S. Toshima (J. Electrochem. Soc. Japan, 37, No. 1, 1, 1969). Review: introduction, electrochemical measurements, interfacial properties on electrode, gas electrode reaction, electrode process concerning corrosion and batteries, electrode process of organic substances. One table, 7 figures and 104 references.

—T.L.R.

(B) ELECTRO-ORGANIC CHEMISTRY

1. **A. C. Polarographic behaviour of a mixture of reducible organic species in aqueous and methanolic medium—**

S. K. Sharma and M. K. Chatterjee (Chem. Age of India, **20,** 516, 1969). Simultaneous estimations of organic reducible species are possible at neutral or alkaline pH values within specified concentration ranges; p-nitrophenol, m-nitroanaline, benzaldehyde. Nine figures and 5 references.

2. **Electrochemical synthesis of pyrazines—**

S. H. Wilen and A. W. Levine (Chemistry and Industry, No. 8, 237, 1969). Electrolysis of ketones in aqueous ammoniacal solutions of potassium iodide produces pyrazines in low yield; 6 references.

3. **Effects of electrical discharges on the chloromonosilanes—**

J. E. Drake and N. P. C. Westwood (Chemistry and Industry, No. 1, 24, 1969). Investigation of the effect on halogenated silanes and germanes of an ozoniser-type silent electric discharge and formation of disilane, tri- and mono-silane derivatives.

4. **Some aspects of electro-reduction of quaternary ammonium salts in liquid ammonia solutions—**

J. T. Wrobel and A. R. Krawczyk (Chemistry and Industry, No. 20, 656, 1969). Measurement of cathode potentials during electrolysis; 7 references.

5. **Literature of industrial electrochemistry of non-metals and electro-organic chemistry—**

J. B. Haglind (Adv. Chem. Ser., No. 78, 24, 1968). Compilation of selected bibliography.

6. **Redox potential of the pyritinol—5'-thiopyridoxine system—**

R. Naumann (Z. Naturforsch A, **23,** No. 12, 2112, 1968). Eo of the system was found to be 0.08 volt, and the reduced form was generated first by cathodic reduction of some of the other.

7. **Electrode reactions of organic compounds—**

R. A. Marcus (Discuss. Faraday Soc., No. 45, 7, 1968). The theoretical basis for the division of reactions into weak-overlap electron transfers and very strong-overlap electron, atom, and proton transfers is given; 13 references.

8. **Anodic oxidations of aromatic amines III. Substituted anilines in aqueous media—**

J. Bacon and R. N. Adams (J. Amer. Chem. Soc., **90,** 6596, 1968). The anodic oxidation of a series of para-substituted anilines in aqueous media revealed a common pattern of para-group elimination and head-to-tail coupling to give 4'—substituted 4 aminodiphenylamines.

9. **Electrochemical reduction of aromatic carbonyl compounds by means of the rotating ring-disk electrode II. Cathodic reduction of benzaldehyde over a wide pH range—**

L. N. Nekrasov and A. D. Korsun (Elektrokhimiya, **4,** 996, 1968); Chem. Abs., **70,** 8387, 1969. The reduction over the pH range 0-13.5 was investigated polarographically by using a rotating ring-disk electrode made of amalgamated gold. Polarization curves were analyzed in order to study the complex formed during the reduction.

10. **Mechanism of anodic cyanation—**

L. Eberson and S. Nilsson (Discuss. Faraday Soc., No. 45, 242, 1968). The mechanism of the anodic cyanation of aromatic compounds was investigated by determining isomer distribution. The reaction has the general characteristics of an homogeneous electrophilic substitution process, being highly selective with regard to attack at the ring positions in monosubstituted aromatic substrates.

11. **Organic synthesis by electrolysis II. Anodic methoxylation of isocyanide—**

T. Shono and Y. Matsumura (J. Amer. Chem. Soc., **90,** 5937, 1968). The anodic methoxylation of cyclohexyl isocyanide was studied.

