Abstracts

(A) GENERAL

1 Intrinsic charging rate capability of the cadmium anode—

P. Bro and Marincic (J. Electrochem. Soc., **116**, 1176, 1969). The intrinsic charging rate capability of the cadmium anode used in new cadmium-silver chloride cells was investigated by depositing cadmium from chloride solutions on plane electrodes in half-cells under constant current conditions. The current densities ranged between 0.03 to 3.48 amp/cm^2. The charging was terminated at the onset of hydrogen evolution. Very fast charging rates were obtained, but the resulting specific capacities were low. Two tables and 3 figures.

2 Galvanic cells. Primary cells and batteries. Part 1. Technical requirements. Part 2. Testing—

East German Standard, TGL 7487, Part 1 and 2 (1968); Zinc Abs., **28**, 51, 62, 1970. Types and applications and symbols used; Leclanche cells; technical requirements and related standards and recommendations; 1 table. Sampling, sample preparation and testing procedures; test evaluation and recording; relevant standards and recommendations; 4 tables.

3 Zinc accumulator electrodes—

M. Muvek, French Patent 1,581,083 (1968); Zinc Abs., **28**, 53, 1970. Zinc or one of its compound; is mixed intimately with a cellulosic material and the resulting mixture is shaped into electrodes by pressing. The activity of the electrodes is increased by adding mercury or its salts to the two components.

4 Effect of sulphide-containing additions on the corrosion of zinc in alkaline solutions—

A. V. Merkulov and V. N. Flerov (Zaschita Metal, U.S.S.R., **5**, 118, 1969); Metals Abs., **2** 739. 1969. Data were obtained for the effects of sulphide-containing additions on the corrosion of zinc in connection with zinc anodes in batteries. Tests were conducted with solid and powered zinc specimens in 5N sodium hydroxide using potentiostatic, weight loss and analytical methods. In general sulphur addition increased the corrosion of solid and decreased that of powdered zinc. The effects of amalgamating the electrodes are discussed.

5 Metair primary batteries—

(Energy Conversion Ltd., Data Sheets, 1969); Zinc Abs., **28**, 95, 1970. Metair range of zinc-air primary batteries, providing up to 200 wh/lb, are much smaller and lighter than Leclanche and lead-acid batteries of comparable capacity and rating, and can maintain high continuous power levels. Specific power levels of up to 100 w/lb and 5 kw/cub. ft. are possible. On-load voltage can be held steady to within a few per cent until 90 per cent of the available stored energy has been discharged. The batteries can be operated using either atmospheric air or bottled oxygen, the latter being highly suitable for aerospace and underwater applications. One table and 7 figures.

6 Effect of artificial convection on the efficiency of a zinc electrode in an alkaline electrolyte—

M. N. Mashevich, Z. P. Arkhangelskaya and G. P. Andreeva (Zh. Prikl. Khim., U.S.S.R., **42**, 135, 1969); Metals Abs., **2**, 1546, 1969. The causes of the passivation of zinc electrodes during the discharge of silver-zinc batteries in conditions of artificial convection of the electrolyte have been studied. The effects of temperature' zinc concentration and stirring were investigated. The factors responsible for passivation were evaluated, attention being drawn to the importance of surface condition and activity of the electrode.

7 Impregnation of porous nickel plates in concentrated cadmium chloride solution—

E. I. Gamashkin, Y. M. Pozin and N. E. Grilikhes (Zh. Prikl. Khim., U.S.S.R., **42**, 127, 1969); Metals Abs., **2**, 1546, 1969. The effects of various pretreatments and the pore size of nickel plates, such as those used in nickel-cadmium batteries, on the absorption of cadmium salts were investigated. The use of cadmium solutions containing nitric

acid 1.25-2.5 g/l resulted in the removal of the passive oxide film and more uniform impregnation, a similar effect being obtained by increasing the plate pore size to values of 30-50μ[or micron] With repeated impregnations, the maximum increase in the cadmium salt content was obtained using plates with the most uniform distribution of cadmium hydroxide after the first impregnation.

