

## Identifying Nuclear Reactions

**Before being able to identify nuclear reactions you must first...**

Remember what the definition and/or the symbol, mass, and charge number are for each of these particles:

- Nucleon
- Neutron
- Proton
- Electron
- Positron
- Alpha particle
- Beta particle
- Gamma particle

What would the symbol, mass, and charge number be for a hydrogen nucleus?

\*\*\*Neutrinos and antineutrinos are subatomic particles that we are NOT concerned with in nuclear chemistry since we are not concerned with conserving momentum and spin.

Recall all the types of nuclear reactions possible and their definitions:

- Fission
- Fusion
- Transmutation
- Decay
  - Alpha decay
  - Beta decay
  - Positron decay
  - Electron capture

## When identifying nuclear reactions ask yourself these questions

Questions to ask yourself and the possible answers		Conclusions or Next Step
1a	How many nuclides or small particles are on the left side of the reaction? <b>One</b>	The reaction will be a type of decay, go to question 5
1b	How many nuclides or small particles are on the left side of the reaction? <b>More than one</b>	Go to question 2
2a	Is one of the nuclides on the left side of the reaction an electron? <b>Yes</b>	This reaction is most likely an <b>electron capture</b>
2b	Is one of the nuclides on the left side of the reaction an electron? <b>No</b>	The reaction will not be a type of decay, go to question 3
3a	Is a heavy nucleus splitting into two lighter nuclei or are lighter nuclei coming together to make a heavier nucleus? <b>A heavy nucleus is splitting into two lighter nuclei</b>	This reaction is most likely a <b>fission reaction</b>
3b	Is a heavy nucleus splitting into two lighter nuclei or are lighter nuclei coming together to make a heavier nucleus? <b>Lighter nuclei are coming together to make a heavier nucleus</b>	Go to question 4
4a	Are the nuclei on the left side of the reaction about the same mass or is one substantially heavier than the other? <b>They are about the same mass</b>	This reaction is most likely a <b>fusion reaction</b>
4b	Are the nuclei on the left side of the reaction about the same mass or is one substantially heavier than the other? <b>One is substantially heavier than the other</b>	This reaction is most likely a <b>transmutation</b>
5a	What is the small particle that is produced in the reaction? <b>Alpha particle</b>	This reaction is most likely an <b>alpha decay</b>
5b	What is the small particle that is produced in the reaction? <b>Beta - particle</b>	This reaction is most likely a <b>beta decay</b>
5c	What is the small particle that is produced in the reaction? <b>Beta + particle</b>	This reaction is most likely a <b>positron decay</b>

**Now, lets practice!**

Identify each of the following nuclear reactions.

