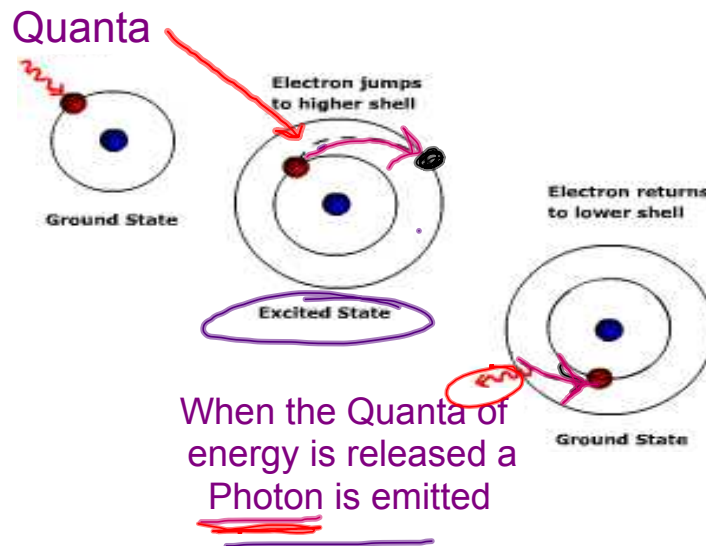# Quantum Theory-Flame Tests
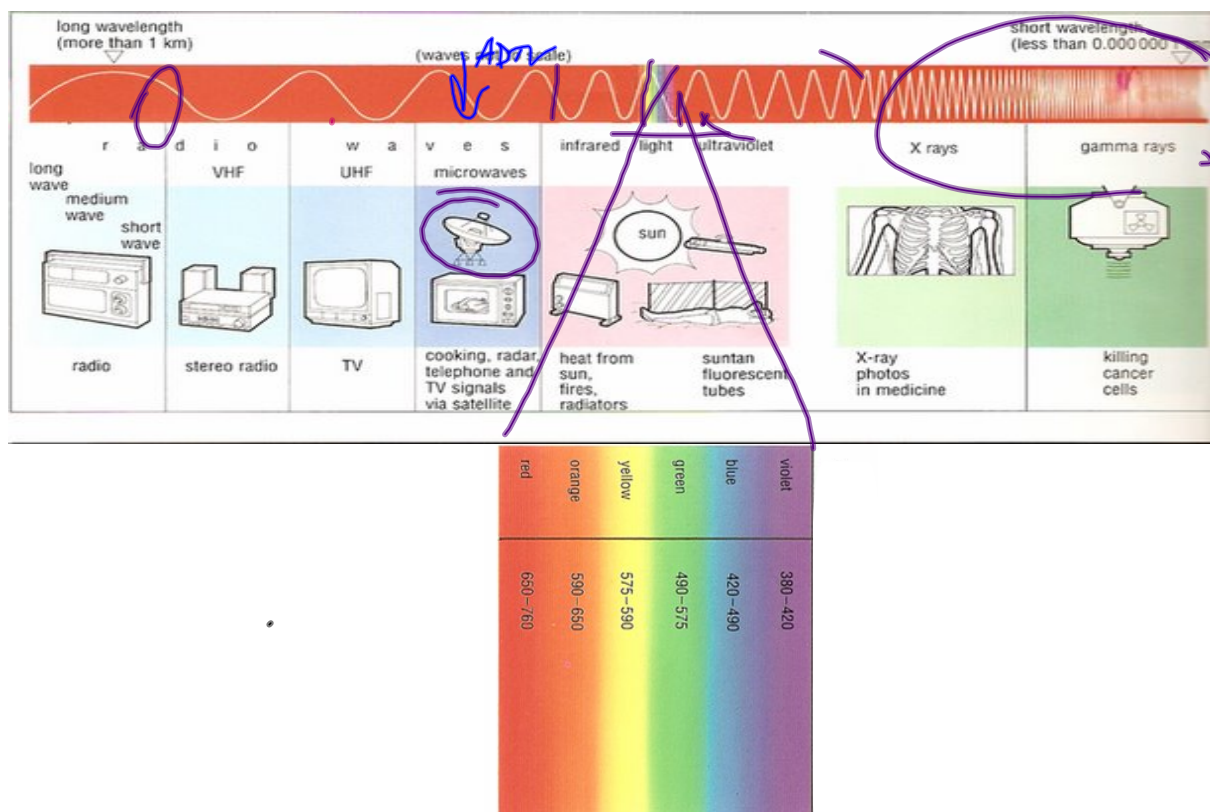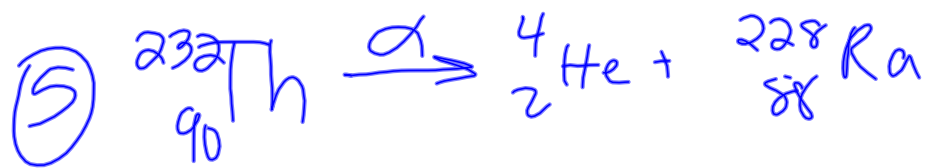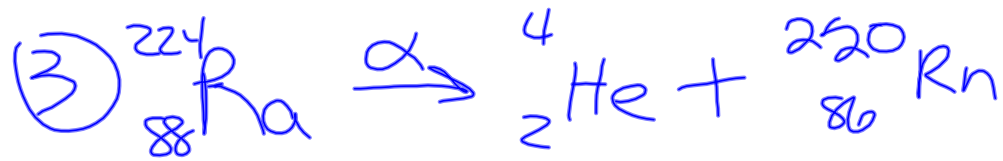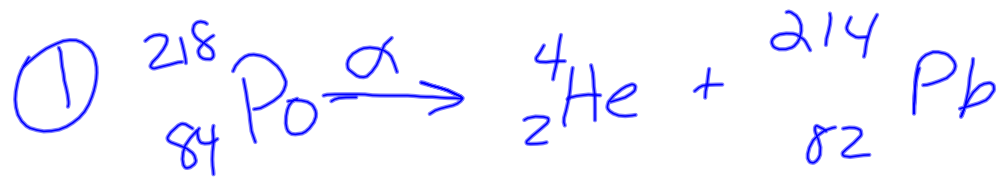
- Energy exists in packets called "QUANTA's"
⭐ • electrons can gain enough energy to "jump" to a higher level

