ABSTRACTS

1. **Is the lead-acid storage battery obsolete ? —**

P. Ruetschi (J. Electrochem. Soc, **108,** 297, 1961).

2. **Corrosion problems and their treatment 6. —**

(Corrosion Engineer, **3,** No. 2, iv, 1961). Buried structures — the new structure, the existing structure, coatings, cathodic protection.

3. **Passivity and corrosion resistance of titanium and its alloys —**

N. D. Tomashov et al (J. Electrochem. Soc. **108,** 113, 1961). A brief review is given of possible ways to increase corrosion resistance of titanium in acids proceeding from analysis of its electrochemical characteristics and passive state stability. It is established that the greatest increase of corrosion resistanceis obtained when the metal is alloyed with cathodic additions — as for instance palladium and other noble metals, capable of stiffening the corrosion potential of alloys in the noble direction ; and simultaneously by metals which increase the tendency of titanium to passivate or which diminish the degree of its thermodynamic stability — as is the case with chromium, molybdenum, zirconium and possibly tungsten. Eight figures on corrosion rate and polarization curves ; 27 references.

4. **The dissolution of metals in dioxan–water solutions of hydrochloric acid. (1) Aluminium, (2) Zinc—**

M. Allbutt and G. Tolley (J. Appl. Chem, **11,** 52, 1961).

5. **Effect of anions on the dissolution kinetics of metals —**

Ja. M. Kolotyrkin (J. Electrochem. Soc, **108,** 209, 1961). In acidic solutions chloride, bromide and iodide ions increase the true anodic dissolution rate of cadmium and of indium amalgam considerably. This is accounted for by the direct participation of these ions in elementary processes of ionizing metal atoms. Some concepts are developed about the mechanism of dissolution of metal with direct participation of the solution components. The mechanism of formation and development of pits on the surface of a corroded metal has been considered, zirconium dissolution in chloride, bromide and iodide solutions being an example.

6. **Anodic behaviour of austenitic stainless steels and susceptibility to stress corrosion cracking —**

S. Barnartt and D. Van Rooyen (J. Electrochem. Soc, **108,** 222, 1961). Potential-time, potential-current and potentiostatic current-time curves, for steels in 42 per cent magnesium chloride. The results are in agreement with the electrochemical mechanism of cracking.

7. **Effects of alternating current in causing corrosion —**

F. E. Kulman (Corrosion, **17,** 34, 1961). Historical review, rectified current as a factor in corrosion, composition and fluidity of the electrolyte, size of electrode and effect of current density, non-symmetrical electrodes, status of the problem - 1960 ; 21 references.

8. **Resistance of aluminium alloys to underground corrosion —**

D. O. Sprowls and M. E. Carlisle (Corrosion, **17,** 125t, 1961). Introduction, field tests, service experience, stray-current corrosion, galvanic corrosion, conclusions ; references and bibliography.

9. **Electrolytic manganese as galvanic anode in river and sea water. Comparison with zinc anode —**

S. Tajima et al (Corrosion Engineering, **8,** 415, 1959). In Japanese ; abstract in Corrosion, **17,** 67, 1961. Behaviour of electrolytic manganese 99.95 per cent as galvanic anode for mild steel sheets in river water of pH 6.6 and in artificial sea water was studied and comparison was anode with zinc anode 99.9964 per cent. Measurements were made of the corrosion rate and anode potential of manganese, and cathode potential of iron. Manganese galvanic anode had an over all better protective action on mild steel sheets in river water where perfect protection by zinc is difficult, but in sea water manganese suffered a corrosion approximately 15 times larger than that of zinc.

10. **Inhibition of corrosion of aluminium-nickel alloys in high - temperature water—**

(Atomic Energy of Canada Ltd, Brit. Pat. 847 981). Corrosion of an aluminium-nickel alloy, containing 0.05 — 5 per cent nickel, in water or in a dilute aqueous solution at 150-350°C, is

inhibited by adding silicic acid to the water in amounts ranging from 100 ppm to that amount which produces saturation at the operating temperature and gives the solution a pH of at least 5. The presence of the silicic acid results in the formation on the alloy of a thin durable corrosion-resistant film of complex aluminium silicate. This is particularly applicable to inhibiting the corrosion of aluminium-nickel fuel-rod sheaths in water-cooled nuclear reactors.

