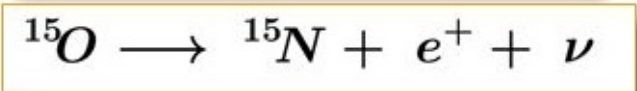
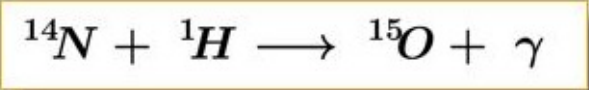
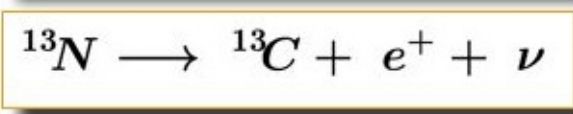
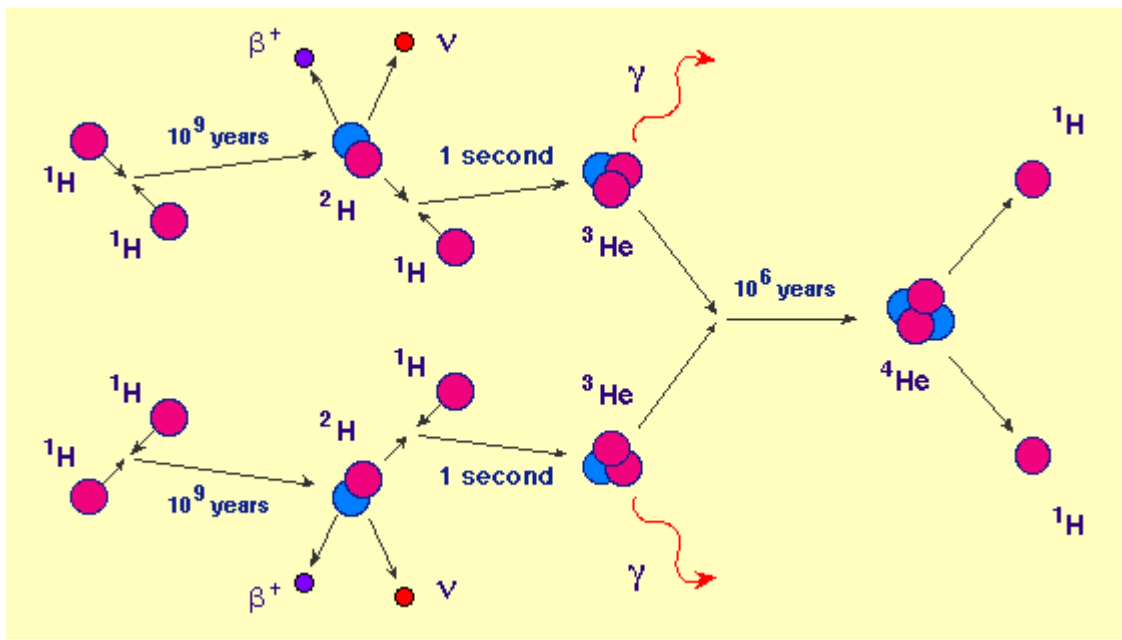
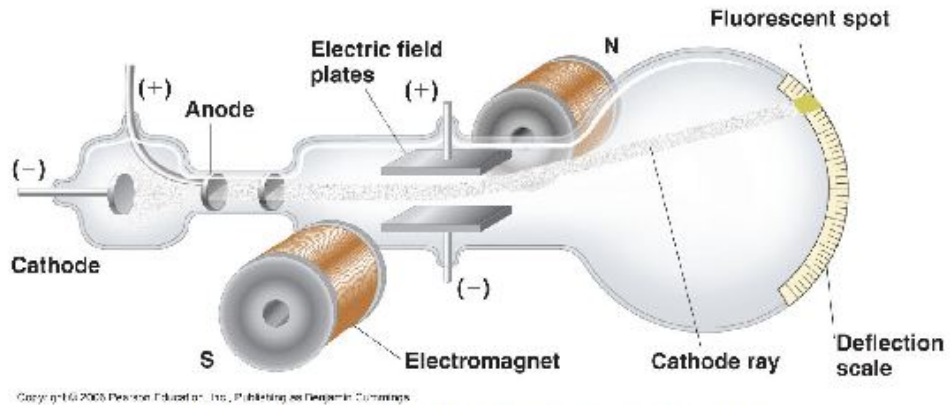


