

Hydrogen emission spectrum

- 1) How is an electron able to transition from a lower to a higher energy level?
- 2) How is an electron able to transition from a higher to a lower energy level?
- 3) What do the black lines on an absorption line spectrum represent?
- 4) What do the coloured lines on an emission line spectrum represent?
- 5) What do you notice about the coloured lines on the emission line spectrum?
- 6) Electron transitions to $n=1$ emit what type of electromagnetic radiation?
- 7) Electron transitions to $n=2$ emit what type of electromagnetic radiation?
- 8) Electron transitions to $n=3$ emit what type of electromagnetic radiation?
- 9) Rank the three types of electromagnetic energy in questions 6, 7 and 8 in terms of their energy, from highest to lowest.

Answers:

1) Electrons can absorb discrete (exact) amounts of energy to transition from lower to higher energy levels.

2) Electrons can emit discrete (exact) amounts of energy to transition from higher to lower energy levels.

Energy is emitted or absorbed in the form of photons (packets of energy).

3) The black lines on an absorption line spectrum represent the energy (or wavelengths/frequencies of visible light) absorbed by an electron as it transitions from a lower to higher energy level.

4) The coloured lines on an emission line spectrum represent the energy (or wavelengths/frequencies of visible light) emitted by an electron as it transitions from a higher to lower energy level.

Visible light (as with all other types of electromagnetic radiation) can be described by its energy, frequency, or wavelength.

5) The coloured lines on the emission line spectrum converge (get closer together) at high energy (red light is low energy, violet light is high energy).

6) UV radiation

7) Visible light

8) Infrared radiation

9) UV > Visible light > infrared