11. Corrosion problems in the railway industry—

T. H. Turner (Corrosion Prevention and Control, **8**, No. 3, 37, 1961). Introduction; railway civil engineering, mechanical engineering ships, testing of paint and corrosion, corrosion and climatic effects; 21 references.

12. Internal protection of pipelines —

C. L. Wilson (Corrosion Engineer, **3**, No. 3, i, 1961). Scope of the problem, need for protection, techniques, coatings, cathodic protection.

13. Corrosion problems and their treatment 7 —

(Corrosion Engineer, **3**, No. 3, iv, 1961). Structures in sea water - causes of corrosion, anti - corrosion techniques, the problems, practical aspects.

14. An investigation of the mechanism of the electrochemical corrosion of titanium II. Corrosion and passivation of titanium in hydrochloric acid in the presence of platinum, copper and iron ions —

N. D. Tomashov and R. M. Altovskii (Zhur. Fiz. Khim. **34**, 2268, 1960). The passivity of Ti in 15 per cent HCl in the presence of Pt^{4+}, Cu^{2+} and Fe^{3+} cations as chlorides is due to shift of the potential of the metal in the positive direction resulting from facilitation of the cathodic process.

15. Corrosion in the caustic soda industry

V. R. Pabbi (Chem. Age of India, **12**, 133, 1961). This paper outlines in general the problem of corrosion in the caustic soda plant of the D.C.M. Chemical Works, Delhi, under: electrochemical and chemical corrosion; protective methods — cathodic protection, coating, sinhibitors and materials of construction.

16. Inhibition of corrosion of commercial aluminium in hydrochloric acid solutions—

J. Sundararajan (J. Sci. and Ind. Res, **20D**, 137, 1961). The efficiency of inhibitors for the corrosion of 92 per cent aluminium in hydrochloric acid solutions has been found to decrease in the order: acridine (99 per cent), thiourea, nicotinic acid and dextrin (76 per cent) The dissolution of the metal is electrochemical in character. Polarization studies with thiourea show that anode polarization is negligible, whereas cathode polarization is considerable; the Tafel plot holds good. It is possible to obtain cathodic protection by impressing low currents. The corrosion process in the presence of thiourea appears to be essentially one of cathodic control. Nine figures and 27 references.

17. Critical pH and critical current density for passivity in metals —

H. H. Uhlig (J. Electrochem. Soc, **108**, 327, 1961). Based on electrochemical mechanism an equation is derived for the relation of pH to the critical current density necessary to passivate metals. Calculated and observed values for the critical pH of 14 per cent chromium-iron alloy are in reasonable agreement.

18. Selection of non-ferrous metals to resist corrosion

C. D. Campbell (Australian Corrosion Engineering, **4**, No. 3, 9, 1960). This paper lists some of the factors to be considered in the selection of non-ferrous metals to resist corrosion and surveys the characteristics and uses of some of the commercial alloys based on copper, aluminium and nickel. Brief reference is also made to the newer and more expensive metals. 45 references.

19. Evalution of electrodeposited coatings

L. F. Spencer (Metal Finishing, **59**, No. 2, 38, 1961). Introduction, thickness, uniformity, porosity test, comparison studies, physical testing, visual inspection; 78 references.

20. Science for electroplaters 63, 64. nickel plating

L. Serota (Metal Finishing, **59**, No. 2, 61; No. 3, 66; No. 4, 64, 1961).

21. Measurement of the thickness of electroplates by electrolytic stripping method: stripping solutions for silver over copper, brass, mild steel & nickel

P. B. Mathur and N. Karuppanan (Plating, **48,** 170, 1961). Thickness tests are described and stripping solutions reported—KF for copper and brass, and $NaNO_3$ plus HNO_3 for mild steel and nickel. 9 tables.

