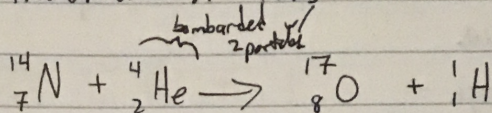


Making new elements

- Particle Accelerators ("atom smashers") used to accelerate sub-atomic particles and cause transmutation rxns



- Accelerators enormous, circular tracks w/ miles long radii

Decay rates and half life

- The rate of decay depends on the amount of N present (first order)
- After 1 half-life, half of N remains

Flashback from the beginning of the semester

$$-\frac{\Delta[N]}{\Delta t} = k[N] \quad 1^{\text{st}} \text{ order rxn}$$

$$\ln \frac{N_t}{N_0} = -kt$$
$$\ln \frac{1}{2} = -kt_{1/2} \Rightarrow t_{1/2} = \frac{0.693}{k} = \ln \frac{2}{k} = \frac{-\ln(\frac{1}{2})}{k}$$

Half-life

$$\frac{0.693}{k} = t_{1/2}$$

- Half-life is the time required for $\frac{1}{2}$ of a radioactive sample to decay

Measuring radioactivity

- Geiger meter - probe w/ Ar(g) , positive and negative electrodes
- When radiation reaches Ar(g) , creates charged particles, registered as pulse
- measure decays/min
- Units
 - Becquerel (Bq) = one decay event/second
 - Curie (Ci) = $3.70 \times 10^{10} \text{ Bq}$