

SCHOOL OF PHYSICAL SCIENCES

Department of Physics

The Department of Physics aims at Providing opportunities for Post-Graduate teaching and offers research facilities in areas of Physics relevant to the National and regional needs. It is intended to appropriately train the students so that they may be able to tackle various problems using their scientific skill. It is thus hoped to build the scientific man-power required particularly for the North-Eastern region of the country. This was the fourth year of existence of the department.

The Department started a Pre-Doctoral Programme of studies. About half a dozen students attended the four courses which were offered. The second batch of 1.Sc. students took their degree, one in First Division three in Second. In the third batch, seven students have cleared the course requirements for M.Sc degree.

In addition to the students of the departments some college teachers also attended the Pre-Ph.D. programme this year.

Analysis of Student intake.

	Male	Female	Total	ST	SC
M. Sc. (Prev)	5	1	6	0	0
M. Sc. (Final)	7	2	9	1	0
M. Phil	2	2	4	2	0
Ph. D	1	2	3	1	0

Participation by faculty in Symposia/Seminars Workshops etc:

- (1) Discussion Meeting on Non-linear Optics, I.I.Sc.,

Bangalore. Oct., 1979. Dr. A.L. Verma was invited by the Indian Academy of Sciences. Bangalore to Participate.

- (2) DAE Nuclear Physics and Solid State Physics Symposium, Bombay, Dec., 1979. Dr. P. Shukla presented a paper.
- (3) Meeting on Spin-Glass Alloys, Roorkee, Feb., 1980. Dr. P. Shukla was invited speaker and presented two papers.
- (4) National Workshop on Advanced High Energy Accelerator Facility, Bombay, Oct., 1979. Dr. Raghuvir Singh attended.
- (5) Discussion Meeting on Non-linear Optics, Bangalore, Oct, 1979. Dr. Y.S. Jain participated.

Publications :

1. P. Shukla, Theory of neutron scattering by excitons, J. Phys. C 12 5463 (1979) with R.L. Elliott.
2. —do— Spin-glass behaviour in Fe-Al alloys : a microscopic model, Phys. Rev. B21,159(1980) with M. Wortis.
3. R. Singh, Spin alignment in $^{12}\text{C} + ^{12}\text{C}$ inelastic scattering Z. Physik A 296. 187 (1980), with W. Trombik, E. Dunnweber, W. Trautmann, W. Dahma, K.A. Eberhard, W. Hering and D. Konnert.

Department of Chemistry

The Department was established in 1979, to undertake Post-Graduate teaching and research programmes. The M. Sc. teaching programme was framed with an integrated approach comprising major areas of the subject incorporating the current trends and developments. Emphasis is laid on the modern instrumental techniques with a sound theoretical background so that the students are trained to handle the challenging problems in their chosen areas of specification. The Research activities of the Department centre round the individual specializations of faculty members who have been so chosen as to cover major areas of interest in the subject.

Analysis of students' intake

	Male	Female	Total	of which	
				ST	SC
M. Sc (Pre) '79-'80	11	1	12	4	0
M. Sc (Final)	11	1	12	2+1*	0
Ph.D. (Full time)	12	3	15	3	0
**Ph.D. (teacher)	7	0	7	0	0
Post Doctoral	2	1	3	0	0

*From other backward communities.

**Ph.D. candidates : Teachers from affiliated colleges.

The Department was further expanded with the addition of its new building with eight research laboratories, glass blowing laboratory and a library. In addition to the availability of excellent working conditions in the laboratories, there exists a wide range of sophisticated equipments housed in a new building. The establishment of the Instru-

mentation Centre is another important addition to the University.

Awards and Distinction

Dr. (Mrs.) H. Ila, Reader in Chemistry accepted UGC Career award for a period of three years.

Research Projects:

(1) Prof. T.S.B. Narasaraju

"Preparation and characterisation of apatites for use as ionexchangers for the removal of toxic ions" (UGC)

(2) Dr. J. Subramanian

"Electrochemical and ESR studies on Prophyrlins" (CSIR)

(3) Dr. S.N. Bhat

"Charge transfer interaction in biomolecules" (UGC)

(4) Dr. M. K. Mahanti

"Kinetics of Oxidative Cyclizations of Heteracyclic Molecules containing Amine, Imine and Thiol Functions" (UGC).