BUT!!!
                                                              (excited state)

⭐ • eventually they will fall back to their original energy level
                                                    (ground state)

⭐ *What goes up ↔ Must come down* ⭐

⭐ • it takes a QUANTA (packet of energy) to raise an electron
   to a higher energy level (by heat or electricity)

⭐ • When an electron "falls back" into place, a QUANTA of energy
   is lost

⭐ • When a quanta of energy is lost, a PHOTON is emitted

                        energy packet seen as light

Quanta

Electron jumps to higher shell

Ground State

Excited State

Electron returns to lower shell

Ground State

When the Quanta of energy is released a Photon is emitted

Radiation Spectrum

red	orange	yellow	green	blue	violet
650-760	590-650	575-590	490-575	420-490	380-420

Photons of light are emitted as electrons drops back
to their ground states after being excited.

2

① $^{218}_{84}Po \xrightarrow{\alpha} {}^{4}_{2}He + {}^{214}_{82}Pb$

③ $^{224}_{88}Ra \xrightarrow{\alpha} {}^{4}_{2}He + {}^{220}_{86}Rn$

⑤ $^{232}_{90}Th \xrightarrow{\alpha} {}^{4}_{2}He + {}^{228}_{88}Ra$

$\frac{88}{22} = 4 \leftarrow$ $640g \xrightarrow[320 \ 160 \ 80]{\div 2 \div 2 \div 2 \div 2} \boxed{40g}$

$$640g\left(\tfrac{1}{2}\right)^4$$

$\frac{78}{26} = 3$ $240g \xrightarrow[120 \ 60]{\div 2 \div 2 \div 2} \boxed{30g}$

$$240g\left(\tfrac{1}{2}\right)^3$$

$\frac{150}{25} = 6$ $1000g \xrightarrow[500 \ 250 \ 125 \ 62.5 \ 31.25]{\div 2 \div 2 \div 2 \div 2 \div 2 \div 2} \boxed{15.62}$

