytes. S. Kaneko. *Bull. Electrotechn. Lab.*, **7**, 266–269 (1943).—According to the theory of statistical kinetics, the dissocn. const. of an electrolyte can be obtained from the potential energy between ions, but in fact the potential energy is unknown. The formula expressing the relation between the potential energy and the dissocn. const. has been derived and dissocn. const. of halogen salt in vacuum calcd. The relation between the dissocn. const. in a soln. and temp. is also discussed.

J. C. L.

The Lindemann formula concerning melting. Electric conductivity of fused salt. VI. S. Sisido. *J. Chem. Soc. Japan*, **63**, 1738–1742 (1943).—With respect to KCl type crystal, from the thermal motion of ions and the force acting between the nearest ions, the Lindemann formula $\upsilon = \text{const.}\,[(Tm)/(MVm\ 2/3)]^{1/2}$ is derived. In the formula, υ denotes the vibration number of the atom, Tm the melting point, M the atomic weight, Vm and Vn the molecular volume at the melting point. The formula is based on the assumption that each ion is unable to make simple harmonious motion on account of a strong thermal motion of the surrounding ions.

J. C. L.

The equivalent conductivity of zinc sulphate. S. Kaneko and Y. Kubota. *Bull. Electrotechn. Lab.*, **7**, 241–242 (1943).—Supposing that there exists the Bjerrum ion pair in a soln., the disson. of zinc sulphate, a, is calcd., using the same disson. const. as in the case of activity coeff., and the limit of equivalent conductivity at a concn. of the soln. of 0, the formula of the equivalent conductivity Λ^* of free ion, and the equivalent conductivity Λ of zinc sulphate from $\Lambda = a\Lambda^*$ are measured, and satisfactory results are obtained.

J. C. L.

A study of the removal of zinc atoms in a zinc accumulator with radioactive zinc. N. Kameyama and N. Kobayasi. *Electro-chemistry*, **11**, 10–17 (1943).—To examine the removal of zinc atoms in elect. discharge or in the state of still standing, a terminal was made of a compd. of zinc with RaD and the transition of radioactivity observed by means of a Geiger-Müller counting tube. Zinc ions brought in by atom exchange or by electro-analysis migrate by diffusion or convection into another substance.

J. C. L.

The effect of the concentration of electrolytic solution on the discharge volume of the electrode of zinc cell. T. Tiku. *Electrochem.*, **11**, 17–20 (1943).—When elect. discharge is passed from the anode and cathode in various concns. of electrolytic soln., the volume of anode is increased with that of concn., while that of cathode is maxim. at the concn. 5.3 M.

J. C. L.

A suggestion for the measurement of the thickness of the galvanization layer. K. Takahasi. *Tosiba Kenkyu Jiho*, **18**, 149–162 (1943).—When the Cu electrode and the sample for galvanization with a potentiometer inserted between them are immersed in a copper sulphate soln., there occurs a substitution reaction between the plating caused by the partial cell formed and $Cu^{\cdot\cdot}$. The reaction can be measured from the change in potential difference with the time, which is used for the measurement of the thickness of the layer. The concn. and temp. of $CuSO_4$ soln. as the most important factors for this reaction are examined and the following eq. is proposed as the velocity eq.: $dm/Sd\theta = k'C^{1.6}$ [m denotes the amount of galvanization, S the galvanized surface area, C the concn. of $CuSO_4$ soln., θ the time for the decrease in elect. press., k′ const. of the substitution velocity $(=7.e^{-3.4}\times 10^3/T$; T is the absolute temp.)] Hence, the formula expressing the thickness is obtained: $d\delta/d\theta=0.98\,e^{-3.4}\times 10^3/T$ [δ=the thickness of galvanization layer; $\delta=m/(S.p)$; P=the density)] the density of galvanization layer being taken to be 7.14. The value obtained is in good agreement with that observed by means of a micrometer. J. C. L.