Hydrogen in



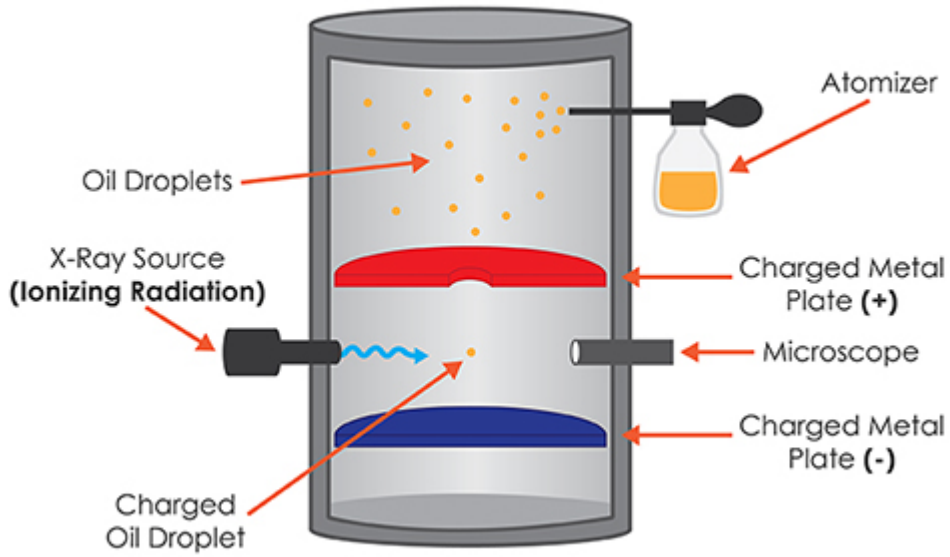
Helium out

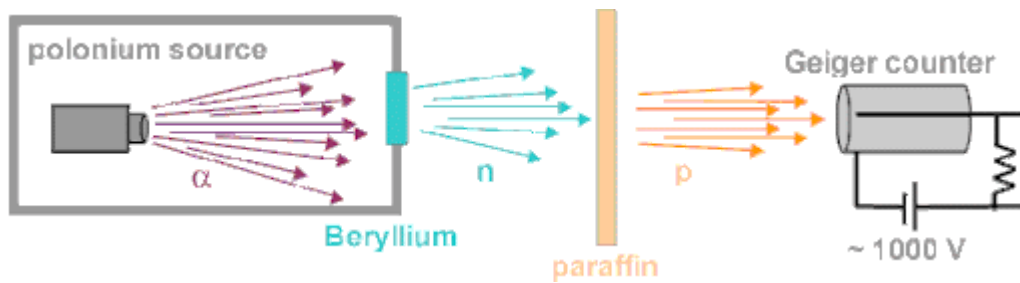
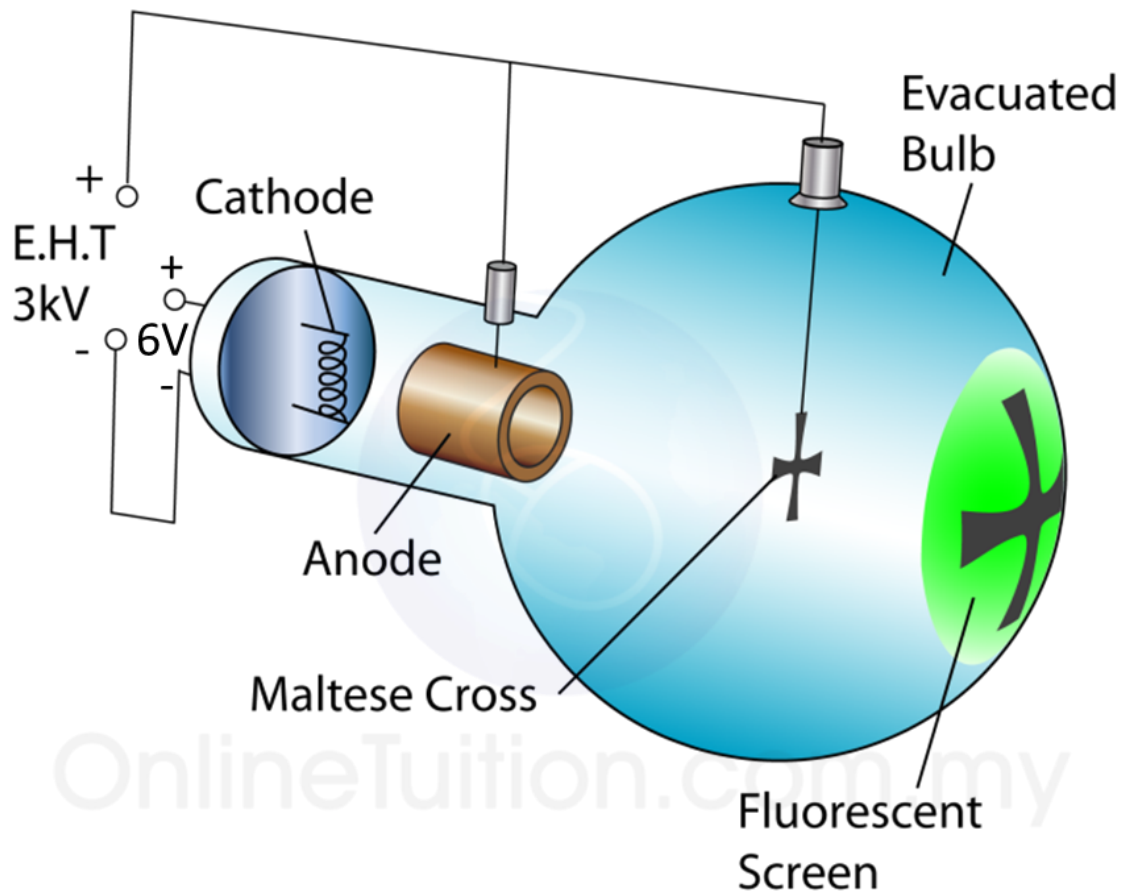


