

α alpha particle ${}^4_2\text{He}^{+2}$

B^- beta particle ${}^0_{-1}\text{e}$

B^+ beta(+) particle ${}^0_{+1}\text{e}$

γ gamma ray ${}^0_0\gamma$

Stopped by



heavy clothing

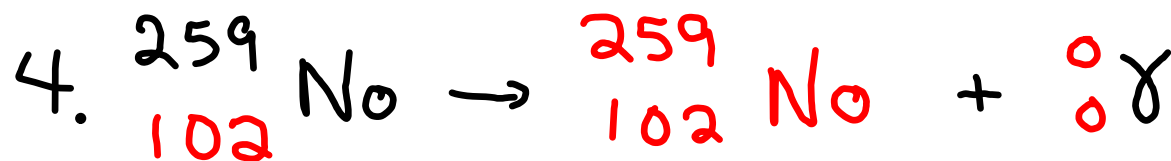


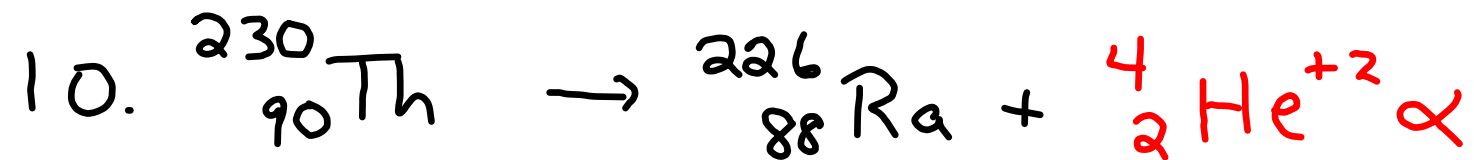
heavy plastic

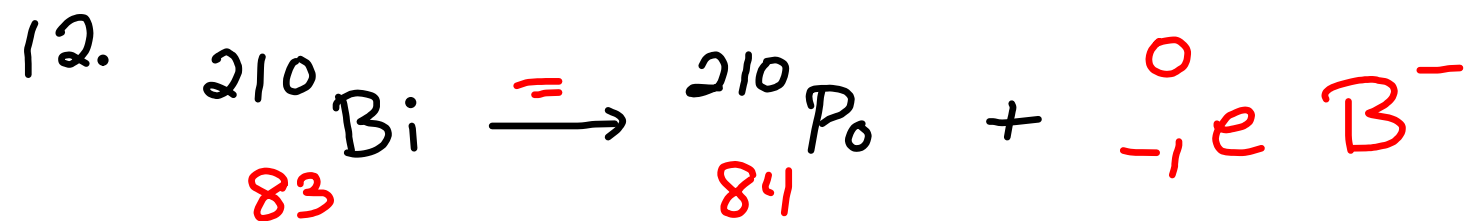


lead

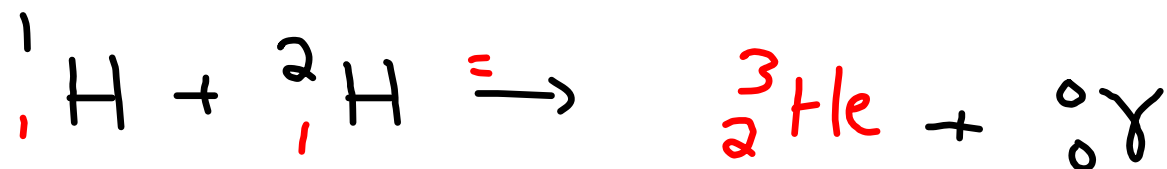
1.







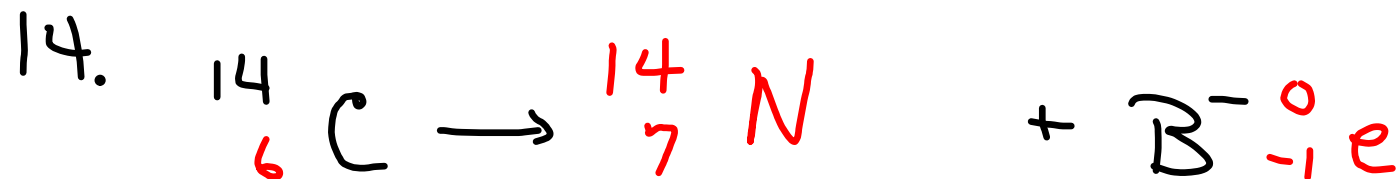
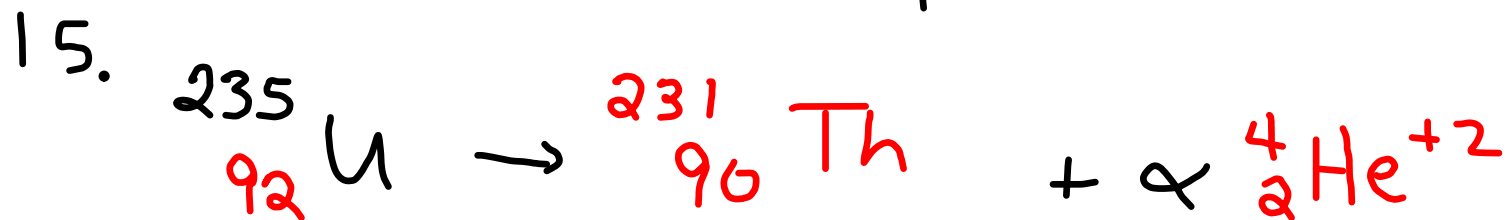
20.