12. **Kolbe electrode process at the platinum anode in aqueous butyrate solution—**

K. Chida and T. Sekine (Denki Kagaku, **36,** 442, 1968); Chem. Abs., **70,** 16501, 1969. The mechanism of the anodic reaction on platinum electrode in butyrate solution was investigated

by measuring the current *vs.* anodic potential under controlled potential electrolysis. The main reaction was the Kolbe electrode reaction.

13. **Electrocatalysts for the direct electrochemical oxidation of n-octane in fuel cells—**

E. Cairns and J. Paynter (J. Electrochem. Soc., **115**, 1218, 1968). Some progress toward acceptably low loadings of high-activity platinum electrocatalysts for the direct anodic oxidation of liquid n-octane is described.

14. **Electrolytic reduction of pyridoxal oxime to pyridoxamine with controlled cathode potential—**

M. Matsumoto and M. Miyazaki (Yakugaku Zasshi, **88**, 1093, 1968); Chem. Abs., **70**, 16526, 1969. Controlled potential electrolysis was carried out at —10.8 and —1.4 volt *vs.* SCE. Pyridoxamine 2 HCl and 4-deoxypyridoxine HCl were formed, respectively in approximately quantitative yields.

15. **Electrochemical study of the behaviour of allyl alcohol on rhodium and palladium blacks—**

G. A. Bogdanovskii, Zh. I. Bobanova and A. V. Stal'bovskaya (Electrokhimiya, **4**, 1196, 1968); Chem. Abs., **70**, 16571, 1969. The potential-curves indicate the interaction of the alcohol with adsorbed hydrogen. The products of catalytic decomposition are propane, propylene and some methane.

16. **Electrochemical reduction of beta-diketones in dimethyl sulfoxide—**

R. C. Buchta and D. H. Evans (Anal. Chem., **40**, 2181, 1968). Reduction of 1, 3-diphenyl-1, 3-propanedione gave the enolate and the pinacol. A reaction scheme for the process is proposed.

17. **Electrochemical reactions I. Preparation of aromatic fluorocarbons from fluorocyclohexadienes—**

A. M. Doyle, A. E. Pedler and J. C. Tatlow (J. Chem. Soc., C. No. 22, 2740, 1968). Reaction products, polarographic data and reaction mechanism.

18. **Electrochemical preparations of metal alkyls—**

R. Galli (Chim. Ind., Milan, **50**, 977, 1968). Metal alkyls can be obtained from metals and electrochemically produced alkyl radicals *via* cathodic as well as anodic reactions. The important features of both processes are evaluated. The direct electrochemical reduction of alkyl halides to yield lead alkyls was investigated.

19. **Kinetic and mechanism studies of o-tolidine electro-oxidation using optically transparent electrodes—**

T. Kuwana and J. W. Strojek (Discuss. Faraday Soc., No. 45, 134, 1968). Spectral data show that the intermediate is a dimer. There are possibilities of evaluating fast kinetic rates of homogeneous reactions following charge transfer.

20. **Anodic reactions of aromatic compounds—**

K. Sasaki and W. J. Newby (J. Electroanal Chem. Interfacial Electrochem., **20**, 137-165, 1969). The anodic oxidation of aromatic compounds, substitution and addition reactions, electrolytic Kolbe reactions and related problems are reviewed; the half-wave potentials are tabulated, 128 references.

21. **Effect of organic compounds on anodic Oxoidation of methanol—**

S. Takahashi and Y. Miyake (Denki Kagaku, **36**, 605, 1968); Chem. Abs., **70**, 25075, 1969. The anodic oxidation current of methanol was decreased by the addition of organic compounds. The suppressing effect was attributed to the decrease of the effective area of electrode due to the adsorption of the additives.

22. **Cathodic reaction of dimethylcyanamide—**

S. Takenaka and T. Sekine (Denki Kagaku, **36**, 349, 1968); Chem. Abs., **70**, 25096, 1969. The electrolysis of Me_2NCN saturated with LiCl gave $C_3N_3(Me_2N)_3$ as a product of the cathodic reaction.

