



ONE AND TWO DIMENSIONAL NMR SPECTROSCOPY FOR CHEMISTS

PROF. N. SURYAPRAKASH

Department of Chemistry
Indian Institute of Science

INTENDED AUDIENCE : It is for chemistry students, pharmaceutical students, biology students

INDUSTRIES APPLICABLE TO : The pharma industries, such as, sun pharma, syngine, Biocon, Bal pharma, Aurigine, etc..

COURSE OUTLINE :

In this course, I will discuss fundamental concepts of NMR spectroscopy, experimental determination of NMR spectral parameters, their interpretation, selective and broadband homo and Heteronuclear spin decoupling, numerous examples of the analysis of NMR spectra of ^1H , ^{13}C and other heteronuclei will be given. The relaxation processes, their measurement and utility in understanding molecular dynamics, the polarization transfer mechanism, the spectral editing techniques, such as, APT, DEPT, INEPT will also be discussed. Two dimensional NMR and the commonly employed experiments, viz., COSY, TOCSY, HSQC, HMQC, HMBC, NOESY, etc will be discussed with number of examples. The practical aspects of one and two dimensional NMR data acquisition and processing will also be highlighted. The solid state NMR, magic angle spinning and cross polarization will also be discussed.

ABOUT INSTRUCTOR :

Prof. N. Suryaprakash has been carrying out research in NMR spectroscopic methodological developments and applications. His research achievements have received world wide recognition, appearing in more than 150 publications in peer reviewed journals of National and International repute, which include several invited book chapters and presented the work in more than 140 occasions in various meetings around the world.

COURSE PLAN :

Week 1: Conceptual Understanding of NMR Spectroscopy

Week 2: NMR Spectral Parameters I (Chemical Shifts)

Week 3: NMR Spectral Parameters II (Scalar and Dipolar Couplings)

Week 4: Analysis of ^1H NMR spectra with numerous examples

Week 5: Selective and Broadband, Homo and Heteronuclear Decoupling, with examples

Week 6: Analysis of NMR spectra of ^{13}C and many other Heteronuclei

Week 7: Polarization transfer and spectral editing techniques, APT, DEPT and INEPT

Week 8: Introduction to Multi-Dimensional NMR

Week 9: Analysis of 2D COSY, TOCSY, HSQC, NOESY spectra with examples

Week 10: Practical Aspects of obtaining high resolution NMR spectra

Week 11: Relaxation processes, their measurement and utility in understanding molecular dynamics

Week 12: NMR in solid state, Magic Angle Spinning and Cross polarization