Editorial

THE TENTH YEAR

The Bulletin has just entered the tenth year of its publication. It was started in 1952 for the dissemination of scientific and technical information in different branches of Electrochemistry. The India Section is the only Section of the Electrochemical Society to have its own publication. During these nine years we have been gradually expanding and improving the contents. It is heartening to note that the Bulletin and the Special Symposium Numbers published by the Section have been received well in India as well as in foreign countries. The technical papers of the Bulletin are included in Chemical Abstracts. The Bulletin is cooperating in the publication of the new Journal 'Chemical Titles' beginning from this year.

All this has been possible due to the continued cooperation of the Society, members, associates and Patrons of the Section, industries, scientific institutions and individuals, and the generous support from the Government. We hope to maintain the standards and do better service in the future.

—T.L.R.

News Section

SECTION REPORT

Meetings

A Technical Meeting of the India Section was held on 27 October 1960 in Bombay at the premises of the Indian Standards Institution Branch Office. Dr S Krishnamurthy, Chief Chemist, Indian Telephone Industries Ltd., gave a talk on 'The Chemicals for the Electroplating Industry in India'. The Secretary proposed Dr S. N. Anant Narayan, Managing Director, Nickel Information Bureau Private Ltd., to preside on the occasion. The speaker reviewed the progress of the industry in the country in the last decade and particularly the progress of the chemical industry, and stated that the chemical industry had expanded considerably and many of the chemicals hitherto imported were produced indigenously. When the young industry could not face competition from imported chemicals, the Ministry of Commerce and Industry of the Government of India came to the rescue by granting concessions.

The plating chemicals can be divided into two major groups—direct chemicals used in plating and indirect chemicals used in some of the processes connected with plating. Among the first category nickel, zinc, tin, copper, chrome salts and sodium hydroxide and ammonium chloride are typical examples. The speaker gave production figures of nickel salts and some of the other salts in the year 1959. A few chemicals like sodium, potassium and other metallic cyanides like copper, zinc, cadmium, silver and gold are not produced in the country. Some of the special chemicals like sulphamates, pyrophosphates, fluorides and special brighteners are not also produced. Among the category of indirect chemicals sodium carbonate, trisodium phosphate, dichromates, sodium thiosulphate and other acids like sulphuric, nitric and hydrochloric can be grouped together. The speaker gave production figures for these chemicals in 1959. Speaking about the use of made up plating salts, the lecturer was of the opinion that made up salts would be suitable for our country as most of the job platers were not well educated. However, he emphasised that the plating houses supplying these salts should give technical service to help the platers to achieve good results.

At present the quality of nickel and zinc salts produced in the country was up to the standards required by the plating industry, and it is gratifying to note that Indian Standards Institution

have already taken up the question of laying down standards for plating chemicals. Before long we may have Indian Standards Specifications for all the chemicals required in the plating industry. As it is there are about a dozen Indian Standards covering the requirements of chemicals of the plating industry. The speaker felt that the future of the industry was very good, as the industry has made excellent beginning in the production of nickel and zinc salts of a high standard. There are no two opinions regarding the quality of plating required on consumer goods and good quality chemicals would go a long way in achieving this end.

There was a lively discussion after the talk. Dr Anant Narayan staced that the Nickel Information Bureau Ltd. could give some advice regarding nickel plating and it was for the plating industry itself to improve the quality of plating by using chemicals of known purity. Mr R. A. Shah of Ronuk Industries assured the gathering that he would do his best to back up his sales with excellent technical service. Mr P. N. Gandhi of Nickel Information Bureau Ltd. felt that the quality of plating could be improved generally, only if attention was paid by the platers for purchasing good quality of chemicals. He was of the opinion that plating material supply houses should back up their sales with service. The Small Industries Service Institute should also come up in educating the platers and bringing them out of the false notion they were labouring under, with regard to indigenous materials. Mr M. B. Desai of Kesar Sugar Works, Chemical Division, stated that India was capable of producing the entire needs of the plating industry with respect to nickel sulphate and nickel chloride. The quality of chemicals produced at present was up to the British Standard Specification and the necessity of imports of these chemicals may not continue long. He also was of the opinion that if the plating technicians were educated with regard to the quality of chemicals to be used in the plating industry, the misgivings in the minds of the technicians could be cleared. Mr. Hirelakar of M/S R K. Hirelakar & Co. was also of the opinion that the lot of the job platers could be improved if the supply houses back up their supplies with technical service. With a vote of thanks proposed by Dr Anant Narayan, the meeting came to a close.

