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## 5. Molecular Spectroscopy: A Theoretical Approach

Course Coordinator: Dr Akshatha R. Salian

**Objectives :** Fundamentals of Molecular Spectroscopy is a 30 hours Certificate online course aims at understanding the basic principles of molecular spectroscopy. On completion of this course, the candidate will be able to solve any questions that will be asked in the interviews and competitive exams.

**Eligibility :** All B.Sc./ M. Sc students who have studied chemistry at PUC level.

**Contents:** Introduction: Electromagnetic spectrum, interaction of electromagnetic radiation with matter, types of molecular spectra, factors contributing width and intensity of spectral lines. Rotational spectroscopy: Classification of molecules, rotational spectrum of rigid diatomic molecule, isotope effect on rotational spectra and numericals. Vibrational spectroscopy: simple harmonic oscillator, vibrational motion of a diatomic molecule, force constants and bond strengths, zero point energy, anharmonicity of molecular vibrations and its consequences, Morse potential energy diagram, normal modes of molecular vibrations and numericals. Raman spectroscopy: theories of Raman effect, Rule of mutual exclusion.

**Learning outcomes:** - After successful completion of this course, candidate will have a firm foundation in the fundamentals of molecular spectroscopic techniques.