8 Secondary galvanic cell—

Lesona Corp., French Patent 1,582,503 (1968); Zinc Abs., **28**, 96, 1970. The cell incorporates a zinc anode, a metallic cathode and an alkali hydroxide electrolyte. Dendrite formation is inhibited by reduciug to minimum the quality of electrolyte in contact with the cathode. A thin porous separator impregnated with the electrolyte is placed between the electrodes.

8 Corrosion of mining machinery and installations and the protective methods applied—

M. Nosek and P. Nieradzik (Ochrona Przed Korozja, Poland, **12**, No. 10-11, 226, 1969); Zinc, Abs., **28**, 55, 1970. Mining equipment corrosion and its prevention: use of protective sprayed or plated zinc or cadmium coatings, and zinc dust paints; future developments in anti-corrosive coating technology; 3 tables.

10 Corrosion of steel structures and installations in coal mines—

E. Szczepanska and E. Graffstein-Malkiewicz (Ochrona Przed Korozja, Poland, **12**, No. 10-11, 220,1969); Zinc Abs., **28**, 55, 1970. Economic and technical aspects of corrosion in mines; corrosive conditions and preventive measures; use of zinc dust paints; good results with hot dip galvanized tubs and mine shaft structures; 2 tables.

11 Methods of the protective properties of plastic films—

E. I. Sergeeva, Y. N. Mikhailovski and G. K. Berukshits (Plasticheskie Messy, U. S. S. R., No. 7, 66, 1968); Zinc Abs., **28**, 57, 1970. Protective action of polymer films is assessed by two methods: measurement of corrosion currents and the ohmic resistance of thin layers of the substrate metals. Results are discussed for iron and zinc protected by films of polythelene and P V C and exposed to atmospheres of 85-95 per cent relative humidity, containing various amounts of sulphur dioxide.

12 Effect of the polar properties of substituents on the protective action of corrosion inhibitors—

S. M. Reshetnikov (Zashchita Metal, U.S.S.R., 5, 234, 1969); Metals Abs., **2**, 1070, 1969. A satisfactory correlation was obtained between the degree of protection and the polar properties of the substituent, for aniline derivatives in iron—10 per cent hydrochloric acid and for pyridine in zinc—1N sulphuric acid. The effectiveness of corrosion inhibition increases with rising polarity of the substituent.

13 Cathodic protection of mooring buoys and chain. Parts 4. Additional field studies with cables providing continuity—

R. W. Drisko, U. S. Govt. Res. Develop. Rept. AD 839 338 (1968); Zinc Abs., **28**, 59, 1970. Cathodic protection with zinc anodes provided complete corrosion protection to the ground tackle and underwater portion of the test buoy. Two tables, 2 figures and 7 illustrations.

14 Significance of climatic factors in atmospheric corosion of metals—

D. Knotkova—Cermakova (Z. Meteorol., Germany, **20**, No. 1/6, 126, 1968.; Chem. Abs. **71**, 24135 (1969). The importance of climatic factors such as temperature, relative humidity and dew formation is discussed. Examples are given of their influence on the corrosion behaviour of mild steel, zinc and cadmium.

15 Corrosion by air pollution—a review—

J. R. Goss (Paper. Ann. Conf. Natl. Soc. for Clean Air, Blackpool, 1967, 25 pages); Zinc. Abs., **28**, 61, 1970. Review of the chemical and physical effects of air pollution on the corrosion of various materials including stonework, metals, textiles and paint. Resistance to corrosion of lead in roofing and other outdoor applications. Outdoor corrosion of zinc, including test conclusions for galvanized coating; 3 illustrations.

16 Corrosion protection afforded by metallic layers applied by thermal decomposition of organic coatings incorporating metallic pigments—

(Chem. Rundschau, Switzerland No, 46, 881, 883, 1969); Zinc

Abs., 28, 97, 1970. Methods of application, characteristics and uses of protective metallic layers deposited by thermal decomposition of organic coatings containing protective metal pigments. Deposition of zinc, cadmium and lead, and use of a paint incorporating flake zinc pigment. Possible industrial applications.

