

Study Guide: Light and Quantized Energy

(Chemistry Textbook p. 136 – 145)

Standard 8: Understand the electromagnetic spectrum & the mathematical relationships between energy, frequency, and wavelength of light.

Standard 9: Calculate the wavelength, frequency, & energy of light using Planck's constant and the speed of light

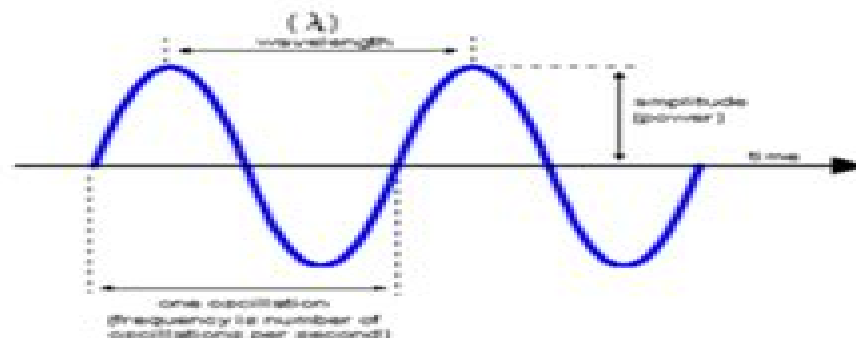
LIGHT AND ATOMIC SPECTRA

Much of what we know about the atom has been learned through experiments with light; thus, you need to know some fundamental concepts of light in order to understand the structure of the atom, especially the placement of the electrons.

The speed of light in a vacuum is the most accurately-known constant in the universe. You should memorize the value for the speed of light because we will be using it extensively.

The speed of light (c) in a vacuum is 3.0×10^8 meters per second.

Light actually has a "dual" nature (or split personality) because there are instances in which it behaves like a wave and other times when it behaves like a particle and sometimes as both. When we consider light as a wave, we must be able to describe its wavelength, its frequency and its velocity.



- (1) **wavelength is represented by the Greek letter lambda (λ)** which looks like an upside down "y". It is the length between corresponding parts of adjacent crests and can be expressed in ANY units of length you choose (feet, inches, meters, kilometers, miles) but normally we choose meters or nanometers as the most common units for wavelength.
- (2) **frequency is represented by the Greek letter nu (ν)** which looks like a "v". Frequency is the number of wave crests which pass a given point in 1 second. Its units are therefore (most commonly) cycles/second or sometimes simply /sec. The unit "Hertz" (abbreviated Hz) is also used as a label for frequency, although this label seems to be gradually going out of existence.

Example 3-8 Does a longer or a shorter wavelength have a greater frequency?

Example 3-9 What mathematical relationship can you draw about wavelength and frequency?

Study Guide Light And Quantized Answer

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Study Guide Light And Quantized Answer:

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Student Study Guide to accompany Chemistry Martin Silberberg, Libby Weberg, 2005-01-06 *Study Guide* Joseph J. Boyle, Douglas C. Giancoli, 1998 2000 2005 State Textbook Adoption Rowan Salisbury

Matter and Interactions I Ruth W. Chabay, Bruce A. Sherwood, 2007 The overall goal of this calculus based text is to provide an introduction to physics with a modern point of view It emphasizes the atomic nature of matter macro micro connections and modeling complex physical systems The approach is designed to go beyond low level physics and to build upon readers prior preparation The first volume deals with mechanics and thermal physics in a unified way with strong emphasis on atomic level description and analysis The ball and spring model of solids is a major theme culminating in computing the specific heat as a function of temperature for an Einstein solid using the concepts of statistical mechanics

Study Guide for Chemical Principles, Fourth Edition, by Dickerson, Gray, Darensbourg, and Darensbourg Patricia L. Samuel, 1984 **Student Study Guide for General Physics with Bioscience Essays** Jerry B. Marion, 1978

The Challenging Questions Antonino Zichichi, 2013-11-21 During July August 1989 a group of 75 physicists from 52 laboratories in 16 countries met in Erice for the 27th Course of the International School of Subnuclear Physics The countries represented were Austria Bulgaria Canada China Denmark France the Federal Republic of Germany Hungary India Italy Pakistan Poland Switzerland United Kingdom and the Union of the Soviet Socialist Republics and the United States of America The School was sponsored by the European

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