

CHAPTER OVERVIEW

15: Lasers, Laser Spectroscopy, and Photochemistry

The word 'laser' is an acronym for "light amplification by stimulated emission of radiation." The use of lasers in science and in society has rapidly expanded since their development in the early 1960s. Lasers provides chemists with a powerful and versatile tool for probing the nature of and dynamics of species and chemical reactions. This chapter will discuss the foundations of lasers and the interaction of their output toward understanding atomic and molecular properties. We will describe the generation of laser light from electronically excited atoms using the rate-equation model developed by Einstein. Modern laser designs and applications will then be discussed.

[15.1: Electronically Excited Molecules can Relax by a Number of Processes](#)

[15.2: The Dynamics of Transitions can be Modeled by Rate Equations](#)

[15.3: A Two-Level System Cannot Achieve a Population Inversion](#)

[15.4: Population Inversion can be Achieved in a Three-Level System](#)

[15.5: What is Inside a Laser?](#)

[15.6: The Helium-Neon Laser](#)

[15.7: Modern Applications of Laser Spectroscopy](#)

[15.E: Lasers, Laser Spectroscopy, and Photochemistry \(Exercises\)](#)

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