The Fourth Technical Meeting of the Section for 1960 was held on November 26 at the Central Electrochemical Research Institute, Karaikudi. Mr V. Aravamuthan, Assistant Director, CECRI delivered a lecture on 'Development of Electrochemical Industries utilising Sea water as Raw Material'.

The Ninth Annual Meeting of the Section was held on November 28, 1960 at the Indian Institute of Science, Bangalore with Dr S. Soundararajan in the chair due to the unavoidable absence of Dr M. S. Thacker. The minutes of the Business Meeting held on September 17, 1960 were confirmed. The Ninth Annual Report covering the activities of the Section for 1959-60 was presented by the Secretary. The following were elected as Officers of the Section, 1960-61: Chairman—Dr M. S. Thacker, Vice-Chairmen—Dr A. Jogarao and Mr S. Ramaswamy, Secretary-Treasurer—Dr S. Krishnamurthy. General matters concerning the Section and its publications were discussed. The meeting terminated with a vote of thanks to the chair.

Personals

S Ghosh has left for France for specialized training in Applied Science in the Faculti des Sciences, Strasbourg.

New Members: *India Section*

1. B. K. Balasubramanyam, Amco Batteries (P) Ltd., Bangalore-2.
2. P. V. Vedanarayan, Western Battery Corpn., 108, Bazaar Ward, Kurla, Bombay 37.
3. F. E. Da Costa, Malabar Mansion, 37, Garden Road, Bombay-1.

New Patrons: *India Section*

M/S Navyug Industries, Mahalaxmi Bobbin Compound, L. J. Cross Road No. 2, Mahim, Bombay.

OUR PATRONS

Phoenix Chemical Works (Private) Ltd., Bombay

Phoenix Chemical Works was started in 1932 with a view to manufacture various types of chemicals, a beginning being made with sodium silicate and ammonium chloride. Electroplating chemicals were then taken up, the production of chromic acid having started in 1949. Nickel plating salts were the next item, and they are being supplied to B. S. Standard for the past several years. The firm are also manufacturing plating compositions for copper, cadmium and zinc, and have developed metal cleaning and passivating compounds. Other products include: sodium silicates, potassium silicate, silica gel, zinc sulphate, potash chrome alum.

GENERAL NOTES

Oxygen-Hydrogen Generator

An experimental electrolytic gas cell generating an oxygen-hydrogen mixture is a promising fuel

source for explosive metal-forming operations and high-temperature welding and cutting torches. The generator consists of a number of flat nickel-plated steel electrodes placed 0.06 inch apart in a plastic or insulated-metal container holding a weak caustic solution. Current is run into the two outside electrodes with the intermediate ones functioning as bi-polar electrodes. Voltage between the electrodes averages 2 volts, and the volume of gas generated can be increased by increasing the number of electrodes. According to Dr J McCallum of the Battelle Memorial Institute, U.S.A., an oxy-hydrogen mixture of approximately 8 to 1 by weight produces the highest flame temperature, fastest detonation, and greatest increase in presence when ignited. Estimated cost of producing the gas is 10-30 cents per 100 cu. ft depending on electric power costs.—Battelle Technical Review, Vol. 9, No. 8, 14, 1960.

Shell's Low-Temperature Fuel Cell

A low temperature fuel cell that can generate from 3 to 5 times more power per unit volume than other similar cells under development was announced during August 1960. This development by Shell's Research Centre at Thornton, Cheshire, England is regarded as a significant step forward in making these devices practicable. The cell can operate with alkaline or acid electrolytes. When run on hydrogen and oxygen at a pressure of 3 lb/sq. in current densities of 70 amp/sq. ft. can readily be obtained with both types of electrolyte at room temperature. If air is substituted for oxygen, there is little loss in performance. As the cell warms up to 60°C the output is doubled. Power per cu. ft. is 3-5 KW. Shell has constructed multiple fuel cells with up to 6 cells per inch and believes that units having a power to weigh ratio of 50 W/lb are realisable. —Chemistry and Industry, No. 33, 1061, 1960.

