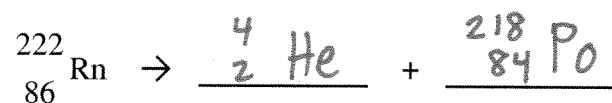
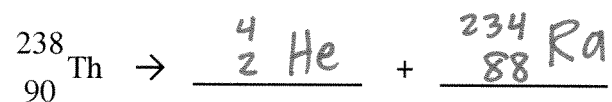
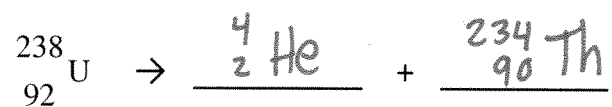
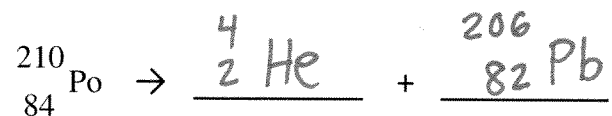


Name: \_\_\_\_\_ Date: \_\_\_\_\_ Block: \_\_\_\_\_

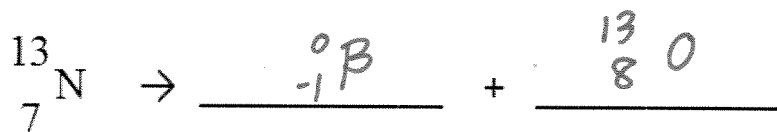
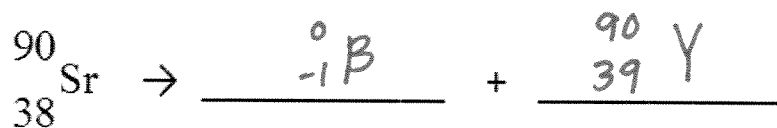
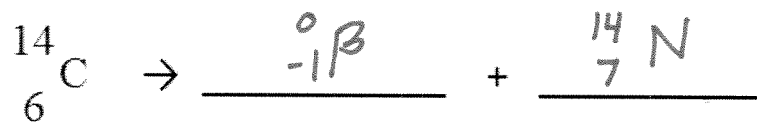
## Nuclear Homework

### Part A: Write the complete nuclear equation.

1. The following atoms all undergo alpha particle emission.



2. The following atoms all undergo beta decay.



## Part B: Half-Life

3. Given that the half-life of carbon – 14 is 5730 years, consider a sample of fossilized wood that, when alive would have contained 24 g of carbon – 14. It now contains 1.5 g of carbon – 14. How old is the sample?

$$24 \text{ g} \xrightarrow{\textcircled{1}} 12 \text{ g} \xrightarrow{\textcircled{2}} 6 \text{ g} \xrightarrow{\textcircled{3}} 3 \text{ g} \xrightarrow{\textcircled{4}} 1.5 \text{ g}$$

————— 4 Half-lives —————

$$(4)(5730 \text{ yrs}) = \boxed{22920 \text{ yrs}}$$

4. A 64 g sample of germanium – 66 is left undisturbed for 12.5 hours. At the end of that period, only 2.0 g remain. What is the half-life of this material?

$$64 \text{ g} \xrightarrow{\textcircled{1}} 32 \text{ g} \xrightarrow{\textcircled{2}} 16 \text{ g} \xrightarrow{\textcircled{3}} 8 \text{ g} \xrightarrow{\textcircled{4}} 4 \text{ g} \xrightarrow{\textcircled{5}} 2 \text{ g}$$

————— 12.5 hrs —————  
and 5 Half-lives

$$\therefore t_{1/2} = \frac{12.5 \text{ hrs}}{5} = \boxed{2.5 \text{ hrs}}$$

5. 1.000 kg block of phosphorus – 32, which has a half-life of 14.3 days, is stored for 100.1 days. At the end of this period, how much phosphorus – 32 remains?

$$\frac{100.1 \text{ days}}{14.3 \text{ days}} = 7 \text{ half-lives}$$

$$1 \text{ kg} \xrightarrow{\textcircled{1}} 0.5 \text{ kg} \xrightarrow{\textcircled{2}} 0.25 \text{ kg} \xrightarrow{\textcircled{3}} 0.125 \text{ kg} \xrightarrow{\textcircled{4}} 0.0625 \text{ kg}$$
$$\xrightarrow{\textcircled{5}} 0.03125 \text{ kg} \xrightarrow{\textcircled{6}} 0.015625 \text{ kg} \xrightarrow{\textcircled{7}} 0.0078125 \text{ kg}$$
$$= \boxed{7.813 \times 10^{-3} \text{ kg}}$$

ANSWERS:

#3) 22920 years

#4) 2.5 hrs

#5)  $7.813 \times 10^{-3} \text{ kg}$