Analysis by faint photo-electric discharge. M. Muda. *Hidati Hyoron*, **26**, 137–141 (1943).—In the case of analysis by faint photoelect. discharge, there are formed basic salts as $2CuSO_4\cdot 5Cu(OH)_2$, $CuSO_4\cdot 3Cu(OH)_2$, $ZnSO_4\cdot 3Zn(OH)_2$ and hydroxides in concentrated and dilute soln. of $CuSO_4$ and $ZnSO_4$, colloids in H_2PtCl_6, $HAuCl_4$ and H_2PdCl_6 soln., and hydroxides in $NiSO_4$ and $MgSO_4$. From the results and mech. of elect. discharge it is concluded that the positive ion of the metal liberated by elect. discharge reacts secondarily to form hydroxides and basic salts. J. C. L.

The Ludwig-Soret effect of melted KNO_3—$AgNO_3$ system. K. Hirota, I. Matunaga and Y. Tanaka. *Bull. C. S. J.*, **64**, 811–816 (1943).—A mixture of KNO_3—$AgNO_3$ (100 : 3) held in a slender glass tube was heated in an elect. furnace at varying temps. for different hours, and the Ludwig-Soret effect was thus produced. After the contents were completely coagulated, the tube was cut into 4 pieces. The amount of $Ag^{\cdot}$ contd. in each being detd. and the ratio of thermal separation measured. Silver salt is condensed at the low temp. part except for short fusing time. At 400° in an average, with the temp. difference of 80°, 2–3 days later, the ratio was const. being about 1.30. The Soret const. obtained is 0.003. J. C. L.

Hydrosulphite. X. The reduction of acid sodium sulphate with zinc amalgam. H. Murooka. *Bull. Inst. Chem. Research.*, **22**, 164–169 (1943).—The velocity of $NaHSO_3$ formation in the reduction of $NaHSO_4$ with Zn amalgam becomes larger with reducing P_H and increasing $[H_2SO_3]$ or $[HSO_3']$ $[H^{\cdot}]$. The lower the concn. of Zn amalgam, the smaller the velocity; the velocity is directly proportional to the concn. of Zn on the surface of amalgam. J. C. L.

Elect. voltage of decomposition by fusion of magnesium chloride. III. T. Okuno, W. Sakai and T. Ōki. *J. Electrochem. Assoc. Japan*, **11**, 35–36 (1943).—The electromotive force of a reversible cell of fused $MgCl_2+CaCl_2$ system is measured by the compensation method. From the results obtained, the thermo-dynamical value of $MgCl_2$ in the salt mixture of the system is calcd., and the effect of $CaCl_2$ on the activity coeff. of $MgCl_2$ is considered, and it is assumed that the complex ion such as $MgCl_3'$ and $MgCl_4''$, is formed at low concn. of $CaCl_2$.

J. C. L.

Schmelzpunktsformel der Kohlenwasserstoffe. I. Mitteilung: Schmelzpunktsformel der n-Paraffine. S. Isikawa und T. Motoda. *Bull. Inst. Phys. Chem. Research*, **22**, 4, 360–366 (1943).—Als allgemeine Schmelzpunktsformel der *n*-Paraffine bekamen wir die folgende:

$$T=C-An^{1-x} \qquad \text{(I)}$$

In der Formel bedeutet T der Schmelzpunkt (°C), n die Kohlenstoffatomszahl im Molekül und C, A und x (x liegt zwiscnen 1 und 2) Konstante.

Der berechnete Wert von x aus dem Schmelzpunkt von $C_{15}H_{32}$, $C_{21}H_{44}$ und $C_{33}H_{68}$ ist 7/4. Dabei wird die Formel (I) wie folgt:

$$T=C-A/\sqrt[4]{n^3} \qquad \text{(II)}$$

Wenn man anstatt n die Molekularschmelzpunktszahl M. P. N. (Melting Point Number) d. i. die Summe der Atomschmelzpunktszahl m. p. n. (melting point number) der Kohlenstoffatome und der Wasserstoffatome im Molekül nimmt, stimmt die berechnete mit der gefundenen gut überein. Zum Beispiel wenn man als m. p. n. des Kohlenstoffatoms 0.5 und als m. p. n. des Wasserstoffatoms 1.0 rechnet, bekommt man folgende Schmelzpunktsformel für *n*-Paraffine, die im Molekül ungeradezahlige Kohlenstoffatome enthalten:

$$T = 151.7 - \frac{3232.2}{\sqrt[4]{(\mathrm{M.\,P.\,N.})^3}} \qquad \text{(III)}$$