17 Comparative study of the protection afforded by zinc and cadmium coatings.—

G. David (Corrosion, France, 17, 343, 1969). Mechanism of corrosion of iron, and its prevention by zinc and cadmium coatings; including relative merits. Cadmium coatings are prefered for tropical climates, in saline solutions and in water containing alkali and detergents. Zinc is superior in urban and industrial atmospheres, and provide a better surface for subsequent finishing. Five tables, six figures and 4 illustrations.

18 Corrosion of zinc and cadmium coatings. Effect of chromate treatment—

J. J. Royuels (Rev. Met., Spain, 5, 535, 1969); Zinc Abs., 28, 101, 1970. The corrosion behaviour of zinc and cadmium coatings in the atmosphere of several Spanish towns has been studied. The highest corrosion rates were observed in industrial districts with high humidity. The effect of sea winds was very slight only a very short distance inland. Chromate treatment increased the corrosion resistance of the coatings. Twelve tables and 2 figures.

19 Passivity of electrolytic tin-zinc alloy—

A. A. Fedulova and K. P. Prokopenko (Protect. Metals, U. S. S. R., English Translation, 4, 369, 1968). The oxidation of zinc, tin and tin–20 per cent zinc in O. 1N sodium hydroxide and 6 per cent sodium pyrophosphate was srudied by anodic potentiostatic polarization curves. The effects of metal surface treatment and addition of amonium citrate to the electrolyte was investigated.

20 Effects of temperature and stress on the anodic dissolution of Wood's alloy.—

V. V. Gerasimov and V.A. Shuvalov (Zashchita Metal.. U.S.S.,R. 5, 53, 1969); Meta's Abs., 2, 738, 1969. The effects have been studied of stress at various temperatures on the kinetics of the electrode processes of Wood's alloy in 0.01 sodium hydroxide. The alloy contained cadmium 12.5, tin 12.5, lead 25 and bismuth 50 per cent. At a constant potential of – 0.25V (NHE), increase in temperature causes a change in the rate of the anodic process with a maximum at 68–71°C. The effects of higher and lower temperatures are also discussed.

21 Rust—

K. A. Chandler (British Steel. No. 8, 24, 1970). Examination of the problem with reference to corrosion prevention; implications.

22 Developments with coated sheet—

H. Hill (New Bldg., 10 No. 9, 5, 1969); Zinc Abs., 28, 53, 1970. The different types of coated steel sheet are described, including zinc plated sheet and the widely used galvanized sheeting, with or without an additional plastic coating. The various building applications of the sheeting are outlined and relevant illustrations provided.

23 Zinc in building—

M. Puech (Centre Technique du Zinc, 16 pages); Zinc Abs., 28, 53, 1970. Chemical properties of rolled zinc, with roofing applications; zinc-coated steel for construction by hot dip galvanizing, flame spraying and use of zinc-rich paints; use of zinc in reinforced concrete and of zinc alloy die castings in building. Nine tables, 2 figures and 28 illustrations.

24 Contribution to the study of phosphating of steel—

E. L. Ghali (Mem. Sci. Rev. Met., France, 65, 859, 1968); Metals Abs., 2, 1107, 1969. The formation of phosphate coatings on steel was investigated using a zinc phosphate bath by electrochemical techniques and physical examination. The effects of bath agitation and anodic polarization of steel at the beginning of the treatment were studied. The mechanism of coating deposition is discussed.

25 Zinc coated steel sheet for new markets—

F. C. Porter and G. K. Walden (Sheet Metal Ind., 46, 686, 1969). The effectiveness is indicated of the protective action of zinc coatings deposited on steel. The methods of application and the advances in coating technology are reviewed, together with the uses in building and construction, car body manufacture and containers. Welding of zinc-coated steel is examined, and attention is drawn to the availability of zinc–copper–titanium alloy sheet with improved creep resistance.