Ground Return Circuits in Electrification

Much to the dismay of many corrosion engineers, a scheme has been proposed whereby electric power will be brought to rural areas in India using earth for return. It is even more dismaying to learn that similar systems are now in use in New Zealand, Australia and Canada. This is especially significant because coincident with the demise of most of the electrified street railways in the U.S.A., the problems of stray current corrosion caused by ground return from this source have almost reached the vanishing point. The new scheme may reproduce in India a situation which caused untold millions in damage to underground piping and cables, and caused the expenditure of millions in control measures in the U.S.A. While it is true now that these systems are in remote regions where underground metallic plant is limited, it does not follow that this always will be the case in view of the rapid industrialization of countries. In the vicinity of even the well-maintained electric railways in France stray current corrosion problems are substantial, and even the best engineered control measures are not wholly successful.

In the case of ground return rural classification schemes—as a minimum—it is noped some notice will be taken of the corrosion hazards involved in the system. At the very least, in case economic and other considerations are such that the single wire system is the only feasible one, plans should be made to ultimately modernize the circuits to provide for return by metal conductor. There will be a strong inclination to use ground return systems in countries like India because a single phase system may cost only 25-30 per cent of an equipment three-phase system.—Corrosion, Vol. 16, No. 8, 7, 1960.

Automatic Chemical Analysis

The Annals of the New York Academy of Sciences, New York, presents in Volume 87, Art 2, pages 609-951, 1960 the proceedings of a conference on 'Automatic Chemical Analysis' held by the Academy during November 1959. Although many of the 30 contributions to this monograph deal with analyses of biological or clinical interest, the special volume will be useful to chemists in general.

India's First Heavy Electrical Plant

The Heavy Electricals Factory at Bhopal, the first of its kind in India and claimed to be the biggest in Asia, started production in July 1960 according to schedule. It will produce switchgears, control panels, power transformers, capacitors, traction motors, equipment for electric locomotives, industrial motors and generators. The plant will be in full stride in about 7 years. The annual output is expected to be Rs. 25 crores.

Symposium on Beneficiation of Minerals

The proceedings of the Symposium on Beneficiation of Minerals held by the Indian Institute of Science, Bangalore during 1959 (This Bulletin, Vol. 8, No. 4, 1959) have been published in a special issue of the Journal of Mines, Metals and Fuels, Calcutta—Vol. 8, No 7, 1-164, 1960; price Rs. 12. It contains 30 papers on various aspects of mineral beneficiation and includes contributions from foreign countries.

Radial change in Aluminium Making

A recently issued French Patent (1,210,068) discloses the salient features of the new approach to aluminium production by Aluminium Ltd. The process has excited considerable industrial interest because it cuts about in half the capital investment for reduction facilities as well as saving on operating costs. Power requirements, however, are about the same as for the conventional Hall process. In Aluminium's process, impure alumina is partially reduced electrically, converting roughly 50 per cent of the aluminium content to metal The partially reduced mass then contacts $AlCl_3$ vapour at over 1000°C and about 1 atmosphere. Under these conditions the aluminium in the converter reacts with the vapour to form the monohalide AlCl. The monohalide vapours then flow to a condenser, leaving behind impurities such as titanium. Vapours cool by coming in contact with a violently agitated pool of molten aluminium. As the temperature drops the initial reaction reverses, forming $AlCl_3$ and metallic Al Product aluminium can be tapped continuously from the molten pool while the $AlCl_3$ is recycled to the converter.—Chem. Engg, Vol. 67, No. 18, 41, 1960.

Nickel-Cadmium Batteries

48 nickel-cadmium cells provide emergency lighting and propulsion for London's trolleybuses. London airport control tower and passenger buildings are guaranteed against mains electricity failure by nearly 400 cells made by Nickel Alkaline Batteries Ltd. of Redditch. They provide a 30-minute supply on full load. A battery installed and charged in 1939 and then left idle, started the engine 7 years later without recharge. An electric supply concern operated 740 cells for 12 years without spending a penny on spares or replacements Another using over 11,000 cells spent only 76 shillings in 0 years A starting battery on a diesel shunting locomotive was tested after 15 years and still gave the same high discharge rate starting performance.—Inco Mond Magazine No 15, 9, 1960.