Für die *n*-Paraffine mit gerader Zahl von Kohlenstoffatomen muss man folgende Zahl *G* zu M. P. N. in der Formel (III) hinzufügen;

$$G = 1.8 + 0.1 \times (6 - n) \qquad \text{(IV)}$$

Diese „ geradezahlige Korrektion " ist für höhere Kohlenwasserstoffe als $C_{18}H_{38}$ nicht nötig.
Authors.

Vapour pressure of molecular crystal. IV. Vapour press. of iodoform crystal and calculation of the heat of sublimation of a few molecular crystals. I. Nitta and S. Seki. *J. Chem. Soc. Japan*, **64**, 475–482 (1943).—The vapour press. in the solid phase of iodoform crystal is measured, and from the change in temp. are derived a few thermodynamical values, such as the heat of sublimation. The values observed and calcd. are compared with those of SnI_4, $PSBr_3$, $TiBr_4$ and I_2 crystals which belong to D–II type of 'Strukturbericht'. According to the approximate formulae of London and Slater-Kirkwood concerning the Van der Waals force between molecules, the reciprocal action among the elements in the chemical union to molecules or division into atoms is calcd.; the values obtained are larger by 10%. As for I_2 crystal, the 'Margenan' force and restitution are measured and examined.
J. C. L.

Thermal conductivity of highly polymerized substances. I.—II. N. Matano. *J. Ind. C. S. J.*, **46**, 124–129 (1943).—I. The method of measuring thermal conductivity: on both side of a disc of heat generating substance are laid a round film of the sample. Outside of it a heat absorbing substance is placed. II. Thermal conductivity of fibrous goods of about 50% filling (Cal./cm., sec. degree) is 0.0002 for protein fibre and 0.0003 for cellulose fibre.
J. C. L.

4—COLLOID CHEMISTRY AND SURFACE CHEMISTRY

Superheated sol of aluminium hydroxide. T. Katurai and T. Kita. *Sc. P.*, **40**, 68–71 (1942).—A highly stable sol is obtained from aluminium hydroxide contg. a small quantity of chlorine ion by heating at 190° under a certain press. for 1 hour. The stability seems unaffected by the chlorine. From the observation of its elect. cataphoresis by means of the U-tube it is found that the sol is a positive colloid, causing a mutual coagulation with a colloidal soln. of arsenic sulphide. The stability of the sol is hindered by freezing. When iron hydroxide is heated alone under pressure, no sol is formed in consequence of the coagulation. On the other hand, if it is heated with an equal amount of aluminium hydroxide, a stable red-brown sol is formed.
J. C. L.

Diffusion by heating and under pressure of Mn, Fe, Co and Cu hydroxides in the presence of aluminum hydroxide. T. Katurai. *Bull. C. S. J.*, **18**, 227–279 (1943).—When the samples in a quartz tube are heated at 190° for 1 hour in an autoclave, Mn, Fe, Co, Ni, Cu, Pb hydroxides tend to be desiccated and their precipitation volumes are reduced, but in the presence of Al hydroxide Ni and Pb hydroxides they remain unchanged. The colloidal solns. of Al–Co and Al–Cu hydroxides produce the Schlieren phenomenon.
J. C. L.

Irregular series of coagulation by the electrolyte of colloidal solution. VII.—VIII. N. Sata and S. Ito. *Bull. C.*