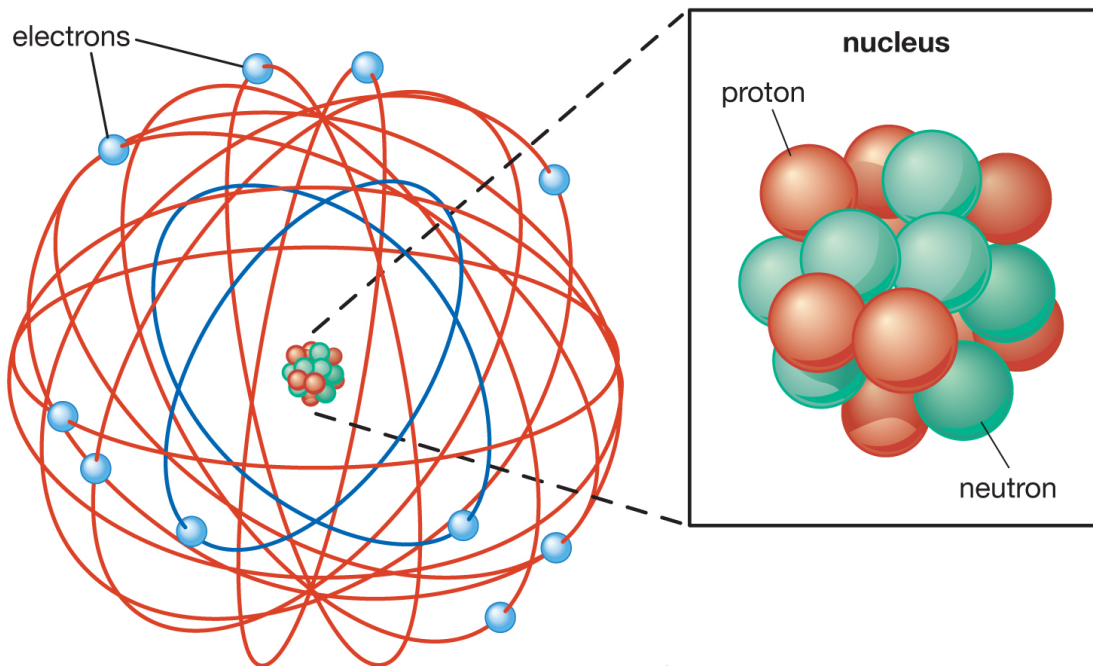


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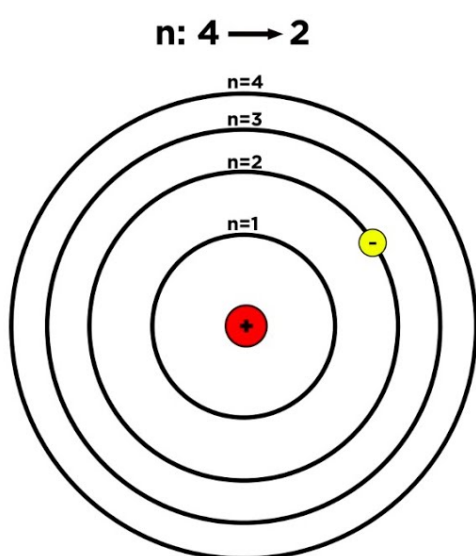
Figure 1: Schematic of J.J. Thomson's experiment.







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$$\Delta E = -R_H \left(\frac{1}{n_f^2} - \frac{1}{n_i^2} \right)$$

$$\Delta E = -R_H \left(\frac{1}{2^2} - \frac{1}{4^2} \right)$$

$$= -2.179 \times 10^{-18} \text{ J } (0.1875)$$

$$= -4.09 \times 10^{-19} \text{ J}$$

$$|\Delta E_{\text{electron}}| = E_{\text{photon}}$$

DOS SCHRÖDINGER EQUATION

$$i\hbar \frac{\partial \psi}{\partial t} = \frac{-\hbar^2}{2m} \frac{\partial^2 \psi}{\partial x^2} + V \cdot \psi$$

P.E. ↙

IN
6⌚ SECONDS ↘ K.E.