ECS Meeting in Houston

The 118th meeting of the Electrochemical Society was held in Houston during October 1960. Technical sessions covered batteries, corrosion, electronics-semiconductors, electrodeposition — electrothermics and metallurgy, electrodeposition, electrothermics and metallurgy. The topics for the Division Symposia were: (*a*) battery—lead-acid storage battery in honour of the 110th aniversary of the invention: primary cells; solid electrolyte, secondary battery characteristics, silver-silver oxidee cetrodes; nickel-cadmium, (*b*) corrosion — can el orrosion; oxidation; unusual valence states and the difference effect; certain properties of the interface related to corrosion; passivity; dissolution of metals and semiconductors, (*c*) electrodeposition — electroless and immersion plating; electrophoretic deposition; metal deposition; alloy plating (*d*) electrodeposition—electrothermics and metallurgy—vapour deposited coatings, (*e*) electronics — semiconductor — crystal growth; compound semiconductors; technology; surfaces, and (*f*) electrothermics and metallurgy—vacuum—evaporated films; refractory and reactive methods. The August 1960 issue of JECS gives the abstracts of the 175 papers.

At the Electrodeposition Sessions, (Miss) Vasanta Sree and T. L Rama Char (India Section) presented a paper on 'Electrodeposition of Nickel-Cobalt Alloys from the Pyrophosphate Bath'. Another paper on 'Inhibition of the Corrosion of Pure Aluminium in Hydrochloric Acid Solutions' was presented by J. Sundararajan and T. L. Rama Char during the Sessions on Corrosion.

Symposium on the Effects of Surface-Active-Agents on the Electrodeposition of Metals

The Academy of Sciences of the Lithuanian S.S.R. have published the proceeding of a Symposium on 'The Effects of Surface-Active Agents on the Electrodeposition of Metals' held in Vilna during May 1956 (Vilna: Gosudarst Izdatel. Politicheskoy i Nauchnoy Lit. Litovsky S.S.R., 1957, 224 papers in Russian) There are 25 papers covering various aspects of the subject: polarization, adsorption, crystal growth, single metal and alloy plating. The titles of the papers are given in Metallurgical Abs, Vol. 28, 87, 1960; J. Inst. Metals, September 1960.

Sixth International Conference on Coordination Chemistry

The Sixth International Conference on Coordination Chemistry will be held in Wayne State University, Detroit, Michigan, U.S.A., from August 27—September 1, 1961. It is sponsored by the International Union of Pure and Applied Chemistry, American Chemical Society and the U S. Air Force Office of Scientific Research.

Plating Industry in Japan

The Japanese plating industry has made remarkable strides in the past eight years. It is quite prosperous and active. These are the impressions carried by E. A. Blount, Editor of 'Products Finishing', U S.A. as a result of his

tour of plating establishments in Japan and other far eastern countries. Improvements include semi-automatic and full-automatic equipment; use of bright copper and nickel plating solutions; use of bright zinc plating solutions and chromate conversion coatings; continuous filtration of solutions; liberal use of PVC for tanks and tank linings; well-equipped control laboratories; adherence to Japanese Industrial Standards specifications; production of plating of improved quality. Details concerning some of the plants inspected have been reported in the September, October and November 1960 issues of Products Finishing.

Foreign Corrosion Reports by NACE

The August and September 1960 issues of 'Corrosion' have published reports on Corrosion activities for 1959 in Japan, Switzerland, Germany and New Zealand (This Bulletin, Vol. 9, No. 4, 1960).

European Symposium on Corrosion Inhibitors

The European Symposium on Corrosion Inhibitors (This Bulletin, Vol. 9, No. 3, 1960) was held at Ferrara, Italy on September 29 and 30, 1960. The topics covered various aspects of corrosion inhibition, and 38 papers were presented by scientists from 16 countries: Belgium, Bulgaria, Egypt, France, East Germany, West Germany, India, Italy, Japan, Poland, Sweden, Switzerland, U.K., U.S.A., U.S.S.R. and Yugoslavia. Two papers were contributed from India: 'Inhibition of the Corrosion of Pure Aluminium in Sodium Hydroxide Solutions' by J. Sundararajan and T. L. Rama Char, Bangalore, and 'Studies on Mechanism of Corrosion Inhibition at the Central Electrochemical Research Institute, Karaikudi, India' by K. S. Rajagopalan, Karaikudi. The programme included social gatherings and excursions.

Electrochemistry Seminar

The Second Seminar on Electrochemistry was held at the CECRI, Karaikudi from December 17 to 20, 1960. Eighty-three papers were presented in 8 sessions: electrode kinetics and electrochemical equilibria, electroanalysis, electro-organic products, electro inorganic products, electrothermics and electro-metallurgy, metal finishing and electrodeposition, corrosion, miscellaneous. Scientists from Australia, Austria, France, Japan, Poland, U.K and U.S.A. participated in the Seminar. Abstracts of the papers have been published as a booklet by the CECRI.