S. J., **18**, 131–133, 134–141 (1943).—VII. The adsorption of silver nitrate by sulphate ppts., as a method of explaining irregular series of coagulation of colloidal soln. of mercury sulphides by silver nitrate, the adsorption of silver nitrate by mercury and arsenic sulphides was measured. Comparison between the adsorption curves shows that the adsorption by arsenic sulphide is large in amount and that there occurs an exchange between arsenic ion and silver ion. The adsorption by mercury sulphide is the ordinary non-polar adsorption. VIII. Mech. of irregularity of coagulation and its characteristics. In many cases, the first coagulation occurs by an extremely low concn. of the electrolyte. As the coagulation value of polyvalent ion is small, the irregular series is caused by the electrolyte contg. a polyvalent ion. The first coagulation should occur under the condition of the transition to the second stable part with the increasing concn. of the electrolyte. As a probability of such a condition a coagulation only by neutralization of elect. charge and free from cohesion is considered. In the case of colloidal sulphides, the combination of silver nitrate and mercury sulphide can only present such a phenomenon. This characteristics is explained to have some relation to chemical properties, such as the specially high coagulation activity of silver ion in spite of being monovalent and of small solubility of silver nitrate. J. C. L.

Artificial aging of V_2O_5 colloidal solution. K. Sato. *Bull. C. S. J.*, **64**, 197–200 (1943).—V_2O_5 colloidal soln. is artificially aged by heating, and the change of density and 'Strömungsdoppel brechung' with the time is measured. From the results obtained the heat of activation is calcd. (above 6,000 cal.). It is assumed that aging is caused by the growth of V_2O_5 particles and the change of the particle to hydrophobe nature.

J. C. L.

Studies on organosols. I. Gold organosols obtained by a chemical method. I. Yamakita. *This Journal*, **17**, 66–84 (1943).

Colloid-chemical action of supersonic waves. VII. Oxidizing component of potassium iodide. N. Sata and K. Nakajima. *Bull. C. S. J.*, **18**, 220–222 (1943).—A trace of iodine in potassium iodide is examined under various conditions. The amount of iodine after the addition of an acid reaches maximum in 24 hours. The measurement of the iodine in potassium iodide by supersonic waves shows that when the intensity of supersonic waves becomes greater than a certain degree, the amount of iodine is decreased and it remarkably differs even for the same intensity. This suggests that the decompn. of potassium iodide by supersonic waves can not be ascribed to the action of hydrogen peroxide formed from the oxygen present in water. J. C. L.

Dehydration by electro-osmosis. S. Komagata. *J. Electrochem. Assoc. Japan*, **11**, 83–86 (1943).—The dehydration by electro-osmosis is effective for large capillarity of the substance to be dehydrated. The higher the boundary-elect. motive press. and the lower the conductivity of the soln., the more effective is the dehydration. J. C. L.

The desorption of H_2O molecules adsorbed on a platinum plate by slow electron impact. Y. Isikawa. *Proc. Imp. Acad.*, **19**, 380–384 (1943).

The determination of the thickness of an adsorbed molecular layer of water. Y. Isikawa. *Proc. Imp. Acad.*, **19**, 385–392 (1943).

Dielectric absorption of soluble resins and the theoretical consideration. R. Kawai. *Electricity*, **63**, 303–306 (1943).—With several kinds of soluble resins, each differing in the chemical structure of its polar part, the dipole moment and dielect. absorption were measured. It is concluded that the existence of a group of polar atoms capable of rotation is to be supposed and that if such a group can be regarded as the Debye dipole, the restriction of elasticity is to be observed as well as that of viscosity. J. C. L.

Selective adsorption of oleic acid in paraffin oil. III.—IV. T. Iguti. *J. Chem. Soc. Japan*, **64**, 747–749, 750–755 (1943).—III. Theoretical observation of the adsorption of oleic acid in the boundary of 2 liquid phases. For the formula of the adsorption velocity of oleic acid in the boundary of the 2 liquid phases of paraffin-oil soln.—pure water, $dn/dt=[A(N-n)/n]+Bn$ is proposed. Supposing that, once adsorbed in the boundary, the molecules are never desorbed, $Bn=0$. Being integrated, it becomes $t=(N/A)[\frac{1}{2}(n/N)^2+\frac{1}{3}(n/N)]$. Comparing this with the exptl. result, the coeff. A is detd. this theoretical curve is in good agreement with the exptl. curve and the above supposition is justified. IV. Adsorption of oleic acid by cellulose. With respect to selective adsorption by cellulose of oleic acid in paraffin oil soln., the amount of adsorption and the number of the molecules adsorbed were detd. The assumption is justified that the whole soln. remaining in the cellulose has the same concn. as the soln. after adsorption. J. C. L.