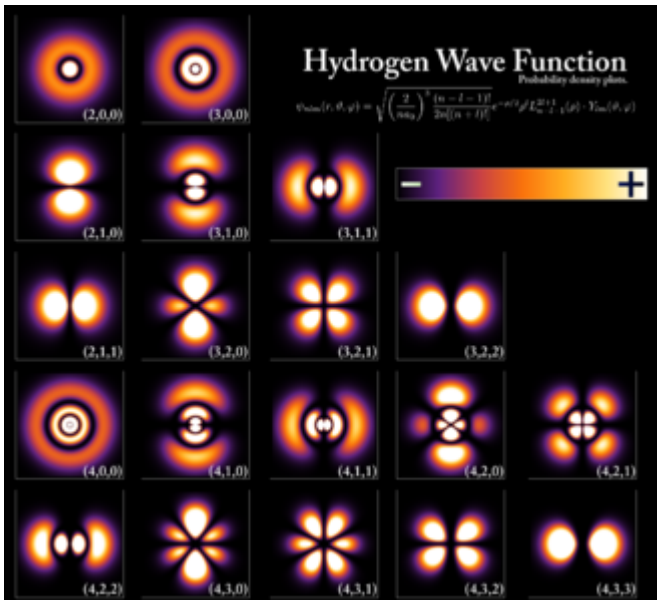
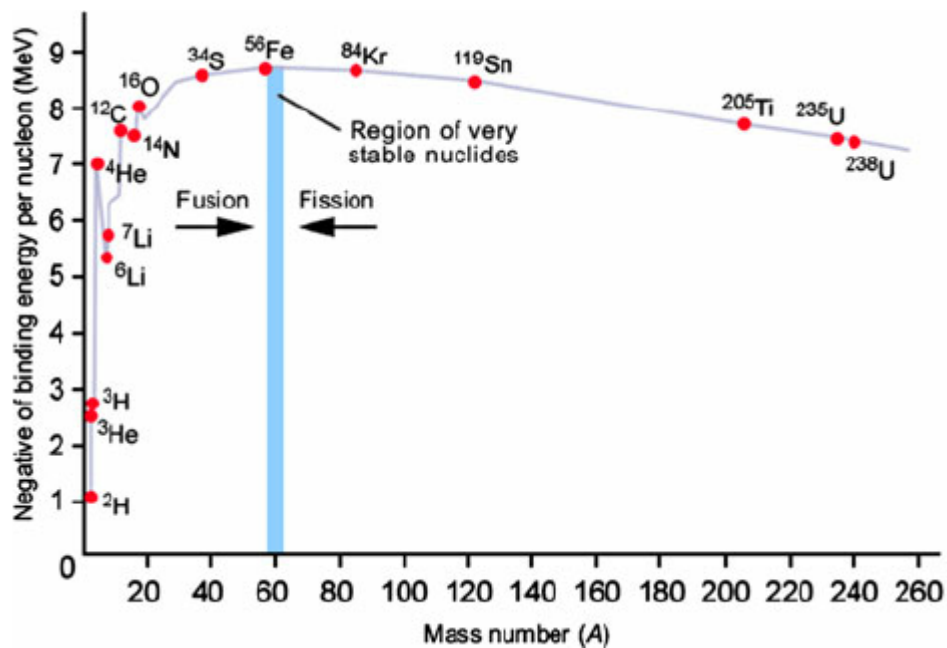
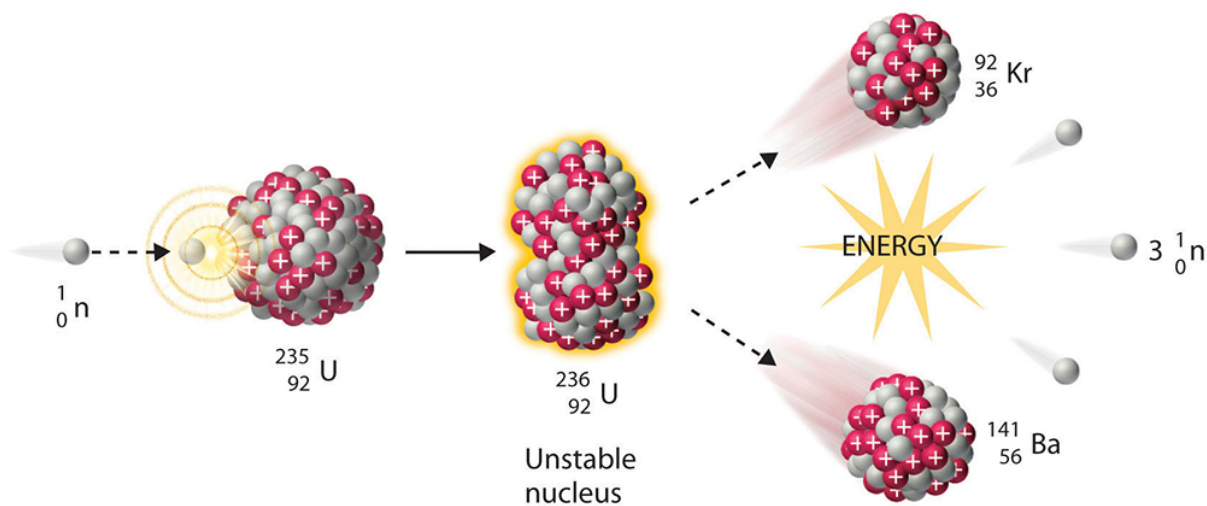
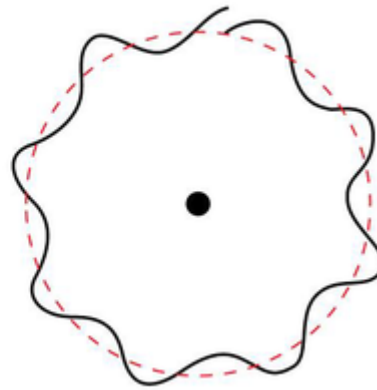
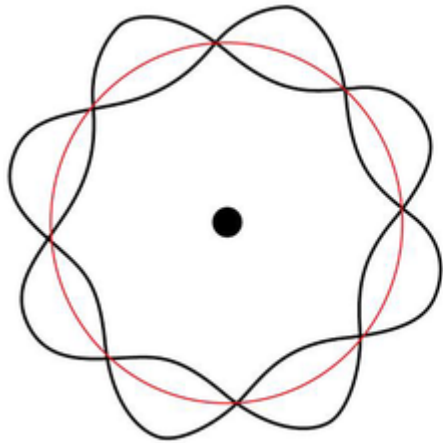


