(velocity)=(wavelength)(frequency) → $c = \lambda \nu$

$E = eV = h\nu$ $\Big\}$ $eV = hc/\lambda$

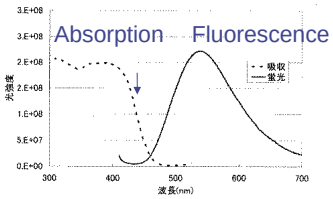
Photon energy

$$E = \frac{(6.62\times10^{-34}\,\mathrm{Js})(3\times10^{8}\,\mathrm{m/s})}{(1.6\times10^{-19}\,\mathrm{J/eV})\lambda} = \frac{(1.24\times10^{-6}\,\mathrm{m\cdot eV})}{\lambda} = \frac{(1240\,\mathrm{nm\cdot eV})}{\lambda}$$

or 1 eV = 1.24 μm $\quad E = \dfrac{(1240\,\mathrm{nm\cdot eV})}{\lambda}$

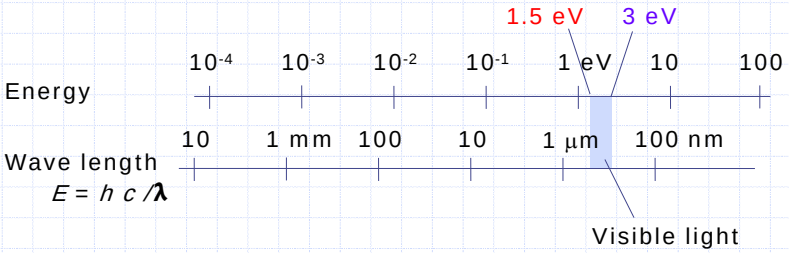
for example Alq3 2.8 eV → 443 nm

Absorption edge

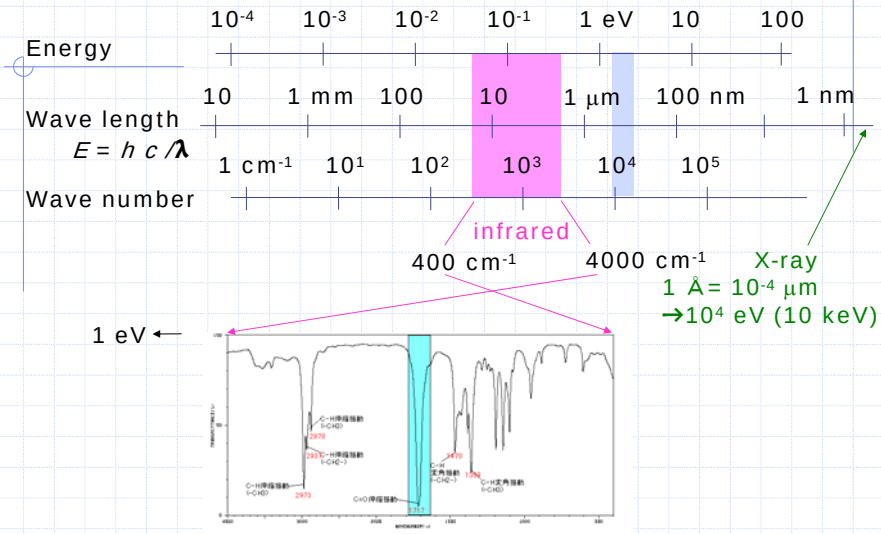



Visible light: 400 ~ 800 nm

3.1 ~ 1.5 eV




1/λ → 1 eV = 8065 cm-1 Wave number





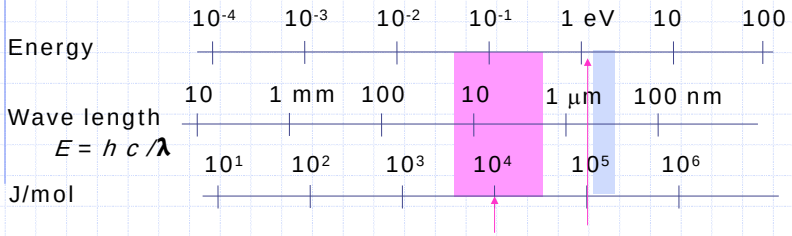

Infrared spectrum ← molecular vibration

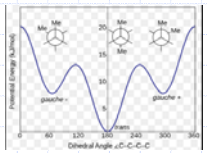
1 eV = $eN_A$ = (1.6x10-19 J)(6x1023 /mol) = 96000 J/mol

Avogadro Number Faraday constant

Faraday constant = Charge of 1 mol electrons (C/mol)