23. **Electrolytic hydrogenation of dimethylethynylcarbinol at a constant cathodic potential—**

M. A. Zhuk, I. N. Azerbaev and I. V. Kirilyus (Tr. Khim.—Met. Inst. Akad. Nauk Naz. SSR, 2, 146, 1968); Chem. Abs., **70**, 25163, 1969. Hydrogenation was carried out on a copper-silver electrode at constant potentials of 1.50, 1.55, 1.60 and 1.65 volt *vs.* SCE. The nickel anode was placed 0.5 cm. from the cathode. Selectivity for hydrogenation of triple bonds depends on the cathodic potential and gave a maximum 88 per cent at 1.55 volt.

24. **Study of electrochemical reduction of organic materials—**

L. L. Wikstrom (Proc. Ann. Power Sources Conf., 22, 89, 1968). The use of laboratory electrochemical data in the design of a battery

system is discussed, and emphasis is placed on the electrochemical reduction of organic cathode materials.

25. **Electrochemical synthesis of fluoro-organic compounds. I. Electrochemical fluorination of organic compounds in various types of electrolysis cells. II. Effect of anode material on electrochemical fluorination—**

V. ya. Kazabov and coworkers (Zh. Prikl. Khim., Leningrad, **41**, 2212, 2220, 1968); Chem. Abs., **70**, 25163, 25185, 1969. Report covering more than 500 reactions; spectroscopically pure nickel anode gave the best results.

26. **Organic synthesis by electrolysis. III. Anodic allylic substitution—**

T. Shono and T. Kosaka (Tetrahedron Lett., No. 59, 6207, 1968). Reaction conditions and yields are tabulated for a novel anodic allylic substitution reaction which may constitute a unique method of synthesis of allylic compounds from cyclic olefinic compounds.

27. **Catalytic and electrochemical reduction of nitromethane on ruthenium catalytic electrode—**

L. P. Mashkova, A. I. Pletyushkina and G. P. Khomchenko (Vestn. Mosk. Univ., Khim., **23**, No. 6, 104, 1968); Chem. Abs., **70**, 53399, 1969. Both reaction rates increased with temperatures.

28. **Electrochemistry of organophosphorus compounds—**

B. H. Campbell (1968, 149 pages); Diss. Abs., B, **29**, No. 5, 1578, 1968.

29. **Mechanism of the anodic methanol oxidation on platinum in sulphuric acid solutions—**

M. W. Breiter (Abh. Saechs. Akad. Wiss. Leipzig, Math. Naturwiss. Kl., **49**, No. 5, 221, 1968); Chem. Abs., 70, 63316, 1969. The nature of strongly bonded species was studied during the methanol oxidation in acidic solutions, by a combination of charging curves and gas chromatog. The mechanism is discussed for steady state and voltammetric conditions.

30. **Electrochemical fluorination of symmetrical dichloroethane—**

G. N. Kokhanov and T. M. Izmailova (Elektro-khimiya, 2, No. 10, 1204, 1966); Chem. Abs., **70**, 63443, 1969. The electrolysis was carried out with a nickel anode and German silver cathode. Substitution of both chlorine and hydrogen occurs. Fluorination takes place by adsorption of the substance on the anode and subsequent reaction with nickel fluoride or with discharging fluoride ions.

31. **Electrochemical reduction of m-dinitrobenzene in dimethyl sulfoxide—**

J. S. Dunning and N. D. Bennion (U.S. Clearinghouse Fed. Sci. Tech. Inform. AD-676318, 1968, 74 pages); Chem. Abs., **70**, 83560, 1969. The electrochemical reduction in the absence of a proton donor takes place in 2 steps, which correspond to the formation and reduction of the nitrobenzene radical anion. When a proton donor is added, a homogeneous reaction takes place in the solution near the electrode which results in an effective increase in the number of electrons to 4, corresponding to the reduction to nitrophenylhydroxylamine.

32. **Organic electrochemistry—Part 2. Anodic reactions of compounds other than carboxylic acids—**

K. M. Johnston (Education in Chemistry, **5**, No. 1, 15, 1968). Electrolysis of phenols, electrolytic coupling of reactive methylene compounds, acetoxylation—alkoxylation- alkylation and another anodic substitutions, anodic addition and polymerization, other anodic reactions, uses of anodic reactions; 27 references.