Table O
Symbols Used in Nuclear Chemistry

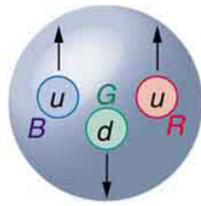
Name	Notation	Symbol
alpha particle	${}^4_2\text{He}$ or ${}^4_2\alpha$	α
beta particle	${}^0_{-1}\text{e}$ or ${}^0_{-1}\beta$	β^-
gamma radiation	${}^0_0\gamma$	γ
neutron	${}^1_0\text{n}$	n
proton	${}^1_1\text{H}$ or ${}^1_1\text{p}$	p
positron	${}^0_{+1}\text{e}$ or ${}^0_{+1}\beta$	β^+





Standard Model of Elementary Particles

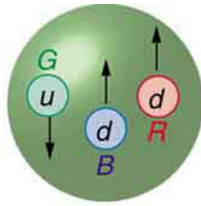
		Three generations of matter (fermions)			Interactions / force carriers (bosons)	
		I	II	III		
LEPTONS	charge	$+\frac{2}{3}$	$+\frac{2}{3}$	$+\frac{2}{3}$	0	0
	spin	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1	0
		u	c	t	g	H
	up	charm	top	gluon	higgs	
QUARKS	charge	$-\frac{1}{3}$	$-\frac{1}{3}$	$-\frac{1}{3}$	0	0
	spin	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1	0
		d	s	b	γ	
	down	strange	bottom	photon		
LEPTONS	charge	-1	-1	-1	0	0
	spin	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1	0
		e	μ	τ	Z	
	electron	muon	tau	Z boson		
LEPTONS	charge	0	0	0	0	0
	spin	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1	0
		ν_e	ν_μ	ν_τ	W	
	electron neutrino	muon neutrino	tau neutrino	W boson		



Proton

Spin $\frac{1}{2} + \frac{1}{2} - \frac{1}{2} = \frac{1}{2}$

Charge $+\frac{2}{3} + \frac{2}{3} - \frac{1}{3} = 1$



Neutron

Spin $-\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{1}{2}$

Charge $+\frac{2}{3} - \frac{1}{3} - \frac{1}{3} = 0$

Fundamental Force Particles

Force	Particles Experiencing	Force Carrier Particle	Range	Relative Strength*
Gravity acts between objects with mass	all particles with mass	graviton (not yet observed)	infinity	much weaker ↓ much stronger
Weak Force governs particle decay	quarks and leptons	W^+ , W^- , Z^0 (W and Z)	short range	
Electromagnetism acts between electrically charged particles	electrically charged	γ (photon)	infinity	
Strong Force** binds quarks together	quarks and gluons	g (gluon)	short range	