Beryllium

The October 1960 issue of Journal of Metals contains 4 articles on beryllium: (1) beryllium research in missile development, (2) fused salt electrorefining of beryllium, (3) recent advances in beryllium metallurgy and (4) nuclear purity beryllium — its manufacture

International Electrotechnical Commission

The November-December 1960 issue of the I S I Bulletin has been brought out as a Special IEC Number. There are many articles of interest including the following: International Standardization in the field of Cables and Measuring Instruments, Power Development in India during the Three Five Year Plans, Electronic Industry in India and Aluminium Conductor Industry in India It also contains a list of IEC Publications together with Indian Standards in the Field of Electrical Technology.

Corrosion Through Industrial Water

An International Meeting on Water Research will be held in Liege, Belgium from June 5 to 7, 1961. The topic for discussion 'Corrosion Through Industrial Water' is divided into 3 sections: general theories; ferrous and non-ferrous metals, materials based on cement, materials based on synthetic products; means of action and protection, corrosion in heat exchangers, settlings in pressure pipes. The meeting is organized by the Belgium Centre for Studies and Documentation on Water, and constitutes the 14th session of European Federation of Corrosion.

Symposium on Nickel-Chromium Plating

The London Branch of the Institute of Metal Finishing, London held a one-day Symposium on Nickel-Chromium Plating on Nov. 16, 1960 in London. The following papers were presented: (1) Developments in nickel plating, (2) Recent developments in decorative plating, (3) Acceptance requirements for nickel-chromium plating and (4) Plating acceptance standards in nickel-chromium plating.

Aluminium on Rails

Some very interesting facts and figures about the use of aluminium were given at a Symposium on 'Aluminium in Railway Rolling Stock' organized by the Institution of Locomotive Engineers and the Aluminium Development Association during May 1960. Starting with 1,000 tons in 1900, world output of the metal has reached an estimated figure of 4.5 million tons in 1960. In 1958 Britain used about 340,000 tons for various purposes: road transport

20, packing 11, railway vehicles 1.5, shipbuilding 1.5 and structural engineering industries 7 per cent. Resistance to corro-ion figured high on the list of reasons for adopting aluminium in railway vehicles. Reduction of maintenance costs was the principal factor affecting the design of the Canadian Railways refrigeration cars, as the corrosive conditions of service subjected the roof and side sheets to brine splash. The London Transport favoured aluminium cars in view of reduction of corrosion damage, elimination of painting and less depreciation.

For external protection against corrosive atmospheres, an anodized finish is reported to be insufficient for surface lines of British Railways. The reduction of maintenance costs in respect to atmospheric corrosion through the use of aluminium was put as not higher than about £35 per vehicle per year. The total weight of aluminium used for refrigerator cars between 1954 and 1959 in Canada is about 1,800 long tons. In production designs at least 10 per cent of the total aluminium weight of prototype refrigerator cars can be eliminated. Aluminium hopper wagons with automatic discharging mechanism designed for the transport of powdered materials such as cement have been constructed in France. Other applications are wagons for the transport of alumina, phosphates and salt.—Corrosion Technology, Vol 7, 306, 1960.

Future Trends in Metal Finishing

The President of the American Electroplaters Society visualises an expansion of metal finishing processes in several new directions. One is in chemical and electrochemical 'machining' or 'milling'. A second area is in the prevention of failure of metal parts subjected to high stresses. A promising direction for progress of the metal finishing industry is to seek to insulate new high strength alloys from embrittlement or corrosion fatigue by application of metallic or chemical compound coatings. This will tend to give freedom to design the basis metal to take fullest advantage of its mechanical properties without worrying about damage from without. On the other hand, the coating can be made to supply heat reflectivity, electrical conductivity, beautiful appearance or other attributes in which the basis metal is lacking.—Industrial Finishing, Vol. 12, No. 14 , 45, 1960.

Exhibition of Scientific and Technical Publications

The National Institute of Sciences of India arranged an exhibition of scientific and technical publications published in India in English and in regional languages since 1935, during December 1960 at New Delhi. This was part of the Silver Jubilee Celebrations of the Institution. The India Section of the Electrochemical Society participated in the Exhibition by displaying copies of the Bulletin as well as the Special Symposium Numbers.

—T. L. R.