P R E F A C E

The work described in the thesis was carried out in the Nuclear Physics Laboratory of the Department of Physics, University of North Bengal, by the author during August, 1978 to August, 1981 while he was the recipient of U.G.C. Junior Research Fellowship and also during August,1981 to August,1983 as a College Teacher under the Faculty Improvement Programme of the University. The author started and developed the Mössbauer spectroscopy laboratory under the supervision of the in-charge of the laboratory Prof. N. Chaudhuri. His contribution includes the following:

1. The setting up of Mössbauer Spectrometer and its standardisation.
2. The use of Mössbauer technique in the characterisation of the secondary forms of iron in agricultural and forest soils to justify that this technique is suitable for such study.
3. He has started a study to understand the mechanism of alteration of natural ilmenite ($FeTiO_3$) to rutile (TiO_2), a very valuable mineral.

Besides, the author has also participated and contributed to other experimental work carried out in the nuclear physics laboratory, University of North Bengal. A list of publications in collaboration with his colleagues is given below as an additional support for the candidature. Some reprints of the papers are attached with the thesis.

1. Atomic pair production by photons in the threshold region - J. Basu, S.K.Sen Gupta, N.C. Paul, S.C.Das and N. Chaudhuri: Phys. Rev. A, 23 No. 4 (1981) 1817.
2. Atomic Rayleigh Scattering of photons in the vicinity of K-absorption edges - Swapan K Sen Gupta, Niranjan C Paul, Jahnabi Bose, Gopal C Goswami, Satyendra C Das and Nirmalendu Chaudhuri: J. Phys. B. At. Mol. Phys. 15 (1982) 595.
3. A simple method of studying atomic screening effect in pair production - J. Basu, S.K. Sen Gupta, N. C. Paul, G.C. Goswami, S. C. Das and N. Chaudhuri: Nucl. Inst. and Methods, 200 (1982) 265.
4. New measurements of coherent and incoherent atomic scattering factors using radioactive gamma-ray sources - S.K. Sen Gupta, N.C. Paul, J. Bose, S. C. Das and N. Chaudhuri: Nucl. Inst. and Methods, 193 (1982) 395.
5. Mössbauer spectroscopic analysis of iron in soils and rocks in the eastern Himalayan foothill region - S. C. Das, S. K. Sen Gupta, N. C. Paul, N. Bhattacharjee, J. B. Basu and N. Chaudhuri: Ind. J. Pure and Appl. Phys. 21 (1983) p. 376.

6. Experimental study of atomic screening effect in Pair Production near threshold, J. Basu, S.K. Sengupta, N.C. Paul, G.C. Goswami, S. C. Das and N. Chaudhuri: Paper presented at the 2nd. International Symposium on Radiation Physics, University of Sains, Malayasia, May 25th. to 30th., 1982.

7. Application of Mössbauer spectroscopy to the study of oxidation states of iron in agricultural soils; S. C. Das and N. Chaudhuri: Paper presented at the 70th. Session of the Indian Science Congress, Sri Venkateswara University, Tirupati, India, Jan., 1983.

8. A study of secondary forms of iron as plant n nutrient in soils by Mössbauer Technique, S. C. Das, S. K. Sen Gupta, N. C. Paul, G.C. Goswami, J. Basu and N.Chaudhuri: Paper presented at the 13th. Annual Convention of the Indian Society of Agricultural Chemists, Vidhan Chandra Krishi Vishwavidyalaya, Kalyani (India) Nov. 27-28, 1980.

The present ~~His~~ application of Mössbauer technique in the characterization of agricultural and forest soils, in the study of natural ilmenites and the original results of measurements serve to advance the knowledge in the area of applications of Mössbauer spectroscopy.

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9. Application of Mössbauer spectroscopy ~~of~~ to the study of iron in soils and rocks in the eastern Himalayan foot-hill region - S. C. Das, S. K. Sen Gupta & N. Chaudhuri: Ind. J. Pure Appl. Phys. (Communicated).

A C K N O W L E D G E M E N T

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