

6/9 - Half-Life - average amt of

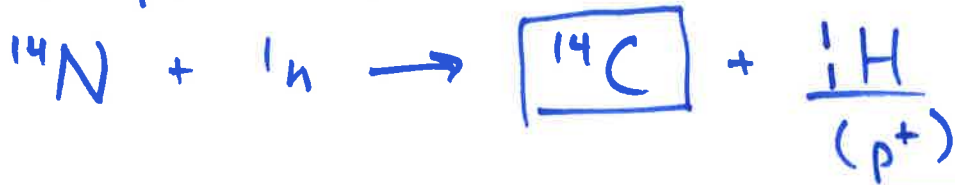
time it takes for $\frac{1}{2}$ of an

unstable isotope to decay into daughter nuclei

ex) U-238 4.5 billion yrs

 C-14 5,730 yrs

 ↓
 upper atmosphere - formation



$\frac{1}{2}$ life EQ:

$$X_F = X_i (0.5)^N$$

\uparrow amt remaining \uparrow amt initial ← # of $\frac{1}{2}$ lives elapsed

$$N = \frac{\text{time elapsed}}{1 \text{ half life}}$$

① $X_i = 20.0 \text{ g C-14}$

time elapsed = 4,000 yrs

$X_F = \underline{\hspace{2cm}} \text{ g}$

$$N = \frac{4,000}{5730} = 0.698$$

$$X_F = (20.0) (0.5)^{0.698}$$

$$X_F = 12.3 \text{ g C-14}$$

② a sample has 30% of its original

C-14. How old is it?

$$X_F = X_i (.5)^N$$

$$X_i = 100$$

$$X_F = 30$$

$$\frac{30}{100} = \frac{100}{100} (.5)^N$$

$$.3 = (.5)^N$$

$$\log .3 = N \cdot \log (.5)$$

$$-0.5228 = N (0.3010)$$

$$1.74 = N \text{ (half lives)}$$

$$1.74 \times 5,730 \text{ yrs} = \boxed{9,960 \text{ yrs}}$$

Rf-261

$$t_{1/2} = 62.0 \text{ sec}$$

$$X_i = 250. \text{ mg}$$

$$\text{time elapsed} = 100. \text{ sec}$$

$$X_F = \text{--- mg}$$

$$X_F = (250 \text{ mg}) (.5)^{\frac{100 \text{ sec}}{62.0 \text{ sec}}}$$

$$X_F = 81.7 \text{ mg}$$