ABSTRACTS

(A) General

1. Electrode kinetics and fuel cells—

L. G. Austin (Proc. Inst. Elect. Electronics Engrs., U. S. A., **51**, 820, 1963). A presentation of some of those aspects of electrode kinetics which would be of use to scientists and engineers working on fuel cells.

2. Economic limits of a fuel cell technology —

J. I. Slaughter and J. J. Gilvarry (Electrochem. Tech., **2**, 249, 1964). Introduction, present situation, supply and demand of platinum and nickel, U. S. and world power demand, probable role of the fuel cell as an energy source, conclusions. Five tables, 2 figures and 15 references.

3. Polarization studies on corrosion and inhibition—

V. S. Agarwala and K. C. Tripathi (Trans. Indian Inst., Metals, **17**, 139, 1964). An investigation into the action of thiourea and its substituted compounds as inhibitors of corrosion of mild steel in hydrochloric acid, and discussion of the mechanism of inhibition. One table, 5 figures and 15 references.

4. The economics of ships cathodic protection—

J. H. Morgan (Corrosion Technology, **11**, No. 11, 53, 1964). Introduction, sacrificial anodes, impressed current, cathodic protection and paint, efficiency and costs of systems, fringe benefits, success of impressed current system.

5. The protection of cadmium against attack by organic vapours—

P. Walker (Corrosion Technology, **11**, No.11, 63, 1964). The possibility of using protective coatings on cadmium plate, to prevent or minimize corrosion due to hostile organic vapours, has been examined. Attack by vapours of acetic, formic, butryric and propionic acids and formaldehyde on cadmium can be eliminated in many cases by the application of a chlorinated-rubber lacquer to the metal. A pre-treatment primer of the two-peak etch-primer type is considered essential for good protection. The protection provided by 9 coatings over three pre-treatments is described in detail. Six tables, 3 figures and 8 references.

6. The modern corrosion section in the chemical industry—

A.S. Snider (Australasian Corrosion Engineering, **8**, No. 11, 9, 1964). This paper defines what a corrosion section is, what it does, and how it fits into the chemical industry of today.

7. Corrosion testing in a high temperature abrasive environment—

R. G. Hanna and J. B. Lean (Australasian Corrosion Engineering, **8**, No. 11, 21, 1964). Considerable reduction of wear on surfaces exposed to impact loads of hard and abrasive materials at high temperatures in corrosive atmospheres can be obtained by hard surfacing.

8. Corrosive applications in coal-chemical plants

R. R. Christian (Chem. Engg. Progress, **60**, No. 10, 93, 1964). Data showing how steel products are being used to combat corrosion associated with organic and inorganic process operations, cooling water, steam generating facilities, and the atmosphere. One table, 12 figures and 5 references.

9. Discussion of potentiostatic methods for evaluation of inhibitors —

R.D. Weed (Corrosion, **20**, 321t, 1964). Passivation theory, theory and design of the classical potentiostat, inhibitor evaluation method, test cell and circuit modifications. Eleven figures and 37 references.

10. Corrosion-inhibitive paints—

A. T. S. Rudram and L. M. Warner (Met. Reviews, **9**, No. 34, 179-200, 1964).

Review: Introduction, lead pigments, chromate pigments, pre-treatment primers, zinc-metal powder in paints, aluminium-pigmented protective paints, miscellaneous; 144 references.

11. Corrosion resistant coatings—

P. F. Bruins (The Chemical Engineer, No. 183, CE 268, 1964). This paper discusses the protection of metals against corrosion and the prevention of contamination of products by the application of polymeric organic coatings of a wide variety: preparation of surface, coating techniques, materials and their performance and economics.

12. Special stainless steels—

L. R. Scharfstein (Chem. Engg. Progress, **60**, No. 11, 90, 1964). Type 304 and 406, and alloy 20-Cb are 3 stainless steels that are tailored for special corrosion resistance.

13. A paint-evaluation test programme—

H. Y. Allgood and coworkers (Chem. Engg., **71**, No. 24, 158, 1964). Designed for evaluating paints in the corrosive atmosphere of a fertilizer plant, this testing programme should prove useful for almost any severe industrial environment.

14. Corrosion and protection of aluminium alloys underground—

H. S. Campbell (J. Inst. Metals, **93**, 97, 1964-65). A practical survey of the performance of 4 wrought and 4 cast alloys in 6 different types of soil.

15. Economic aspects of corrosion prevention in refineries—

P. W. Sherwood (Corrosion Anti-corrosion, **12**, No. 5, 227, 1964). The costs involved in the installation and the running of a corrosion protection system-cathodic protection, protection with coatings or a combination of both —are discussed with particular reference to underground structures.

16. Recovery and re-use of chromates in cooling tower discharge—

J. C. Hesler and A. W. Oberhofer (Materials Protection, **3**, No. 12, 8, 1964). Method for recovery of chromate ion from cooling tower blowdown wastes by simple anion exchange is discussed. The process results in selective and substantially complete recovery, and extends the application of chromate based inhibitors to areas where anti-pollution regulations otherwise prohibit their use. Three tables, 5 figures and 9 references.