The life of bubbles of a liquid. II. The life of bubbles covered with monomolecular film of insoluble substance. J. Isemura. *J. Chem. Soc. Japan*, **64**, 1016–1023 (1943).—From the life of bubbles measured and the surface press.—area curve, the relation between the state of monomolecular film of insoluble substance and the life of the bubble is studied. In the substances producing condensed films or liquid expansion films and in those producing gas films or vapour expansion films, the stability (life)-area curves are markedly different from each other. In the former case the bubbles are not stable until the molecules are completely covered, while in the latter the surface press. is extremely low and the bubbles are stable in spite of incomplete covering. J. C. L.

The characteristics of dilatancy. K. Sato and B. Tamamusi. *J. Chem. Soc. Japan*, **64**, 341–348 (1943).—With respect to the dilatancy of soluble starch, F and the flow velocity (S) were measured and it was found that there holds the following relation between them: $S=(F)^n/\eta^*$, $[n<1]$. J. C. L.

Alumina gel catalyst. VI. S. Abe. *Sc. P.*, **40**, 331–332 (1943).—Alumina gel was pptd. from solns. of hydrophile colloids, such as agar agar, starch, and glue; the hydrophile colloid was washed away with warm weakly acidified water. The alumina gel thus treated is porous and very powerful as a catalyst for alcohol-dehydration. J. C. L.

Amorphous carbon. II.—III. H. Imada. *J. Electro-chem.*, **10**, 453–455, 455–458 (1942).—II. Activation of carbide and absorption of active carbon: based on the discussion in a previous report, carbide was immersed in 1*N* HCl for one night, washed, dried, powdered, sintered and heated at 100° for saturating overheated vapour. Then it was heated at 400° in reducing flame, kept at 3–8 mm Hg. for 2 hours and activated by cooling. Generally, vegetable carbon has good absorptive ability. III. Absorption of carbon tetrachloride with active carbon: provisional expts. are carried out concerning absorption equil. at 25° and under different press. J. C. L.

Acid clay. III. Clay treated with acid. K. Mitui and T. Iijima. *Naval Fuel Research*, **162**, 1–8 (1943).—The X-ray diffraction image and the heating and dehydration curve of acid clay are not changed by acid treatment. Fe and Al on its surface is dissolved and part of silicic acid remains on the surface as non crystalline silicic acid. The product of acid treatment is far more acidic. On the other hand, the dehydration of ethylalcohol with acid clay as a catalyst has no relation to the acidity. It is assumed that as the surface of the clay consists of alumina and silicic acid gel, the change in composition leads to that of catalytic activity. J. C. L.

Catalytic action of a cast metal. I.—II. H. Matumoto and T. Takei. *Electrochemistry*, **11**, 7–10 (1943).—I. The thermoanalytic catalytic action of acetylene : C_2H_2 is allowed to react on a sample of cast metal kept at a desired temp. and from the amount of carbon remaining in the sample is examined the catalytic activity. The results obtained are compared : Ni > stainless steel > Fe > Cu > brass > Zn ≥ Sn > Al (at about 600°). II. C_2H_2 heat decompn. of cast Ni and Ni-Fe alloy : in the case of plated Ni the decompn. velocity is higher than in electrolysed Ni. The thicker the layer the higher the velocity. J. C. L.

Studies on the iron catalyst used for the synthesis of petroleum by X-rays. I. S. Kodama and H. Tahara. *J. Ind. Chem. S. J.*, **45**, 1260–1263 (1942).—For investigating the nature of an iron catalyst and the decline in its activity, the change of the crystal state during the course of the synthesis reaction was studied by X-ray analysis. The original iron catalyst ($Fe+25\%\ Cu+2\%\ Mn+125\%$ diatom earth$+2\%\ K_2CO_3$) did not give any definite figure when examined by X-rays. When it was heated at 700°, it turned into $a-Fe_2O_3$. When it was reduced at 450° it lost its activity as $a-Fe$. Further, when it was oxidised at 250°, it changed to a crystal of spinel type, but it did not regain its activity. J. C. L.