= eV ⇔ J/mol conversion



Chemical Reactions

Enthalpy of combustion

$H_2$: 286 kJ/mol

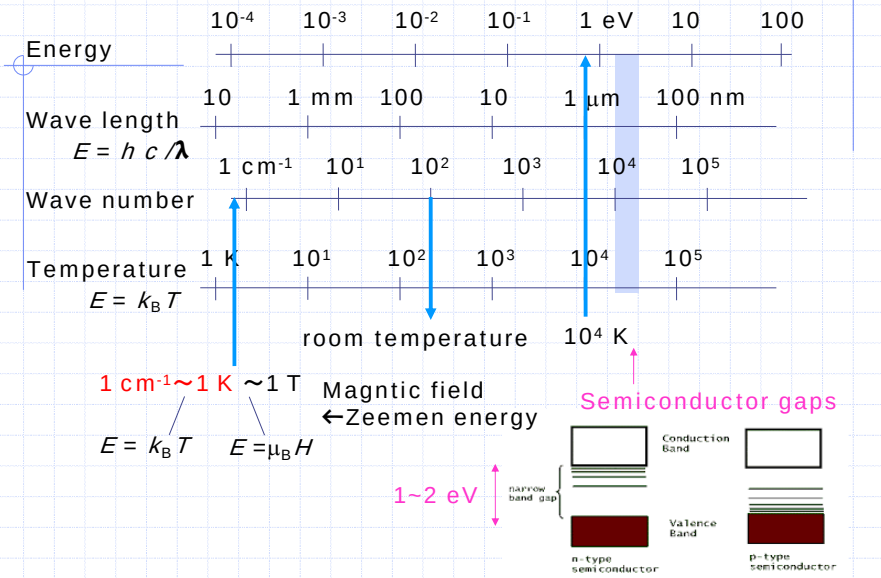
Enthalpy of vaporization

$H_2O$: 41 kJ/mol

Photoexcitation

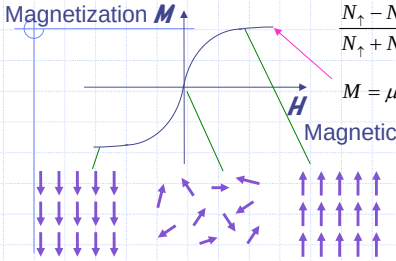
→ Chemical reactions

1 eV = $k_B T$ = (1.6x10-19 J)/(1.38x10-23 J/K)=11600 K



$E = \mu_B H$ = (9.27x10$^{-24}$ J/T)/(1.6x10$^{-19}$ J/eV)=0.58x10$^{-4}$ eV/T

1 eV = 0.58x10$^{-4}$ T or 1 K = 0.67 T → 1 K ~ 1 T




$$\frac{N_\uparrow - N_\downarrow}{N_\uparrow + N_\downarrow} = \frac{e^{\mu H/k_B T} - e^{-\mu H/k_B T}}{e^{\mu H/k_B T} + e^{-\mu H/k_B T}} = \tanh\frac{\mu_B H}{k_B T}$$

← 1 T ~ 300 T
← 1 K ~ 300 K

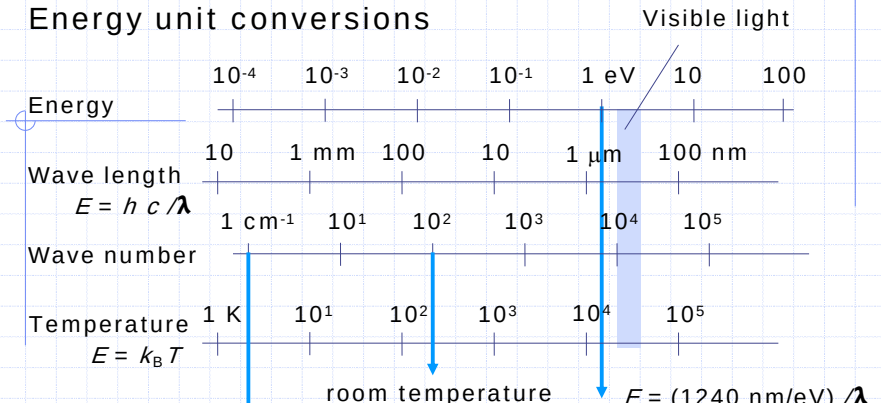
$$M = \mu_B(N_\uparrow - N_\downarrow) = N\mu_B \tanh\frac{\mu_B H}{k_B T}$$

1 T

8 T

45 T

## Energy unit conversions




1 cm$^{-1}$~1 K ~1 T

Magntic field

$E = k_B T$ $E = \mu_B H$

1 eV = 1.24 μm $eV = hc/\lambda$
= 8065 cm$^{-1}$
= 11605 K $E = k_B T$
= 0.96x10$^5$ J/mol or C/mol
$eN_A$ Faraday const.
=1 mol charge

1 eV ~ 1 μm ~10$^4$ cm$^{-1}$
~10$^4$ K ~ 100 kJ/mol