22. Plating—a vital part of aircraft engine overhaul—

E. A. Blount (Products Finishing, **25,** No. 5, 42, 1961). Introduction, preplating inspection, stripping methods, plating processes — silver, lead—tin, lead and indium, hard chromium, copper, cadmium, tin, analysis and control, water and waste treatment.

23. Improve your phosphate coatings—

(Products Finishing, **25,** No. 5, 78, 1961). Report of a panel discussion on common difficulties in phosphatizing, and ways to improve results. Includes trouble shooting table.

24. Automation in electroplating—

F. Lohrie (Elektro—Anzeiger, **13,** 454, 1960). Automation of copper, nickel and chromium electroplating in terms of operation sequence, working and transformation methods and design of baths. Economic considerations.

25. A survey of progress in the electrodeposition of precious metals—

W. T. Lee (Metal Finishing J, **7,** No. 74, 63, 1961). Platinum, palladium, rhodium, silver, gold, decorative and industrial, 24C and gold—alloy plating; equipment, vat and barrel plating, filtration; 17 references.

26. Cleaning of surfaces—

E. E. Bishop (Metal Industry, **98,** 127, 1961). Introduction, choice of system, solvent degreasing, alkali cleaning, acid pickling, ultrasonic cleaning.

27. Nickel-cobalt alloy plating from the sulphamate bath—

S. Venkatachalam and T.L. Rama Char (J. Sci. and Ind. Res, **20D,** 127, 1961). Nickel has been codeposited with cobalt from the sulphamate bath. Studies on alloy composition, cathode efficiency and potential have established the conditions for obtaining satisfactory alloy plates containing 9·69 per cent nickel. One table showing effect of variables.

28. Recent developments in the electrodeposition of zinc and cadmium—

T.E. Such (Electroplating and Metal Finishing, **14,** 79, 115, 1961). Introduction; zinc plating—cyanide, acid, chloride, pyrophosphate and fluoborate solutions; tin-zinc alloy plating, Post plating treatments for zinc; cadmium plating—cyanide, fluoborate, sulphate and sulphamate, post plating treatments; tin-cadmium plating; hydrogen embrittlement. 24 references.

29. Effluent treatment for the small plater—

J. Lakin (Electroplating and Metal Finishing, **14,** 89 1961). Batch treatment processes, continuous flow plants, non-ferrous pickling effluents, mixed chromates and cyanides, treatment under difficulties.

30. A survey of recent developments in chromium plating—

S. W. Baier (Metal Finishing J, **7,** No. 75, 89, 1961). Plating solutions, plating conditions, porosity and cracking, improved decorative plate overlays, heavy or hard chromium, plating on steel and cast iron, heavy chromium plating on aluminium, barrel plating, spray suppressing agents, chromium alloy plating; 18 references.

31. Metal finishing technology—A students' guide: 7—

A. Alexander (Metal Finishing J, **7,** No. 75, 97, 1961). Calculation of potential difference at a metal-solution juncture.

32. Throwing power of lead nitrate bath for the anodic deposition of lead dioxide—

K. C. Narasimham, S. Sundararajan and H. V. K. Udupa (Current Science, **30,** 139, 1961). For a linear ratio in the range 2 to 11, the throwing power as per Field formula has been found to vary from −3·2 through +0·6 to −0·45.

33. Complexometric method for determining thickness of chromium plate on steel—

M. R. Varma, K. C. Agarwal and J. S. Bahl (Electroplating and Metal Finishing, **14,** 119, 1961). Introduction, complexometric behaviour, calibration curves of chromium, iron and chromium-iron and EDTA solutions, determination of chromium from optical density, stripping chromium and calculation of thickness. One figure, 2 tables and 17 references.

34. The effects of some addition agents in bright nickel plating—

T. Shimuzu and K. Azada (Electroplating and Metal Finishing **14**, 126, 1961). It is shown that 2-butyne-1, 4-diol and other compounds with triple bonds produce very bright nickel deposits from the Watts bath, and exhibit excellent levelling action in the presence of saccharin or naphthalene sodium sulphonate. Gelatin, ethyl cyanhydrin and butyne diol alone produce a tensile stress in deposits while saccharin and sulphonate produce a compressive stress. Mixtures of these two groups of addition agents promote a lower residual stress in the deposit.