Thermal analysis of the catalytic action of colloids. IV. Hydrogen-, oxygen-, and nitrogen- platinum sol. E. Suito. *This Journal*, **16**, 1–14 (1942).

On the poisoning of catalysts. I—II. S. Ono. *This Journal*, **17**, 115–138, 145–150 (1943).

Mixed catalysts. I.—II. S. Tanida. *Bull. C. S. J.*, **18**, 30–36, 36–44 (1943).—I. The promoting action of molybdenum and tungsten for a nickel catalysts : the change of the catalytic action for hydrogenation in the case of the addition of Mo or W to a nickel catalyst is examined from $C_6H_6+3H_2\rightarrow C_6H_{12}$. When 15 atoms of Mo or 5 atoms of W are added to 100 atoms of Ni, the catalytic activity is maxim. The relation between the constituent of the catalyst and the catalytic activity differs in the cases of Mo and W. The density of a catalyst with highest catalytic activity is highest. From this it is inferred that the promoting action of Mo and W is due to (a) the formation of a chemical compd., (b) the formation of solid solution and (c) a partial reduction of oxides of Mo and W. II. A study of the structures of Ni-Mo catalyst and Ni-W catalyst by X-rays. The catalysts in the preceding report are examined from their X-ray diffraction. In the case of the Ni-Mo catalyst the diffraction line gradually becomes dim with the increase of the amount of Mo, and the const. of the grating becomes larger till the ratio of the atoms is 100 : 15, and further increase in the amount of Mo gives the const. value. This suggests that when the const. of grating becomes larger, Mo forms a solid solution and when it shows const. Mo co-exists as a solvent, MoO_2. In the case of two Ni-W catalysts, (Ni atom : W atom, 100 : 5 and 100 : 10), the X-ray diffraction is essentially similar and it is much the same with that of pure Ni catalyst. In this case it is thought that W makes only the Ni-particles smaller. J. C. L.

Catalytic polimerization of olefine. I. Catalyst. M. Koizumi. *J. Chem. Soc. Japan*, **64**, 257–262 (1943).—Morikawa's view that, though reduced Ni can not be a catalyst for the polymerization of a lower hydro-carbon at room temp., it shows catalytic activity when attached to diatom earth, is exptl. examined and confirmed. Platinum black has not the catalytic activity, pure diatom earth has a little activity, and oxidized Ni with diatom earth has a higher activity than Ni with diatom earth. **II. Analysis of polymerides of propylene.** M. Koizumi, H. Nisimoto and K. Taga. *ibid.*, 64, 263–270 (1943).—It is confirmed that the catalytic activity of diatom earth with oxidized Ni for polymerization of propylene is far higher than that of diatom earth with Ni. The polymeride is a mixture of 2–5 molecular polymerides and the mixing ratio of these polymerides is almost similar. Hence, the reaction mechn. is considered to be essentially not different. J. C. L.

P_H of the catalysts used for the preparation of monovinyl-acetylene. R. Kitani and M. Sekido. *Tosiba Kenkyu Jiho*, 18, 1341–1346 (1943).—The measurements of P_H (<5) at 80° with electrodes made of three kinds of glass—the Mac Innes, the soda and the hard glass—were carried out, and it was found that the first two kinds give the value agreeing with the theoretical above P_H 2 and 3, and the third gives it below 2. The P_H of the catalytic soln. in question was measured and the relation between the concn. of HCl and P_H before and after the introduction of acetylene is made clear. J. C. L.

お 断 り

第11卷(昭和12年)以來編輯掲載してきたこの「我が國に於ける物理化學研究の抄錄」も時局に鑑み之を以て中止する事とします．本抄錄集は日本化學總覽に記載された物理化學關係の論文を基として各論文の著者より直接に抄錄(歐文)原稿を戴き，著者原稿を得られぬ場合は編輯員(主として戸川委員)が日本化學總覽の抄錄を英譯し中瀬古六郎博士の校閲を經て，それ等を適當に編輯して來たものであつて，日本化學總覽第17卷第12號(昭和18年)迄に掲載の論文を以て打切つてあります．中止するに當り各著者並びに日本化學總覽に感謝します． (編輯幹事)

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