26 Pretreatment of coated metal strip—

D. Galjard (Tijdschr. Oppervlakte Tech. Metal., Holland, 12, 370, 1969): Zinc Abs., 28, 65, 1970. Surface treatments, used at strip metal plants, are described for improving the corrosion resistance and adherence of coatings deposited on continuously produced metal strip. Chromating and phosphating of galvanized steel strip are considered; 6 figures.

27 Zinc alloy die casting. Surface treatment—

(Zinkberatung, Work Sheet 01, 1969, 16 pages); Zinc Abs., 28, 65, 1970. Procedures and materials used for the surface treatment of zinc alloy die castings are described together with the characteristics of the coating applied; plating, painting, phosphating and chromating. Testing of the coatings; 5 tables and 15 illustrations.

28 Anti-corrosive pigments in paint systems—

V. Cupr. (Dent. Farben Z., 23, 209, 1969): Zinc Abs., 28, 76, 1970. Properties and uses of zinc tetroxychromate and phosphate, calcium plumbate, and other zinc and lead pigments; theoretical aspects of corrosion and pigment action; effects of atmospheric pollutants; use of filler materials; bibliography.

29 Anti-rust paints—

A. v. d. Abbeele (Galvano, France, 38, 213, 1969); Zinc Abs., 28, 115, 1970. Mechanism of iron corrosion; types of inhibiting paint including those based on red lead and those containing zinc chromate; galvanic action of anti-corrosive paints containing zinc dust; multi-layer paint systems incorporating anti-rust formulations; 3 figures.

30 Steel structures painting manual. 1968 Supplement to second edition of Volume 2. Systems and specifications—

J. D. Keane (Steel Structures Painting Council, Pennsylvania, 1968, 26 pages); Zinc Abs., 28, 116, 1970. Six specifications are presented one of which deals with standard methods of evaluating the degree of rusting on painted steel surfaces. Another presents a guide to zinc-rich coating systems which may be composed of organic or inorganic vehicles. Two tables and 1 figure.

31 Industrial waste treatement—

L. E. Lancy (Metal Finishing, 68, No. 3, 42, 1970). Certification of plant operators: introduction, need for regulation, proposed requirements, restatement of issue.

32 Measuring electrodeposit adhesion—

S. D. Cramer, V. A. Cammarota and D. Schlain (Metal Finishing, 68, No. 3, 45, 1970). Electrodeposit adhesion can be measured quantitively by a method using silver solder for bonding the free surface of the deposit to the test assembly. Here is an account of the theory, experimental results and discussion; 4 figures and 16 references.

33 Decorative chromic acid anodizing of aluminium—

R. F. Darnell and A. Raymond (Electroplating and Metal Finishing. 23, No. 2, 17, 1970). Introduction, developments in chromic acid, opacity and properties of chromic acid films, importance of correct sealing, applications for anodic films; 3 tables and 3 references.

34 Zinc, cadmium and their alloys—

(Zinc Cadmium Alliages Rev. Tech., France, Annual Issue, No. 42, 1969, 188 pages); Zinc Abs., 28, 73, 1970. Review of developments in the use of zinc in France, U. K., Japan, West Germany, Italy and U. S. A. Applications of galvanized steel sheet, zinc alloy die castings, zinc roofing on churches, zinc-rich shop primers in the ship building industry, corrosion testing of zinc and its alloys.

35 Use of chlorinated polymers in fire retardant surface coatings—

T. F. Birkenhead (Australian Paint J., **15**, No. 6, 16, 1969). Mode of action, formulations and uses of fire retardant paint coating utilizing chlorinated polymers; paints incorporating zinc borate, an afterglow reducing agent; excellent corrosion protection with chlorinated rubber – chlorinated paraffin fire retardant coat systems, including those containing zinc borate: 13 tables.