33. **Electrode reactions of organic compounds—**

(Discuss. Faraday Soc., No. 45, 1968, 281 pages).

34. **The electrolytic preparation of p-aminophenol—**

H. C. Rance and J. M. Coulson (Electrochim. Acta, **14**, 283, 1969). An account of new methods for the electrochemical preparation p-aminophenol by the reduction of nitrobenzene; improvement in efficiency by controlled electrode potential; effect of addition of redox compounds to the catholyte and elevation of tem perature; 7 figures and 14 references.

35. **Electrochemical oxidation of multicomponent hydrocarbon fuels. 1. Studies with n-octane based fuels containing aromatic, olefinic, and naphthenic components. 2. Long-term performance studies with n-octane based fuels containing aromatic, olefinic and naphthenic components—**

E. Luksha and E. Y. Weissman (J. Electrochem. Soc., **116**, 118, 1969); J. F. Lennon, E. Luksha and E. Y. Weissman (*ibid*, **116**, 122, 1969). One table, 7 figures and 8 references; 6 figures and 3 references.

36. **Studies of electro-oxidation of dextrose in neutral media—**

M. L. B. Rao and R. F. Drake (J. Electrochem. Soc., **116**, 334, 1969). The oxidation has been carried out on platinized platinum electrodes in phosphate buffer at pH 7.4. Rest potentials are interpreted as mixed potentials. Gluconic acid is observed as the reaction product and is found to inhibit oxidation of dextrose due to adsorption on the electrode surface. One table, 3 figures and 7 references.

37. **Anodic oxidation of cyclic hydrocarbons at full cell electrodes—**

M. L. Savitz and A. L. Hubbard (J. Electrochem. Soc., **116**, 714, 1969). The anodic oxidation of cyclohexane and benzene has been studied with potentiostatic-gas chromatographic techniques on commercially available fuel cell electrodes at 107°C. in 85 per cent phosphoric acid. The cathodic desorption products were identified and studied as a function of potential and reactant: methane, ethane, propane, n-butane, n-pentane, n-hexane, cyclohexane and benzene. Three tables, 5 figures and 19 references.

38. **Electrolytic reductive coupling 16. A study of 1,2-diactivated olefines. Part 1, voltammetry. 17. A study of 1,2-diactivated olefins. Part 2, macro-electrolyses—**

J. P. Petrovich, M. M. Baizer and M. R. Ort. (J. Electrochem. Soc., **116**, 743, 749, 1969). Six tables, 3 figures and 41 references; 2 tables and 33 references.

39. **Electrochemical cyanation of aromatic compounds—**

S. Andreades (U.S. Patent, 3,431,184; 1969); Chem. Abs., **70**, 92686, 1969. Mono- and dicyano carbocyclic aromatic and N heterocyclic aromatic compounds are produced by passing electricity through a solvent containing the title aromatic comopunds and a cyanide-containing compound at —50 to + 100° and an anode potential of 0.5—3.5 volts.

40. **Electrolytic production of organic isocyanates, urethanes, or ureas—**

E. T. Blues (Brit. Patent, 1,141,638; 1969); Chem. Abs., **70**, 92686, 1969. Organic isocyanates are produced by passing an electric current through an electrolytic cell containing Am OCN, an aromatic compound, with at least one hydrogen on the aromatic ring, and an olefin.

41. **Organic polarography—**

P. Federlin (Introd. Method. Electrochim., Rec. Trav. Sesss., 1,315, 1967); Chem. Abs., **70**, 102339, 1969. Review of recent advances.

42. **Anodic oxidation of cyclic hydrocarbons—**

M. L. Savitz and R. L. Carreras (Amer. Chem. Soc., Div. Fuel Chem., Preprints, **11**, No. 3, 143, 1967); Chem. Abs., **70**, 102,364, 1969. The adsorption and oxidation of cyclohexane and benzene on a smooth platinum electrode has been studied at 130° in 85 per cent phosphoric acid by using potentiostatic and galvanostatic pulse techniques.

