Satyendra Nath Bose and his contributions to chemistry

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Satendra Nath Bose is well known as a theoretical physicist round the globe. Besides physics, he had also done good amount of work in organic synthesis and industrial chemistry. His findings in chemical sciences are discussed in this note.

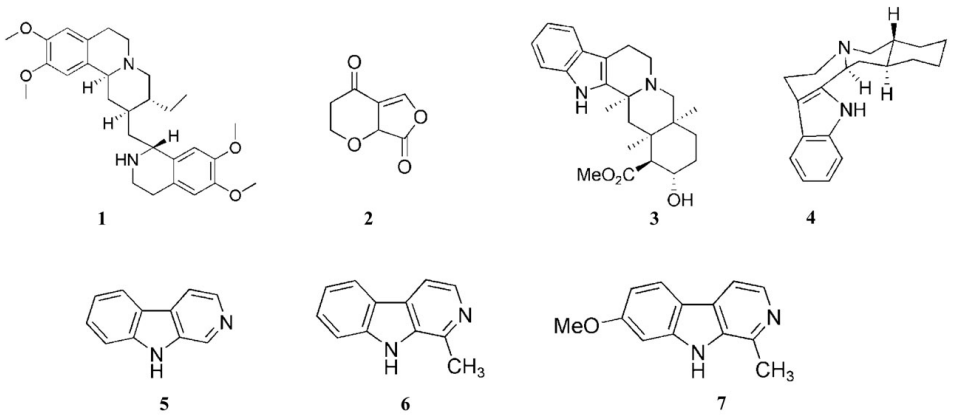
Being a noted physicist of India, Satyendra Nath Bose, interestingly, had a fascination for chemistry as well. As a physicist it would seem proper if he showed interest in bonding theory calculations, properties of electrolytic solutions, which were then being successfully addressed by his classmate and colleague Jnan Chandra Ghosh at Dacca University (presently Dhaka University, Bangladesh). However, he used to synthesize different useful organic compounds and analysed ores which had societal benefits. Unfortunately, most of his chemistry work either remained unpublished or were published without his name[1]. The reasons for his passion in this very field of chemical sciences may be manifold. He might have been be interested in this subject because of his close association with P. C. Rây, the father of modern chemistry in India from his college days[1]. Establishment of a small chemical industry by his father could have influenced Bose to work in the field of chemistry[1]. Moreover, like a few scientists in British India, he had nationalistic feelings. Bose's visit to the laboratory of the famous German chemist Herman Mark in Berlin in 1920s might have aroused his interest in experimental chemistry[2].

Work in Dacca and Calcutta

At Dacca University, Bose developed a sophisticated laboratory where he installed a X-ray diffractometer to work in experimental science along with theory. There he started to work on synthetic organic chemistry. His work on sulphonazide compounds became popular[3]. P. K. Dutta was an associate of Bose in this work; he completed his doctorate degree under the supervision of Bose[4]. After the sudden demise of Bidhu Bhusan Ray, the Khaira Professor post at the Physics department at Calcutta University was lying vacant. Bose was offered the post, which he accepted and joined in 1945 (ref. 5). Interestingly, Ray had built a laboratory with X-ray facility at Calcutta University. Bose now had the privilege to use the facility[5]. He began to synthesize interesting bioactive organic compounds and solve their X-ray structures. Jadu Gopal Dutta (later became professor of Chemistry at The University of Burdwan, Burdwan) joined Bose's laboratory and worked on the synthesis of emetine (**1**, Scheme 1), which is a natural product found in Costa Rica, Panama, Colombia, Brazil, etc. and used as an anti-protozoal drug[6]. Pranabandhu Dutta, under the supervision of Bose, synthesized several γ-pyrone derivatives (**2**, Scheme 1) having patulin-like activities[6] (Patulin is a micotoxin produced by a variety of moulds, in particular, aspergillus, penicillium and byssochlamys. Patulin is commonly found in rotting apples and generally the amount of patulin in apples is considered as a measure of the quality of apples in production). Moreover, the structure and absolute configuration of the alkaloid, rauwolscine (**3**, Scheme 1), the adrenergic blocking drug of *Rauwolfia canescens* were also established[6]. To elucidate stereochemistry and reactivity in heterogeneous ring systems, a detailed study of yohimbane (**4**, Scheme 1), norharman (**5**, Scheme 1), harman (**6**, Scheme 1) and harmine (**7**, Scheme 1) was undertaken under the supervision of Bose.

Work on metallurgy

As mentioned earlier, Bose was very much aware of national interests. The element germanium (atomic number 32) was invented by the German chemist Clemens Winkler in 1886 and named after his country. As soon as the first transistor was made using polycrystals of germanium[7], the element gained



Scheme 1.

importance in the electronics industry round the world. Germanium was mostly recovered from chimney dusts of different refineries in USA and UK then[7]. There were no other sources of the element. At that time Bose collected sphalerite from Nepal and established its suitability as an ore of germanium[7]. This work was done with his friend the then Professor of Chemistry Pulin Bihari Sarkar.

Conclusion

Thus Bose made his mark in different branches of chemical sciences which remained unfocussed during last few decades. These work of Bose should be highlighted in his 125th birth anniversary this year (Bose was born on 1 January 1894). Many of his chemistry work were unpublished[6]. His only available chemistry publication is in the journal *Science and Culture*[3], published by Indian Science News Association established by the joint initiatives of P. C. Rây and Meghnad Saha in 1935. Work on chemistry and related disciplines by Bose proved his efficiency as well as diversity in various subjects. Present generation people should know these to know Bose as a man of multidimensionality.

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