36 Vibratory finishing of zinc die castings—

(Am. Machinist, **113**, 121, 1969). Different types of commercially available vibratory finishing equipment and media are described. The preferred compound system comprises a flow-through or constant spray and drain technique. The important factors affecting this process are indicated.

37 Design and operation of a treatment plant for metal finishing wastes—

A. K. Coleman (Effluent Water Treat. J., 8, 337, 389, 1968); Zinc Abs., 28, 113, 1970. A flow sheet is presented to treat the combined finishing wastes discharged to local authority sewers from adjacent Rolls Royce factories. Its operation is discussed, together with quality control of the final effluent. After 3 years of continuous operation the plant has proved adequate in most respects. Six tables, 2 figures and 1 illustration.

38 Electrolytic treatment of telephone accessories—

(Galvano, France, **38**, 581, 1969); Zinc Abs., **28**, 116, 1970. The manual and automatic plants for zinc plating in France are described; 8 illustrations.

39 Present position of zinc electroplating—

H. W. Dettner (Baender Bleche Rohre, Germany, **10**, 271, 1969); Zinc Abs., **28**, 117, 1970. The present position of zinc plating technology is reviewed and compared with other types of metal coating processes. The improvement in the corrosion resistance of zinc coatings resulting from chromating procedures, mechanism of deposition, bright zinc and the plating of wire and strip are discussed.

40 Copper and zinc plating with pulsating current—

R. I. Gurovich and A. K. Krivtsov (Zh. Prikl. Khim., **41**, 1227, 1968); Zinc Abs., **28**, 117, 1970. The effects of various forms of pulsed currents on the coatings produced in normal zinc and copper plating electrolytes were investigated. No change was found in the case of high frequencies, but frequencies of 20 and 60 HZ gave finger structures in zinc deposits, especially with half-wave rectification. The effects are said to be due to changes in the nature and magnitude of cathode polarization, and to the non-stationary nature of the processes which take place at the electrode. Six figures.

41 Report on the control of cyanides in plating shop effluents—

(Plating, **56**, 1107, 1110, 1112, 1969). Review of the present methods used in the U. S. A. for the disposal of cyanides in plating effluent. Two tables and 6 figures.

42 Hungarian automatic detoxifying equipment for electroplating plants—

A. Gerenczer and J. Kerese (Musaki Tervezes, Hungary, **9**, No. 3, 26, 1969); Zinc Abs., **28**, 118, 1970. Description of an automated installation for the treatment of plating effluents containing acids, chromate and cyanide.

43 Physical and chemical properties of non – ferrous metals and alloys—

U. P. Mullick (Science and Engineering. **23**, 52, 1970). Brass and bronze, antifriction alloys; concluded from previous issue with 17 tables and 10 references.

44 Nickel alloys in the mining and mineral processing industries—

S. M. Renof (Aurtralasian Corrosion Engineering, **14**, No. 2, 7, 1970). Selection and use of improved materials of construction in each phase of production and processing. Materials of construction, nickel alloy steels, mining and quarrying – crushing and grinding – concentrating equipment, off-shore structures, petroleum-cement-superphosphate industry. Thirteen tables, 7 figures and 11 references.

45 The significance of nickel—

T. Smallwood (British Steel, No. 8, 22, 1970). Review of the past and previous of the future of

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43 Physical and chemical properties of non – ferrous metals and alloys—

U. P. Mullick (Science and Engineering, **23**, 52, 1970). Brass and bronze, antifriction alloys; concluded from previous issue with 17 tables and 10 references.

44 Nickel alloys in the mining and mineral processing industries—

S. M. Renof (Aurtralasian Corrosion Engineering, **14**, No. 2, 7, 1970). Selection and use of improved materials of construction in each phase of production and processing. Materials of construction, nickel alloy steels, mining and quarrying – crushing and grinding – concentrating equipment, off–shore structures, petroleum-cement-superphosphate industry. Thirteen tables, 7 figures and 11 references.

