N16 – Atomic Structure and Periodicity

Target: I can calculate things related to energy waves such as wavelength, frequency, and energy as they relate to chemistry concepts.

<u>N16 – Atomic Structure</u> <u>and Periodicity</u> Waves and Math

Electromagnetic Radiation

Propagates through space as a wave – moving at the speed of light

$$\mathbf{c} = \mathbf{v}\lambda$$



c = speed of light, a constant $(3.00 \times 10^8 \text{ m/s})$ ν = frequency, in units of hertz (hz, sec⁻¹) λ = wavelength (meters) Careful! Careful! Sometimes in MHz = x 10⁶ Hz nm = x 10⁻⁹ m

Types of Electromagnetic Radiation



Energy of EMR

Energy (E) is directly proportional to the frequency (v) of the radiation

$$E = hv$$

E = Energy, in units of Joules (kg·m²/s²) *h* = Planck's constant (6.626 x 10⁻³⁴ J·s) v = frequency, in units of hertz (hz, sec⁻¹)

Parts of a Wave



Relationship between λ , ν and E



Wave Interference

Linear Superposition – when waves come together the result is the sum of the waves



In Phase Constructive Interference Additive



Out of Phase Destructive Interference Cancellation

Game of Rearranging and Substitution!

Common Arrangements:



Game of Rearranging and Substitution!

Other Useful Equations:



Link to YouTube Presentation

https://youtu.be/SWV-OEPv3R4