



*Abhaya Chandra*



# JOGENDRA KUMAR CHOWDHURY

(1890—1967)

Elected Fellow 1938

## CHILDHOOD AND FORMATIVE YEARS

JOGENDRA KUMAR CHOWDHURY was born on October 10, 1890 at the remote village Lamchar in Noakhali, now in Bangladesh. His father Mr. Kali Chandra Chowdhury was a self-made village patriarch. Fifth among the seven brothers, Jogendra Kumar received special encouragement from his parents for his studies as from the very childhood he showed signs of being intellectually inclined. In his later life Dr. Chowdhury used to mention in particular about his mother's role in inculcating a sense of discipline at childhood, both for his studies and the daily habits, which he thought stood him in good stead throughout his life. He also acknowledged with pride the part played by a village school teacher in making him look ahead and in visualising a future in the pursuit of knowledge. Much later when men like Acharya P.C. Ray influenced greatly his thoughts and actions he still remembered gratefully those like his mother and the school teacher who initially channelised his way of thinking.

As a boy Jogendra Kumar was greatly influenced by the surroundings of his neighbourhood in village Lamchar which was approachable by small river-crafts only. The life of the villagers, unspoilt by any intrusion by suburban life imbued in him a sense of seclusion, a natural instinct of thoughtfulness and a love for simplicity.

## EDUCATION, PROFESSIONAL CAREER AND RECOGNITION

Jogendra Kumar had his secondary schooling at Comilla Zilla School. After standing first in the district in his entrance examination he went to Berhampore Krishnath College where he enjoyed a Government scholarship. He passed his Intermediate and B.Sc. (Chemistry Honours) examinations in 1911 and 1913 respectively. He then joined Presidency College as a post-graduate scholar where he met Acharya P.C. Ray as his teacher and took his M.Sc. degree in 1915 along with Satyendra Nath Bose, Meghnad Saha, Jnan Chandra Ghosh and Jnanendra Nath Mukherjee. A part of his researches with Dr. R.L. Datta for his M.Sc. thesis was published in J.A.C.S. in 1916. For the next four years he served as the Chief Chemist with the Assam Oil Company, Digboi. In 1921 he went



Berlin to work with Professor R.O. Herzog at Kaiser Wilham Institute fur Wasserstoffe Chemie. He was awarded Ph.D. degree in Chemistry of the Berlin University in 1924 based on his thesis titled "Uber Aether von Polysacchariden mit Oxytauren". On his return to India in 1925 he joined the Dacca University as a Reader in Chemistry. In 1939 he became the Professor and Head of the Department of Chemistry and later was the Dean of the Faculty of Science at the Dacca University. He retired from Dacca University after 22 years of service in 1947 and joined The Bose Institute as its first Head of the Department of Chemistry. He finally retired from active research in 1955.

Professor Chowdhury spent all his energy to research and teaching. Although the former was the foremost passion of his life he enjoyed teaching Industrial Chemistry. As a teacher he was somewhat different from others in the department. He was not an orator but he delivered his lectures in clear, simple, lucid statements with not a word less than necessary and not a word in excess. This, coupled with his erudition, earned him admiration and respect of his students. The lectures were so precise, direct and useful that the students would seldom need the use of a text book. The books on Industrial Chemistry were rare in those days. The notes taken from his lectures were used as texts. His reputation as a teacher was indeed high and his students remember him as an inspiring teacher and guide. Many of his students made a mark in life later.

The scientist in him wanted to solve problems with cold and factual data and the orthographic analyst in him placed his results in the form of operative conclusions. This earned him the coveted place in the academic world. He was elected a fellow of the National Institute in 1938 and was the Secretary of the Indian Chemical Society in 1948-49, and later its editor. He became the President of the Chemistry Section of the Indian Science Congress at Poona in 1950.

At different periods, he served as a member of various committees connected with research. Some of those committees are : (i) Chemistry Committee (ICAR), (ii) Fuel Research Committee (CSIR), (iii) Cellulose Committee (CSIR), (iv) Indian Central Jute Committee, (v) Scientific and Industrial Research Committee, Bengal, (vi) Cottage Industry Board, West Bengal etc.

### CONTRIBUTIONS TO SCIENCE

Dr. Chowdhury worked and lived through historic times when there had been great upheavals in this country ultimately leading to its independence. He was a great scholar and an intense patriot. This had a bearing on his activities. As a true nationalist, the welfare of his country was always uppermost in his mind. He was conscious that political and administrative powers are not enough to fight the



appalling poverty of the masses. The panacea lies in improving and increasing industrial production in the country. His interest in human welfare in general was no less than that of his other colleagues but his interest in the welfare of the Indian humanity was more intense. This is why his lines of investigations followed two directions : (i) increasing productivity in general and (ii) mobilising indigenous resources to provide scarce commodities in abundance to meet the industrial needs and generate consumable commodities. With these purposes in view, he relentlessly worked in his laboratory (1) to improve the quality and yield of some of our core productions, e.g., removal of sulphur from our petroleum or coal resources, improve quality of our jute products; and (2) to effect the recovery of useful substances from common, cheap or waste materials, e.g., activated charcoal from rice husks. The theme chosen for his 1950 presidential address of the Indian Science Congress (Chemistry section), namely 'The Utilisation and Disposal of Industrial Wastes : The need for a National Programme' will indicate the basic philosophy of his approach towards science and society. In this speech he tried to focus attention of scientists of a poor country to disposal and utilisation of polluting wastes such as sulphur from coal discards and thrown-away sulphur dioxide, recovery of phenol from waste industrial water, fuels and fertilisers from municipal sewage, fuel and food from forest residues, rare elements from metallurgical slags etc. In 1950, not much attention was paid to his remarks on water and air pollution, but now, after thirty five years of his speech many of the topics are receiving foremost attention in the hands of our environmentalists and Government. Now a few words about his investigations :