45 The significance of nickel—

T. Smallwood (British Steel, No. 8, 22, 1970). Review of the past and previous of the future of

the metal; present-day problems of the alloy steelmaker; major uses and consumption figures.

46 Tantalum electrolytic capacitors—

J. A. Sunda (Electron. Equip. News, **11**, No. 4, 8, 1969); Electro-Technology, **13**, Lvii, 1969. Manufacturing aspects are given along with data illustrating parametric changes with voltage, frequency, temperature and time. Application notes are included and attention is drawn to factors affecting reliability.

47 Low energy electron diffraction (LEED) and Auger electron spectroscopy (AES)—

C. S. McKee and M.W. Roberts (Chemistry in Britain, 6, 106, 1970). These two techniques are revolutionizing the study of surface chemistry and catalysis. Here is a description, with 6 figures and 30 references.

48 Exchange reaction at polycrystalline cadmium electrodes. Part 1. Galvanostatic measurements in perchloric electrolytes—

N. A. Hampson, R. J. Latham and D. Larkin (J. Electroanal. Chem. Interfacial Electrochem., Holland, **23**, 211, 1969). The exchange reaction at a solid cadmium electrode in perchlorate electrolyte, pH about 3, was investigated and the exchange currents were measured. The apparent charge transfer coefficient obtained from the change of the exchange current with Cd (II) was 0.23, and the enthalpy of activation, evaluated from the change of the exchange current with temperature, amounted to 6.3 Kcal/mole. Two tables and 5 figures.

49 Electrochemical effect in alloys of cadmium, magnesium and mercury—

J. E. Inglesfied (ActaMet., **17**, 1395, 1969). The effect of an electronegativity difference on alloying behaviour is examined for cadimum-mercury/magnesium and mercury-magnesium systems using a previously derived pseudo-potential method. The alloying behaviour is discussed employing a square well potential whose depth is proportional to the electronegativity difference. The formation and characteristics of the intermediate compounds are considered in relation to the potential depth. Four tables and 5 figures.

50 Some observations on the thermodynamic properties of alpha-phase palladium-cadmium alloys—

W. G. Bugden, J. D. Filby and J. N. Pratt (J. Less Common Metaes, **17**, 257, 1969). Isopiestic vapour pressure measurements and a solid electrolyte E. M. F. technique employing a nickel-nickel oxide reference electrode were used to obtain activities of cadmium and free energies of solution and formation of f.c.c. palladium – 0 to 28 atomic per cent cadmium alloys. Entropies of formation were estimated by combining these data with reported heats of formation. The relationship of the thermodynamic properties to the electronic structure of the alloys is briefly discussed.

51 Electromotive force studies of liquid uranium-zinc alloys—

Y. Hoshino and J. A. Plambeck (Canadian J. Chem., **47**,965,1969). The E. M. F. of cells of the type U(s)/LiCl-KCl (eutectic)+UCl_3/(U+Zn) (liquid alloy) has been measured over the temperature range 450–550°C, in the zinc-rich region of alloy composition. Thermodynamic functions are presented for the limiting uranium-zinc intermetallic compound existing in this region. Results are compared with previously reported values.

52 Investigations of the physical and chemical properties of Ag-Zn alloy powders—

J. Przyluski, K. Madry and J. Bielinski (Rudy metale Niezelazne, Poland, **14**, 514, 1969); Zinc Abs., **28**, 111, 1970. The properties of electrochemically produced silver-zinc alloy powders were determined and compared with those made by a thermal procedure and mechanical comminution. The former had a more developed specific surface than the thermal ones, and exhibited greater activity with respect to oxygen and greater water adsorption ability. Relationships between the various characteristics of the powders were investigated, and the findings discussed. Two tables and 6 figures.