43. **Kinetics of the electroreduction of phenyeglyoxalic acid—**

B. N. Afanas'ev (Electrokhimiya, **4**, No. 9, 1089, 1968); Chem. Abs., **70**, 102461, 1969. The effect of the ionic strength of a solution on the polarographic waves during electroreduction was studied.

44. **Electrochemical reduction of benzil in alkaline methanol-water solution—**

H. E. Stapelfeldt and S. P. Perone (Anal. Chem., **41**, No. 4, 623, 1969). Conventional dropping-mercury electrode polarography, stationary electrode polarography, cyclic voltammetry, and step functional controlled-potential electrolysis techniques were employed. At a pH equal to or greater than 11 the overall reduction process is a reversible, two-electron transfer involving a single proton.

45. **Adsorption and oxidation of ethane, n-butane and n-octane on platinum electrodes—**

G. Aronowitz ant R. J. Flannery (J. Electrochem. Soc., **116**, 938, 1969). Studies of the kinetics of anodic oxidation and of hydrogen codeposition indicate that the adsorbed species are similar for ethane and n-octane but differ for n-butane adsorption. Two tables, 14 figures and 10 references.

46. **Electron transfer as an elementary act of organic reactions—**

K. A. Bilevich and O. Yu. Okhlobystin (Russian Chem. Reviews, No. 12, 954-968, 1968). Review: introduction, formation of stable radical-ions, reactions of radical-ions, reactions which proceed through the intermediate formation of radical-ions; 3 tables and 242 references.

47. **Industrial organic electrochemistry—**

L. Eberson (SV. Kem. Tidskr. **80**, No. 12, 417, 1968); Chem. Abs., **70**, 111050, 1969. Special reference is made in this review to the cathodic hydrodimerization of acrylonitrile, synthesis of Pb Et, electrochemical fluorination

of organic compounds and electrochemical polymerization; 63 references.

48. Electrochemistry in N-methylpyrrolidinone I. General considerations. Range of electrolysis—

M. Breant and coworkers (Bull. Soc. Chim. Fr., No. 12, 1065, 1968). The electrochemical activity range of several electrolytes in this compound was measured with polished platinum, mercury, silver and platinized platinum electrodes. The obtained anodic and cathodic limits are given and compared with results obtained with several aprotic polar solvents.

49. Oxidation of carcinoganic azo dyes V. Oxidation of 4-(dimethylamine) azobenzene and some of its metabolites on a rotating platinum disk microelectrode—

M. Matrka, J. Marhold and Z. Sagner (Collect. Czech. Chem. Commun., **34**, No. 5, 1615, 1969). The tendency of some azo compounds to oxidation was studied in aqueous buffer solutions containing 50 per cent dioxane in the pH range 1-9. The half potentials for the studied compounds at 4 pH values are tabulated.

50. Hydrodimerization of acrylonitrile—

Z. Uchio and coworkers (Jap. Patent 69,02,451, 1969); Chem. Abs., **70**, 111177, 1969. Two diaphragms are inserted between the platinum cathode and palladium anode to form 3 compartments. The electrolysis was carried out at 0.2 amp/sq. cm. for 24 hours with 84—91 per cent current efficiency.

—T.L.R.

(*Continued from page* 188)

8. J. Janickis, D. Khingevicriute and A. Sulickas, Lietuvos TSR Mokslu Akad. Darbai Ser. B, No. 1, 121 (1966); Chem. Abs., 65, 19678 (1966).

9. B. Stulpinas, B. Girciene and O. Petroseviciute, Elektrokhim. Margantsa. Akad,. Nauk. Gruz. SSR 3, 399 (1967); Chem. Abs., 68, 26252 (1968).

10. E. W. Turns in: D. V. Subrahmanyam and T. L. Rama Char, J. Electrochem. Soc. India, 13, 35 (1964).

11. G. E. C. William ,B. Stephenson Jr., and E. R. Farmer, French Patent 1,358,807 (1964); Chem. Abs., 62, 7396 (1965).

12. W. H. Safranek, Plating, 53, 1211 (1966)