Jute is the foremost cash crop of Bengal. But the future of jute was threatened when gunnybags faced a keen competition from synthetic plastic bags. It was imperative to find out an alternative use for this golden fibre and it attracted the attention of Dr. Chowdhury. He made a thorough investigation of the composition of jute and estimated the amounts of raw and  $\alpha$ -cellulose, hemicelluloses, lignin, furfural contents etc. The cellulose content was nearly 70% which was to be obtained by removing the lignin. In previous methods of separation of lignin, mostly halogens or phenolic bodies were used which also attacked the cellulose. Dr. Chowdhury discovered a very significant method in which  $\text{ClO}_2$  was used to remove lignin completely without any effect on the cellulose. He also made a comparative study of jute and cotton celluloses. The two celluloses were chemically similar having same structural units, but physically they differ. The jute celluloses have shorter lengths and hence are poorer in textile quality. But it would be useful for other cellulose industries, such as viscose, surgical cotton, etc. An investigation on the molecular sizes of cellulose from different sources, such as cotton, jute and bamboo gave very interesting results. In fact, some of the schemes pursued in the jute Technological Laboratory later were based on his initial findings. Apart from the studies of uronic acids in jute, he also attempted the production of reducing sugars



from hydrolysis of jute sticks by acids, commonly used only as a fuel. Such hydrolysate should be suitable for alcoholic fermentation or for the culture of fodder yeast. He also initiated work on impregnation of jute yarns with synthetic resins to improve their wet strength and water resistance.

A lasting interest of Dr. Chowdhury was the use of mixed adsorption catalysts. In fact, he applied mixture of such catalysts in different types of reactions. In the desulphurisation in petroleum refining the chemical methods were complicated and also involved losses. He showed that most of the sulphur compounds could be satisfactorily removed by aerial oxidation using alumina-gel as adsorption catalyser. The adsorption capacity is considerably increased if activated charcoal or silica gel be mixed with it. In the adsorption of benzene vapour, the performance of alumina and silica-gel mixture, or bauxite and silica-gel mixture was satisfactory. It had a potential use in coal-gas production. In the vapour phase oxidation of toluene, it was shown that the catalytic activity of nickel or vanadium catalysts could be much improved by impregnation with alumina and silica gel. In the recovery of sulphur from waste gases, the activity of iron-oxide catalyst (to remove  $H_2S$ ) was observed to be increased on addition of  $MnO_2$  and  $Fe_2O_3$ . The decolorisation of reddish kerosene oil and yellowish groundnut oil by mixed adsorbents like bauxite— $Al_2O_3$  or  $Al_2O_3-SiO_2$  is much superior to the use of bauxite or alumina singly.

Parallely, Dr. Chowdhury worked with oils and fats. He introduced a new method, pyridine-permanganate method, for the characterisation and estimation of commonly used oils, such as olive oil, coconut oil, ground nut oil, ghee etc., even in mixtures. The unsaturated oils in some common fishes were identified and estimated. His attempts to produce lubricating oil from polymerization of unsaturated acids in presence of  $SnCl_4$  also succeeded. Among other miscellaneous work of Dr. Chowdhury mention may be made of his attempts to develop insecticides to control water hyacinth. The project met with limited success.

The huge volume of rice husk available in Bengal prompted Dr. Chowdhury to utilise a portion of it in the preparation of activated charcoal, the important adsorbent. Impregnated with boric acid/ammonium borate/ammonium phosphate the husk was carbonised at  $450^\circ C$ . The product was found to have adsorption capacity higher than that of the commercial samples. Betel-nut husk, which is practically a waste material, was also tried for the same purpose. At Dacca, he made some elaborate study of the chemical composition of coal samples collected from Talcher and from Assam coal fields. From aerial oxidation studies he produced evidence for the distribution of oxygen and carbon in coal, the major portion being found to be humic acid. Subsequently, he established an average chemical composition of coal along with the nature of compounds constituting the humic acid. At the Bose Institute, he took up the desulphurisation of Assam coals which was an irritating problem. Assam coals



have high sulphur content where, he proved, it is present as organic groups like thiols, sulphides, disulphides, etc. He showed that pretreatment of the coal with NaCl, MgCl<sub>2</sub>, ZnCl<sub>2</sub> and best of all, steam-ammonia, would remove most of the sulphur during carbonisation.

### PERSONAL LIFE AND PERSONALITY

Dr. Chowdhury married Indira, daughter of Mr. Jogendra Guha Thakurta who was a practising lawyer at the Dacca bar, while he was 28. Indira, brought up under the cross cultural influence of orthodox Hinduism, Brahma revisionist ideas and Swadeshi upsurge of the period, made an excellent partner to Dr. Chowdhury who himself was deeply influenced by the liberal and humanistic values of the west. In the upbringing of their children Dr. Chowdhury emphasized the fostering of an atmosphere of learning in the household and promoted free rational discussions which helped to make the family singularly free from any form of superstition. Each of his three daughters and two sons grew up to make their mark in the field of education and research.

Dr. Chowdhury led a simple unostentatious life with firm faith in honesty and justice. An academician in the truest sense of the word, he was rational, balanced, modest, and upright. He shunned both politics and power, even in academic circle, and was a man of high personal integrity. His interest in humanity in general and especially in the welfare of needy students drew love and esteem from all. Dr. Chowdhury breathed his last on December 20, 1967.

P. C. RAKSHIT

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