1-19

Natural Transmutation

1 reactant that decays
to two or more products



20.

Artificial Transmutation

2 or more reactants

20 happens in the sun

Nuclear fission

$$PV = nRT$$

atm
L
mol
K

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

K
K

9.

$$\frac{22.53\%}{100} = \frac{\cancel{100} \times \frac{x}{357}}{\cancel{100}}$$

$$.2253 = \frac{x}{357}$$

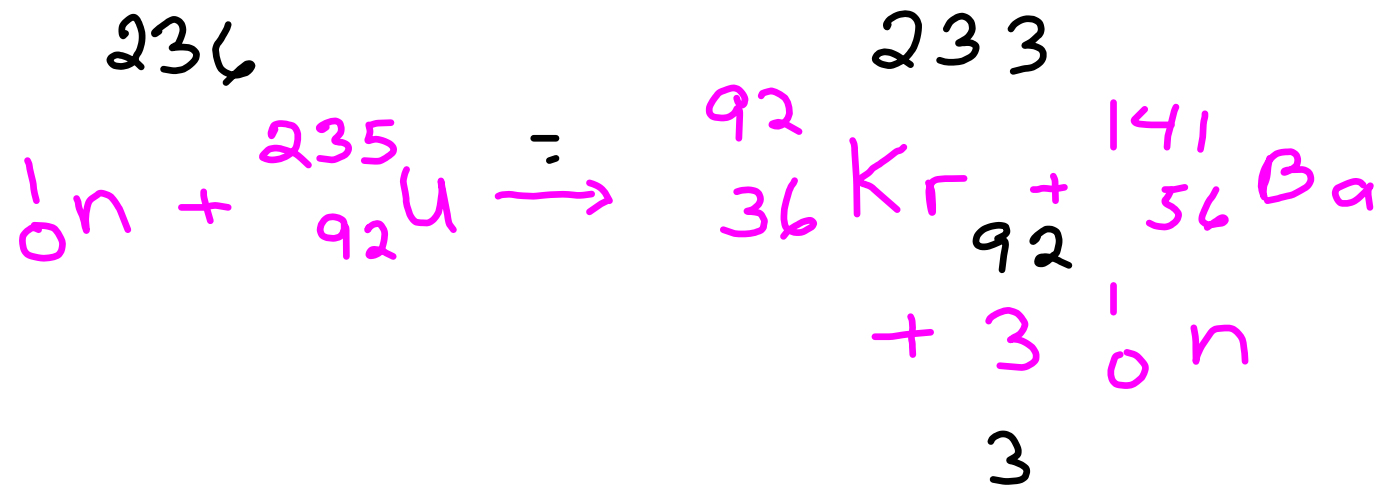
Polar water

ionic bonds

salts, acids and
bases

covalent sugar, ethanol

Nuclear Fission



26.



Half-life - time it takes
for a substance to decay
by $\frac{1}{2}$ its mass.

^{14}C 5730 yr

10g $\longrightarrow$ 5g
5730 yr
1 half-life

a substance never decays
to zero

$10\text{g} \rightarrow 5\text{g} \rightarrow 2.5\text{g} \rightarrow 1.25 \rightarrow$
 ~~$.75$~~ $\rightarrow .375 \rightarrow .1875 \rightarrow$
 $.09375 \rightarrow \dots$

$$\# \text{ of half-lives} = \frac{\text{total time}}{\text{half-life time}}$$

21.

10g original

10 million 10,000,000 yrs

$\frac{1}{2}$ life = 2.5×10^6 yrs

$$\frac{1 \times 10^7 \text{ yrs}}{2.5 \times 10^6 \text{ yrs}} = 4$$

10g $\xrightarrow{1}$ 5g $\xrightarrow{2}$ 2.5 $\xrightarrow{3}$ 1.25 $\xrightarrow{4}$
.625 g

.625g

22. $4.2 \times 10^{-1} \text{g}$ original .42
 $6.6 \times 10^{-3} \text{g}$ left .0066
 5730yr half-life
 ? total time

$$6 = \frac{x}{5730 \text{ yrs}}$$

$$\begin{aligned} &.42 \xrightarrow{1} .21 \xrightarrow{2} .105 \xrightarrow{3} .0525 \\ &\xrightarrow{4} .02625 \xrightarrow{5} .013125 \xrightarrow{6} \\ &\quad .0065625 \end{aligned}$$

$$x = 34380 \text{ yrs}$$

24.

1.36g original amt
0.5yrs total time
?g left
45.6 days half-life

$$\frac{0.5\text{yr} \times 365\text{d}}{1\text{yr}} = 182.5\text{d}$$

$$\frac{182.5\text{d}}{45.6\text{d}} = 4$$

1.36g $\rightarrow$.680 $\rightarrow$.34 $\rightarrow$.17 $\rightarrow$
.085g

.0850g