Seminar and Conferences :

The following faculty members have been invited and presented papers as indicated in the table.

Name	Title of Paper.	Venue
1. Prof. H. Junjappa	Plenary Lecture on 'Keten dithioacetals as potential three carbon fragments'.	Convention of Chemists Kurukshetra (Sept. 1979).

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| 2. Dr. (Mrs) H. Ila | "Novel and Convenient method for synthesis of 2-N-Alkylarylsmino pyrimidines using polarized ketone S, Nacetals. | Convention of Chemists Kurukshetra (Sept. 1979). |
| 3. Dr. S. N. Bhat | (i) Phase diagram studies of charge-transfer complexes.

(ii) Transference Number of charge transfer complexes. | do |
| 4. Dr. M. K. Choudhuri | (i) "Reactions of perchloro-cyclopentadiene with mental carbonyls"
(ii) Studies on Fluoromanganate (III). | do |
| 5. Dr. M. K. Mahanti | "Kinetics and mechanism of oxidation of diphenylmethane by ferricyanide ion in acid media". | |
| 6. Dr. J. Subramanian | (i) "Some aspects of the ESR of Metalloporphyrins."

(ii) 'Basic Principles of ESR'

(iii) "Electronic Structure of metalloporphyrins" | Winter School on Electron Feramagnetic Resonance" IIT, Bombay (Nov. '79).

Summer School on 'Bioinorganic Chemistry, Indian Insti- |

- (iv) "Structural aspects of heme enzymes" tute of Scienne, Bangalore
- (v) "Physico-chemical behaviour of open chain tetrapyrrole pigments". (June-July 1980).

Publications :

1. A novel and convenient synthesis of 2-amino-4-aryl allylamino pyrimidines using polarized keten S, S-Acetals, A. Kumar, V. Aggarwal, H. Ila and H. Junjappa, *Synthesis*, 748 (1980).
2. Newer Synthesis methods. One-Step synthesis of Methylacetates from Acetopoenones using Lead Tetraacetate, B. Myrboh, H. Ila and J. Junjappa, *Synthesis*, 1980.
3. A new general method for the Synthesis of 1-Substituted-4-aryl-s-Methylthio-2-aminopyrroles using ketoken S.S Diacetals, A. Apparao, H. Ila and H. Junajppa, *Synthesis*, 1980.
4. Potential antifertility agents-Synthesis of 3-(phydroxyphenyl)-4-(3-oxecyclopentyl) hexane and 3-(phydrozyphenyl)-4-(3-oxecyclehexyl) hexane and attempted Synthesis of 3-p-(hydroxyphenyl)-4-(.-methyl-5-oxocyclopentyl)-hexane, V. Debrai, H. Ila and Nitya Nand, *Indian J. Chem*, 18 B, 152 (1979).
5. Determination of solubility products of hydroxyapatities, clorapates and their solid solutions, T.S.B. Narasaraju, U.S. Rai and K.K. Rao, *Canadian J. Chem*, 57, 1919 (1979)
6. Some thermedynamic aspects of dissolution of solid solutions of hydroxyapatities of phosphorus and arsenic,

- T.S.B. Narasaraju and U.S. Rai, *Canadian J. Chem.* 57, 2662, (1979)
7. Preparation and characterization of hydroxyapatites of phosphorus and arsenic and their solid solutions T. S.B. Narasaraju and U.S. Rai. *Indian J. Chem.* 17 A, 293 (1979).
 8. Nature of Water in Hydroxyapatites of phosphorus and arsenic and their solid solutions, T.S.B. Narasaraju. K.K. Rao and U.S. Rai, *Indian J. Chem.* 18A, 257 (1979).
 9. Preparation and characterization of solid solutions of hydroxyapatite and chlorapatite, T.S.B. Narasaraju, U.S. Rai and K.K. Rao, *Indian J. Chem* 18A, 168 (1979)
 10. Synthetic oxygen carriers; R. Singh and J. Subramanian, *J.Sc. and Ind. Res.* 00, (1980.)
 11. Surface tension measurements in the study of molecular complexes R.A Singh, S.P. Mishra and S.N. Bhat, *Proc. Ind. Acad Sci*, 89, 139 (1980).
 12. Thermal Reactions of perchlorocyclopentadienes with iron carbonyl, M.K. Choudhuri, *Indian J Chem* 19 A 125 (1980).
 13. Synthesis and studies on alkali metal pentafluoromanganates (IV), M.K. Choudhuri, J.C. Das and H.S. Dasgupta, *J. Inorg. Nucl. Chem.* 1980.
 14. Mass spectrometry of metal compounds-I. Mass spectra of $Mn(CO)_5Cl$. Evidence that C-O cleavage competes with Mn-C and Mn-Cl cleavages, M.K. Choudhuri, H.S. Dasgupta, N. Roy and D.T. Khathing, *J. Organometallic Chem.* 1980.
 15. Fixation of double bonds in bicyclic (4.1.0) hepta-1,3,5, triene, using molecular orbital calculations, M.K. Mahanti,