17. Tri-n-butylamine as n inhibitor for the corrosion of an Al-alloy in HCl—

V. K. V. Unni and T. L. Rama Char (Corrosion Science, **4**, 453, 1964). The inhibition of the corrosion of aluminium-manganese alloy in hydrochloric acid solutions by tri-n-butylamine has been studied. The efficiency of this amine is 80-95 per cent. Polarization data indicate that the corrosion process is predominantly under cathodic control. Three tables giving inhibitor efficiencies, anode weight loss, cathode polarization and Tafel parameters.

18. Studies on vapour phase inhibition: Part II—Further tests with m-dinitrobenzene, beta-naphthol and ammonium stearate—

N. Subramanyan, G. Ramaseshan and K. S. Rajagopalan (Indian J. Tech., **2**, 402, 1964). It has been found that m-dinitro-benzene is more effective than beta-naphthol under severe exposure conditions. Four tables giving inhibitor performance; 6 references.

19. Corrosion of machinery items inside weaving sheds and preventive measures—

P. L. Annamalai and K. S. Rajagopalan (Indian J. Tech., **2**, 405, 1964). Under the conditions prevailing inside weaving sheds, coatings of cadmium have longer life and are more economical than zinc or tin coatings.

20. Di-n-butylamine as in inhibitor for the corrosion of aluminium alloy in hydrochloric acid solutions—

V. K. V. Unni and T. L. Rama Char (Corrosion Prevention and Control, **12**, 17, 1965). Di-n-butylamine is a satisfactory inhibitor for the corrosion of aluminium-manganese alloy in hydrochloric acid, and the process appears to be under cathodic control. Two tables on inhibitor efficiencies, anode weight loss and cathode polarization.

21. Corrosion inhibitors IV. Investigations into the suppression of the dissolution of aluminium by organic substances in acid and alkaline solution—

L. Horner et al (Werkstoffe u. Korrosion, **16**, 36, 1965). Onium salts or potential onium salts are effective inhibitors for aluminium in hydrochloric acid. In the alkaline medium the protective effect is less marked.

22. Corrosion surveying and evaluation—

C. L. Wilson (Corrosion Technology, **12**, No. 1, 7, 1965). This is the third in a series of articles addressed to management by a corrosion consultant, dealing with the economic,

educational and organizational aspects of anti-corrosion work. It discusses protection of structures — exposed to the weather, in confined spaces, buried, submerged and those holding electrolytes.

23. **The economics of corrosion control by protective coatings**—

A. R. Charlton (Corrosion Technology, **12,** No. 1, 11, 1965). Calculations of costs for surface preparation, coating application, inspection, maintenance.

24. **Titanium: its corrosion behaviour and passivation**—

E. E. Millaway (Materials Protection, **4,** No. 1, 16, 1965). Brief review of data on corrosion resistance of tatanium; applications for process industries; passivation. Two figures, 3 tables and 22 references.

25. **Beryllium corrosion and how to prevent it**—

A. J. Stonehouse and W. W. Beaver (Materials Protection, **4,** No. 1, 24, 1965). Types of beryllium corrosion, minimizing corrosion of unprotected beryllium, protection with anodizing coatings, other protective systems. Five figures and 27 references.

26. **Evaluation of corrosion data for the oil and chemical industries**—

G. A. Nelson (Materials Protection, 4, No. 1, 36, 1965). Significance of corrosion rates, need for corrosion information, form of survey, symbols for corrosion rates, additional factors influencing corrosion rates, selection of materials for ratings, selection of corrosive environments, illustration of chart method, sources of information; 3 figures.

27. **Anodic protection for a titanium heat exchanger**—

P. E. Morgan and L. S. Evans (Materials Protection, **4,** No. 1, 60, 1965). Only short service life was achieved by the application of anodic protection to a titanium heat exchanger in viscose rayon factory where processing liquors are hot solutions of sulphuric acids usually containing hydrogen sulphide and carbon disulphide.

28. **Glossary of terms used in maintenance painting**—

(Materials Protection, 4, No. 1, 79, 1965). NACE Technical Committee Report.

29. **NACE Glossary of corrosion terms**—

(Materials Protection, **4,** No. 1, 79, 1965).

30. **Recent advances in cathodic protection in CEGB installations**—

W. Matthewman (The Metallurgist, **3,** 162, 1965). Introduction, anodes, control equipment, criteria of performance; 11 references.

31. **Chemistry in thin-film electronics — 1, 2**—

K. E. G. Pitt (J. Royal Inst, Chemistry, **88,** 381, 414, 1964). Introduction, thin-film circuits, conductive thin films, resistive films—chromium, nichrome, titanium, cermets; thin-film capacitors, substrates, film definition, inter-connexious and active devices, conclusion. Figures, references and bibilography.