35. **Sealing of anodic coatings of aluminium—**

B. A. Shenoi, (Miss) K. Vijayalaksmi and (Miss) K. S. Indira (Electroplating, India, **3**, No. 1, 7, 1961). Review with 51 references.

36. **Plating anodes, Part 2—**

D. J. Fishlock (Electroplating, India, **3**, No. 1, 14, 1961). Chromium plating anodes; miscellaneous inert anodes; insoluble anodes for nickel; contoured, auxiliary and bipolar anodes; 9 references.

37. **Waste disposal for metal finishing industries—**

I. L. Newell (Plating, **48**, 373, 1961). Introduction, industrial wastes, standards of purity, waste survey, internal control, treatment — plant design and methods, metal recovery by ion exchange, destructive methods of treatment, lagoons, batch and flow thru type treatment plants.

38. **A new cobalt-nickel sulphamate bath—**

I. Tsu (Plating, **48**, 379, 1961). A sulphamate bath for electroplating cobalt-nickel films having a wide range of magnetic properties is described. It consists of cobalt chloride (or sulphamate) and nickel sulphamate (or chloride) and is operated at pH 6·5-6·8, room temperature and 1·7 volts, with 100 per cent cathode efficiency at 4·5 asf.

39. **The porosity of electrodeposits — causes, classification and assessment —**

A. Kutzelnigg (Plating, **48**, 383, 1961). Introduction, cavities in electrodeposits, causes of porosity, inclusions, porosity and thickness, assessment; 31 references.

40. **Microhardness of silver deposits — modified plating baths —**

S. Ramachandran and N. V. Parthasarady (Metal Finishing, **59**, No. 4, 40, 1961). Hardness and other properties; difficulties in measuring microhardness; experimental—testing of deposits from a cyanide-nitrate bath; results and discussion; 16 references.

41. **Rotating cathode for the reduction of nitrobenzene to hydrazobenzene —**

K. S. Udupa, G. S. Subramanian and H. V. K. Udupa (J. Electrochem. Soc., **108**, 373, 1961). The use of a rotating cathode in the reduction of nitrobenzene suspended in alkaline medium is described. Almost quantitative yields of the reduction product were obtained at current densities of 15-30 amp/sq.dm. Cathode potential data have been obtain to explain some of the results. Four figures, 6 tables and 10 references.

42. **A new acid alumina process —**

T. R. Scott (Research, **14**, 50, 1961). This report describes a new combination of techniques, using high temperatures which overcomes most of the problems of earlier acid processes for recovering alumina from bauxite and other raw materials. This method is potentially capable of producing pure alumina at no greater cost than the Bayer process and from a much greater variety of source materials.

43. **Beryllium —**

M. K. McQuillan and T. W. Farthing (Endeavour, **20**, No. 77, 11, 1961). Beryllium in nuclear engineering, properties, processing, toxicity, research, future.

44. **The contribution of metallurgy to electric power generation —**

L. Rotherham (J. Iron and Steel Inst., **197**, pt 2, 109, 1961). The electric power industry, nuclear energy, changing design pattern, material requirements, future needs.

45. **Contribution to the theory of the electrolytic production of aluminium —**

R. Piontelli (Metallurgia Ital, **52**, 469, 1960). Phenomena of overvoltage, anodic effect and concentration polarization discussed in relation to laboratory experiments and basic laws governing operation of cell for production of aluminium.

46. **Electrowinning of maganese —**

G. Scacciati (Metallurgia Ital, **52**, 551, 1960). Electrochemical and technological problems and operating conditions imposed thereby; types of electrolytic cells in use; characteristics of metal produced; power consumption; 21 references.

47. **Mechanical polishing of precious metals —**

W. Burkart, H. Silman and C. R. Draper (Electroplating and Metal Finishing, **14,** 85, 1961). Gold, rolled gold, silverware, platinium; stains, spotting, clouding, barrel polishing.