53 Improvement in the alkaline process for reprocessing dusts from the shaft melting of lead concentrates—

S. Ageev and coworkers (Tr. Inst. Met. Obogashch. Akad. Nauk Kaz. S. S. R., U. S. S. R., **29**, 23, 1969): Chem. Abs., **71**,

83657, 1969. Studies are reported on the reprocessing of lead dust containing lead 50.2, zinc 7.21, cadmium 1.45, sulphur 10.3, sulphate sulphur 7.5 per cent and smaller quantities of other constituents. This involved the treatment of the dust with sodium hydroxide and simultaneous electrolytic deposition of zinc and lead. The optimum processing conditions are listed; the lead recovery amounts to 87 per cent.

54 Regeneration of the solutions used in the production of zinc and manganese dioxide by the coupled electrolysis process—

W. Tomassi (Przemysl Chem., 48, 668, 1969): Zinc Abs., 28, 122, 1970. Determinations were made of the maximum permissible concentrations of zinc and manganese respectively in manganese and zinc sulphate solutions used in the production of zinc and manganese dioxide by the coupled electrolysis process. An electrochemical procedure has been developed for the removal of these ions permitting the regeneration and reuse of the treated solutions.

55 Method for producing electroluminescent zinc/cadmium sulphide/oxide phosphors—

U. S. Patent 3,462,372 (1966). The phosphors activated by copper and halides can be most effectively produced by firing a batch of zinc sulphide containing the activators and mixed with copper sulphide and cadmium oxide, and then removing the excess reactants. This method is designed to produce efficient phosphors which exhibit emission peaks between 520 and 590 nm, with good brightness characteristics.

56 Method for producing polycrystalline photovoltaic cell—

U. S. Patent 3,480,473 (1966). An improved polycrystalline photovoltaic cell, preferably made of cadmium sulphide, is produced by etching the surface of the semiconductive material with hydrochloric or preferably sulphuric acid before the formation of the barrier layer. The cells have output efficiencies 30–50 per cent higher than similar ones manufactured without the etching step.

—T. L. R.

(B) ANALYSIS

1 Cathodic stripping voltammetry of lead—

E. Hrabankova, J. Dolezal and P. Beran (J. Electroanal. Chem. Interfacial Electrochem., 22, 203, 1969). Utilizing a rotating platinum electrode and a derivative circuit, lead can be determined at concentrations of at least 5×10^{-9}M with an error not exceeding 10 per cent. Separation from elements such as copper, cadmium and zinc is easier than in the case of amalgam polarography, but the technique is less sensitive. One table and 5 figures.

2 The spectrophotometric determination of cobalt in steel—

F. M. Tulyupa, Yu. I Usatenko and V. A. Pavlichenko (Zavodskaya Laboratoriya, 34, No. 1, 14, 1968); Cobalt, No. 45, 224, 1969. Potassium dicarboxymethyldithiocarbonate, a new reagent, is proposed for cobalt determination, and its synthesis described. It forms a coloured water-soluble complex with cobalt, with a maximum absorption at 315 mu and a molar absorptivity of 20000. Manganese, chromium, titanium, tungsten, niobium, tantalum, aluminium, and small quantities of molybdenum do not interfere. Ferric iron and nickel present in the steel should be removed; the method is sensitive to 0.2 ug cobalt in 1 cub. cm. solution.

3 Automations gerechte analyse- mund messmethoden—

F. Oehme (Galvanotechnik, 61. 113, 1970). Investigation into possibilities of automatic analysing and testing methods suitable for application with automatic plating plants. Five tables, 8 figures and 16 references.

4 Die komplexometrische titration und ihre indikation—

G. Kraft (Galvanotechnik, 61, 123, 1970). Complexometric titration and its application possibilities for chemical analysis are discussed; 14 figures and 14 references.

5 Analytische untersuchungen mit ionen sensitiven elektroden—

F. Oehme (Galvanotechnik, 61 133, 1970). Modern analysing methods are outlined. It is shown how the use of respective electrodes makes the application of direct potentiometric analyses possible for determining solution concentrations. They are applicable in laboratories, and also practicable in plating shops. Four tables 10 figures and 11 references.