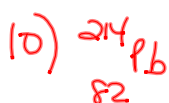$$1000\left(\tfrac{1}{2}\right)^6$$
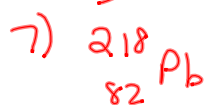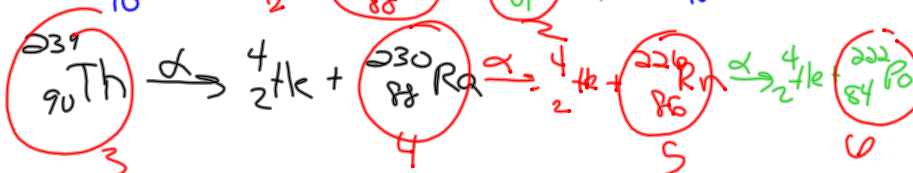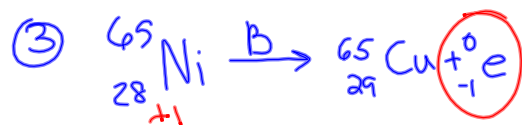
13) $\frac{3200}{1600} = 2$ $8000 \div 2 \div 2 = 2000 \, at$

14) $\frac{48,240}{24,120} = 2$ $20 \div 2 \div 2 = \boxed{5 at}$

$\frac{4,470,000,000}{4,470,000,000} = 1$ $60 \div 2 = \boxed{30}$

$\frac{32}{8} = 4$ $24 \xrightarrow[12 \ 6 \ 3]{\div 2 \div 2 \div 2 \div 2} \boxed{1.5}$

① $^{220}_{86}Rn \xrightarrow{\alpha} \boxed{^{4}_{2}He} + ^{216}_{84}Po$

③ $^{65}_{28}Ni \xrightarrow{\beta} ^{65}_{29}Cu + \boxed{^{0}_{-1}e}$

⑤ $^{238}_{90}Th \xrightarrow{\alpha} ^{4}_{2}He + \boxed{^{234}_{88}Ra} \xrightarrow{\beta} \boxed{^{234}_{89}Ac} + ^{0}_{-1}e \xrightarrow{\beta} ^{234}_{90}Th + ^{0}_{-1}e$

$\boxed{^{234}_{90}Th} \xrightarrow{\alpha} ^{4}_{2}He + \boxed{^{230}_{88}Ra} \xrightarrow{\alpha} ^{4}_{2}He + \boxed{^{226}_{86}Rn} \xrightarrow{\alpha} ^{4}_{2}He \boxed{^{222}_{84}Po}$

3   4   5   6

7) $^{218}_{82}Pb$ 10) $^{214}_{82}Pb$

8) $^{218}_{83}Bi$ 11) $^{214}_{83}B$

9) $^{218}_{84}Po$

Unit 3-Electrons/flame tests
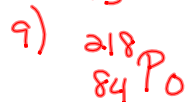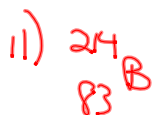
6) $\frac{TE}{HL} = n \qquad m\left(\frac{1}{2}\right)^n$

$\frac{20}{5} = 4 \qquad 64\left(\frac{1}{2}\right)^4 = 4g$

8) 6 days 2 hrs

$\times 24$

$\overline{144} + 2 = \frac{146\,hr}{73} = 2 \qquad 4mg\left(\frac{1}{2}\right)^2 = \boxed{1mg}$

$4C$

$$2.5 \div 2 = 1.25 \div 2 = \underline{0.625}$$

①   ②

$$
\begin{array}{r}
1960 \\
56 \\
\hline
2016
\end{array}
$$