- Indian J. Chem, 198, 149 (1980).
16. Application of Environmental Relaxation Model to the transport behaviour of glassforming melts, N. Islam and Ismail K. C. Polymer Sci. 17, 4021 (1979).
 17. Modified Frenkel equation and isothermal concentration dependence of Walden Product, N. Islam, Ismail K and Anwar Ali, Indian J. Chem. 19 A, 254 (1980).
 18. Viscometer-cum-deductivity cell, K. Ismail and N. Islam, Indian J. Chem. Chem Education 7, 17 (1980).
 19. Mass spectral studies of 2-mercapto pyrimidines, S.M. Sondhi, M.P. Mahajan and N. K. Ralhan, J. India Chem. Soc. 56, 390 (1979).
 20. Studies in heterocyclics : Part IX : S.M. Sondhi, M.P. Mahajan and N. K. Ralhan, Indian J. Chem, 178 632(1980)
 21. Mass Spectral studies on thiazolo triazapines, S. M. Sondhi, M.P. Mahajan and N. K. Ralhan, J. Indian Chem Soc., 57 (1980).
 22. Alkali metal induced transformations of cis 1,2-dibenzyl alkenes, B. Pandey, M. P. Mahajan and M. V. George, Angew. Chem Intl. Ed. (eng) (1980).
 23. Revelation of Pentacyclo (6.2.1.0^{2,7}0^{4,10}0^{5,9}) udnecone oxabird cage equilibrium by ¹³CNMR spectroscopy, G. Mehta, V. Singh, P. N, Pandey. B. Choudhuri and H. Duddeck Chemistry Letters, 59 (1980).

Department of Mathematics

The Department of mathematics a constituent unit of the School of Physical Sciences completed the sixth year of its existence in 1980. The Department aims at the intellectual, academic and cultural uplift of the people of the North-Eastern Region in imparting good grounding in mathematics, and in providing facilities to students in fields like Statistics, numerical analysis, operation research and other applications of mathematics which are suited to jobs in this Region and to jobs likely to come up in the near future and to develop a strong centre of advanced research in mathematics so as to enable students of this Region to play a significant role in the scientific development in India and abroad as well.

In the beginning, the Department was mainly oriented towards Pure Mathematics. Now efforts are being made to create a group of people interested in Statistics and other applications of Mathematics which may in turn be helpful in training students in the directions having better job potential. In view of the fact that teachers and statisticians will be in great demand in the North-Eastern Region, the Department has altered the syllabus of the M.Sc. programme from 1979 and made it more broadbased with the inclusion of various courses such as mechanics and statistics. The Department at present offers M. Sc., M. Phil and Ph. D. programmes.

Break up of students' intake :

Year	Male	Female	Total	of which SC	ST
M. A/M. Sc. I Semester ('79-'80)	15	5	20	1	2
M. A/M. Sc. III	2	2	4	—	—
M. Phil.	1	—	1	—	—
Ph. D.	—	1	1	—	—

Research Activities :

The following table gives the name of students who got their M. Phil from the Department in 1979-80.

Name	Title	Supervisor
1. Miss S. P. Choudhury	"Projective Module over a certain class of Rings and Serre's conjecture."	Dr. P. Jothilingam
2. Mr. P. Rajkhowa	"Cohomology of Groups and some applications."	do

Publications :

1. Mr. B. K. Dev Sarma "Flow in a horizontal circular cylinder bounded by porous medium", Acta Mechanical 1979, 34, pp. 251-255
2. Mr. S. Ramasubramaniam "An elementary proof of Girsanov's formula, Sankhya" The Indian Journal of Statistics, 1979, Vol. 41, Series A, Pts. 3 and 4, pp. 263-270.