32. **Aluminium in electronics**—

(The Aluminium Courier, No. 68, 16, 1964). Brief review of the utility of aluminium in the field of electronics.

33. **Developing a new alloy**—

R. B. Leonard (Chem. Engg., **71,** No. 22, 150, 1964). Potentiostatic studies were employed in developing a new alloy for use in sulphuric acid. Here is a description of both the method and the new alloy G. Polarization curves, penetration rates and tensile data for Hastelloy Alloy G.

34. **Aluminium in small craft**—

(The Aluminium Courier, No. 68, 4, 1964). Introduction, marine alloys, construction, spares and fittings, power units, future development.

35. **The platinum metals in fuel cells** —

(Platinum Metals Review, **9,** No. 1, 14, 1965). Economic factors in the choice of electrocatalysts.

36. **Electrolytic production of pure zinc**—

(German Patent 1, 173, 669; 1961); abstract in Zinc Abstracts, **22,** 426, 1964. Zinc of 99.999 per cent purity and containing less than 0.0005 per cent lead is produced by the electrolysis of zinc sulphate at 200-250 amp/sq.m. and 35°C with solutions containing 250-280 g/l sulphuric acid and 1-5 g/l divalent manganese. The anode is of lead or lead alloy and is used in conjunction with a vinyl resin diaphragm which is rendered impermeable by deposited manganese dioxide. The cathode

may be made of an aluminium-manganese alloy.

37. **Exceptional metals—**

(Materials Protection, **4**, No. 1, 7, 1965). Staff feature about some of the new processes and applications of metals with exceptional corrosion resistance: cobalt, gold and silver, boron fibres and epoxy, columbium alloy products, zirconium diboride, magnesium-lithium alloy, molybdenum, titanium. References, special articles and books.

38. **Influence of cavitation on metal surfaces —**

A Grossmann and H. V. Loewis (Z. Physik. Chem., **225**, No. 3/4, 133, 1964). A study was made of the cavitation occurring on the surface of zinc, aluminium and its alloys, and copper. The cavitation was produced by passing steam into water in which specimens of the metals were arranged.

39. **Industrial applications of high frequency induction heating—**

M. Banerjee (Indian and Eastern Engineer, **106**, 669, 1964). Article discusses the advantages of induction heating, and other aspects including heat generators, power requirements and methods of induction hardening.

40. **Coppers —**

(Materials in Design Engg., **60**, No. 7, 115, 1964). This manual gives complete details on copper — types and forms, important properties, and processing and fabrication characteristics.

41. **Electrical engineering in process plant —**

G. W. Spall (Chem. & Process Engg., **45**, 457, 1964). The present-day approach to electrical engineering in process plants is discussed under: plant supply and distribution, transformers, motors, variable speed drives, motor starters, semi-conductors, cables, earthing and a survey of electrical safety standards for hazardous installations.

42. **Radioisotope — fueled thermoelectric generators—**

W. E. Kortier and M. Pobereskin (Battelle Tech. Review, **13**, No. 12, 3, 1964). The need for dependable, unattended sources of power is being filled increasingly by radioisotope — fueled thermoelectric generators. Here is a discussion of problems involved in their design and some steps being taken for improving such devices.

43. **The place of radiation in production of chemicals—**

J. F. Kircher and D. A. Jeffrey (Battelle Tech. Review, **14**, No. 1, 3, 1965). Review of current uses of radiation in chemical production; description of ongoing research in the field; discussion of factors important in the use of such methods.

—T.L.R.

(B) Electrodeposition and Metal Finishing

1. **Material costs in electroplating—**

O. Mudroch (Electroplating and Metal Finishing, **17**, 374, 1964). The formulae for calculating the costs of anodes and chemicals consumed in electroplating have been derived and the factors influencing these costs discussed. Two figures, 4 tables and 3 references.

2. **Black nickel plating—**

B. A. Shenoi and (Miss) K. S. Indira (Electroplating and Metal Finishing, **17**, 381, 1964). The conditions for satisfactory plating of black nickel on aluminium and its alloys, brass, cadmium, chromium, copper, nickel, stainless steel, mild steel and titanium have been described in detail. One table and 11 references.

3. **The case for fast, continuous filtration —**

J. H. Berg (Products Finishing, **29**, No. 2, 52, 1964). A filter that rapidly removes solid particles from plating solutions isn't a 'necessary evil'; it is a profit-maker. This is shown with a 36-cartridge filter which continuously processes 1000-gallon barrel zinc solution. Filtration prevents roughness and helps to maintain uniform temperature in the plating tank.

4. **Plating for the electronics industry—**

(Products Finishing, 29, No. 2, 65, 1964). This is the second part of a panel discussion report.

5. **Proposed recommened practice for the processing of mandrels for eletroforming —**

(Plating, **51**, 1075, 1964). ASTM recommendations: scope, classification of mandrels, design considerations, aluminium and its alloys, stainless steel and chromium-plated mandrels, nickel and nickel alloy mandrels, low melting alloys.