Paramagnetic - attracted to a magnetic field; unpaired e^-

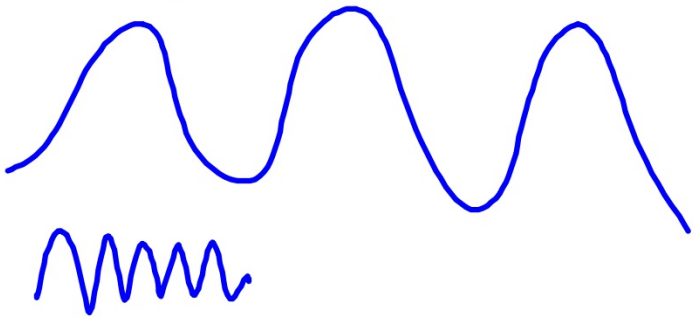
Diamagnetic - not attracted to a magnetic field; no unpaired e^-

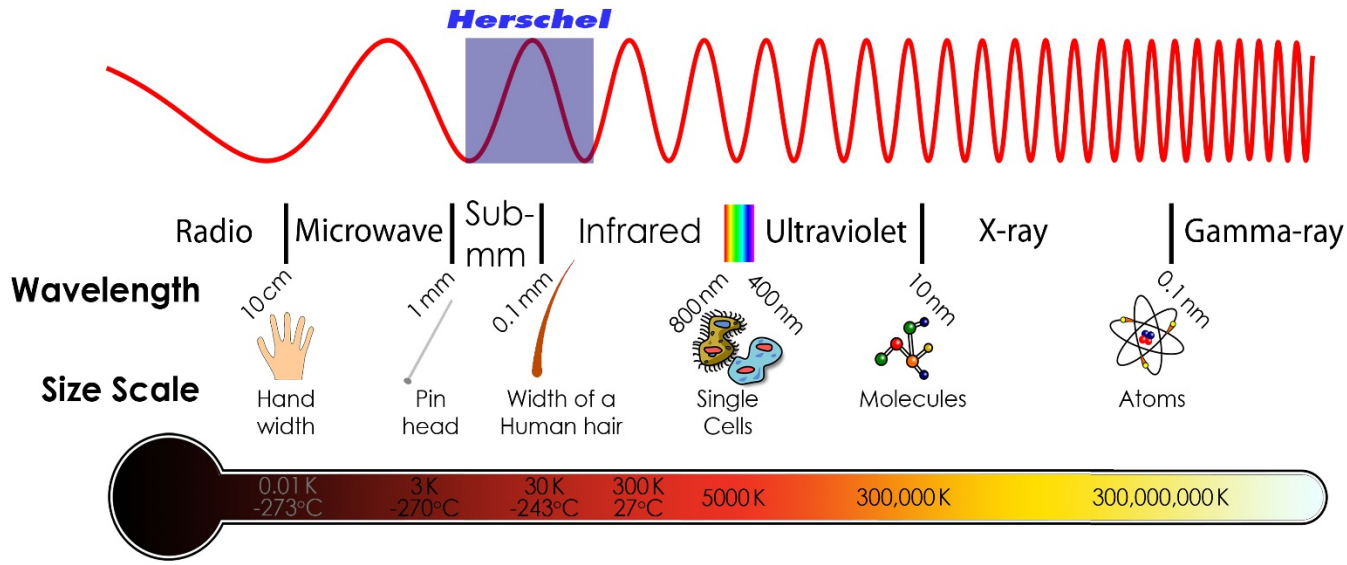
$c = \lambda\nu$ ✓ c = speed of light = 3.00×10^8 m/s λ = wavelength ν = frequency

$E = h\nu$ ✓ E = energy of a photon h = Planck's constant = 6.626×10^{-34} J s

$E_n = \frac{-B}{n^2}$ n = energy level (1,2,3,...) $B = 2.179 \times 10^{-18}$ J

$\Delta E = E_{final} - E_{initial}$ ✓



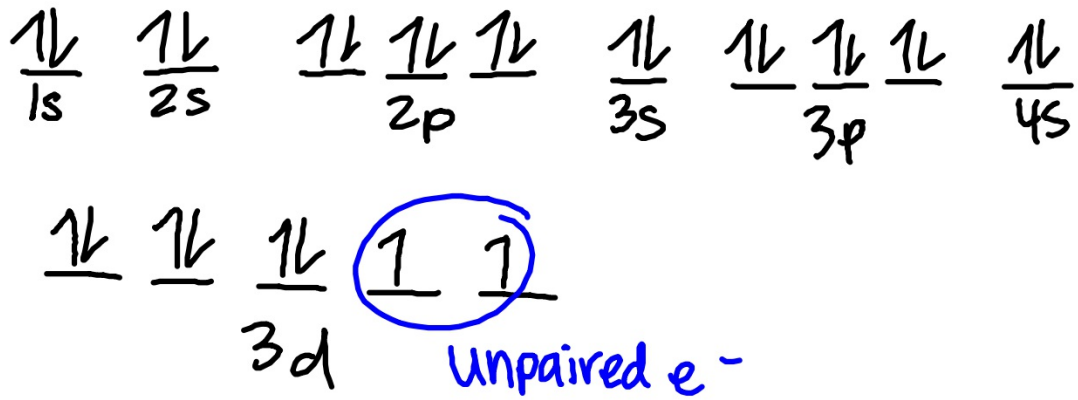


1. Write the electron configuration of nickel and Ni (II) ion.

Ni = 28 e^- $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$

Ni^{2+} = 26 e^- $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$

2. Is nickel paramagnetic or diamagnetic?



Unpaired e-

Paramagnetic

3. For each energy level transition, state whether energy is absorbed or emitted. = losing

a. n = 2 to n = 4 gain/absorb

b. n = 5 to n = 3 lose/emitted

c. n = 3 to n = 2 emitted

d. n = 3 to n = 1 emitted

4. If an electron emits 2.616×10^{-19} J of energy. What is the wavelength of the electromagnetic radiation that is emitted?

E

λ

$E = h\nu$

$2.616 \times 10^{-19} J = (6.626 \times 10^{-34} J \cdot s)\nu$

$\nu = 3.948 \times 10^{14} \frac{1}{s}$

$c = \lambda\nu$

$\lambda = \frac{c}{\nu}$

$\lambda = \frac{3 \times 10^8 m/s}{3.948 \times 10^{14} \frac{1}{s}} = 7.60 \times 10^{-7} m$

5. A gamma ray has a wavelength of 6.12×10^{-14} m. How much energy does it have?

$\nu = \frac{3 \times 10^8 m/s}{6.12 \times 10^{-4} m} = 4.902 \times 10^{21} \frac{1}{s}$ or Hz

$E = h\nu$

$E = (6.626 \times 10^{-34} J \cdot s)(4.902 \times 10^{21} \frac{1}{s})$

$E = 3.25 \times 10^{-12} J$

6. A radio wave has a wavelength of 3.41×10^2 m. How much energy does it have?

$\nu = \frac{3 \times 10^8 m/s}{3.41 \times 10^2 m} = 8.798 \times 10^5 \frac{1}{s}$

$E = (6.626 \times 10^{-34} J \cdot s)(8.798 \times 10^5 \frac{1}{s})$

$E = 5.83 \times 10^{-28} J$

longer wavelength = low frequency = low E

shorter wavelength = high frequency = high E