48. Electrowinning of copper from cuprous chloride —

(Late) G. C. Mitter et al (J. Sci. and Ind. Res., **20D,** 114, 1961). The results of laboratory and semi-pilot scale experiments on the electrowinning of copper from cuprous chloride electrolyte are presented. Smooth deposits of 99.9 + per cent purity copper could be obtained at 28-30°C and 1.45 amp/dm². The possibilities of simultaneous recovery of copper and sulphur from copper pyrites ore, as a cyclic operation, are indicated.

49. Properties of the new cobalt-base alloy UMCo50 —

L. Habraken and D. Coutsouradis (Cobalt, No. 10, 3, 1961). Structure and properties of Co-Cr-Fe alloys, effect of addition elements and heat treatment, the low carbon alloy, summary and conclusions; 13 references.

50. Production and utilization of cobalt powders—

E. De Bie and P. Doyen (Cobalt, No. 10, 22, 1961). Review with 16 references.

51. Aluminium and its alloys in 1960—

E. Elliott (Metallurgia, **63,** 65, 105, 1961). Report on research and technical progress in the various aspects of the metallurgy of aluminium and its alloys: extraction, founding, fabrication, constitution, properties and standardisation; joining, properties, corrosion and protection, applications, standards; 232 references.

52. Materials of construction for chemical plant, Aluminium—

J. C. Bailey (Chem. and Process Eng, **42,** 137. 1961). This article discusses the use of aluminium and its alloys as materials of construction for chemical plant. Economic considerations make the metal quite attractive to the plant designer.

53. The prevention of silver tarnishing—

H. W. Dettner (Plating, **48,** 285, 1961). The problem; earlier proposals; new developments —electrodeposition of oxides of aluminium and beryllium from sulphate solutions; further improvements—chromate passivation, 11 references.

54. Trends of development in blast furnace technique—

N. I. Krasavtsev (Chem. Age of India, **12,** 167, 1961). A brief review with reference to the U.S.S.R.

55. Aluminium and its alloys in chemical engineering—

E. Elliott (Australian Corrosion Engineering, **4,** No. 2, 23, 1960). Properties of the metal and its alloys, stronger alloys, aluminium castings, super-purity aluminium, 'sap', cladding developments, new joining methods, protective finishes, chemical works structures.

56. Polarography—

G. C. Barker and G. W. C. Milner (Endeavour, **20,** No. 77, 26, 1961). Introduction, technique, production and interpretation of polarograms, supporting electrolyte, kinetic and catalytic currents, applications of conventional polarography, metallurgical and inorganic analysis, organic analysis, gas analysis use in titrations, derivative polarography, A. C. polarography, oscillographic polarography; 10 references.

57. Analytical chemistry of beryllium—

L. E. Smythe and R. N. Whittem (The Analyst, **86,** 83, 1961). A review with 159 references: introduction, materials requiring chemical analysis, general chemical and radiochemical methods, spectrometric methods.

58. Science and electrode processes—

S. Schuldiner (J. Electrochem. Soc., **108,** 29C, 1961). Second William Blum lecture of the Electrochemical Society.

59. Characteristic functions and parameters in the theory of hydrogen overpotential. 1. Theoretical—

G. W. Castellan (J. Electrochem. Soc., **108,** 277, 1961).

60. Some problems of electrochemistry in printed circuitry—

C. G. Subramanyan, R. Raman and R. Ramachandran (Electrotechnology, **4,** 283, 1961). Introduction, fully plated circuits, electrolytic production of copper foils, chemical deposition of metal foils, electrolytic etching, plating for special purposes, plating through holes, silver migration; 13 references.

61. Electrochemical aspects of plasmas—

G. G. Mannella (Battelle Tech. Review, **10,** No. 3, 3, 1961). Discussion of the nature and potentialities of plasmas, particularly in the fields of chemistry and chemical research. Historical aspects, present concept, formation and application, early studies in the arc, plasma as an electrochemical reactor and as a research tool.

— T. L. R.