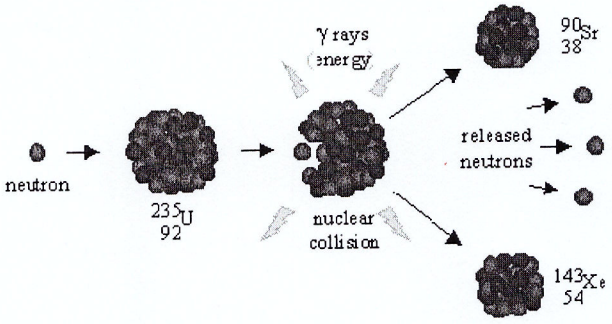
Fission and Fusion

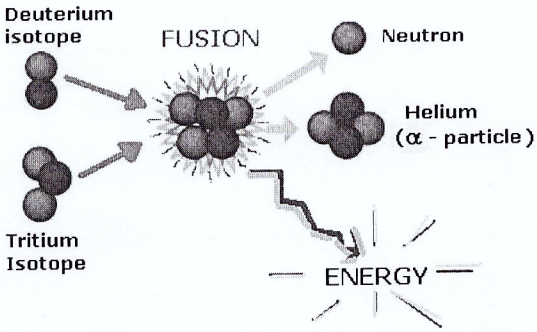
- Fission and fusion are specific types of nuclear reactions

* Important!

	Nuclear Fission	Nuclear Fusion
Definition	Fission is the splitting of a large atom into two or more smaller ones.	Fusion is the fusing of two or more lighter atoms into a larger one.
Requirements for the Reaction	Parent element needs a critical mass and a high speed neutron is required. However, very little energy is required to split atoms in a fission reaction.	High density and high temperature environment required. High density required so high probability small particles will collide and fuse together. Extremely high energy is required to bring two or more protons close enough and overcome the electrostatic repulsion.
Energy Released	The energy released by fission is a million times greater than that released in chemical reactions; but lower than the energy released by nuclear fusion.	The energy released by fusion is three to four times greater than the energy released by fission.
Natural Occurrences	Fission does not normally occur in nature. It is a man-made reaction used in atomic bombs and nuclear power plants.	Fusion occurs in stars, such as the sun.
By Products of the Reaction	Fission produces many highly radioactive particles. ↳ harmful to biological tissue	Few radioactive particles produced from fusion. ↳ not harmful

Fission **vs.** **Fusion**





$^{1}_{0}n + {}^{235}_{92}U \longrightarrow {}^{90}_{38}Sr + {}^{143}_{54}Xe + 3\,{}^{1}_{0}n$

${}^{2}_{1}H + {}^{3}_{1}H \longrightarrow {}^{1}_{0}n + {}^{4}_{2}He$

*****Now try pg. 330 #1-3 & Practice Problem*****

Practice Problem

1. Explain why only relatively small nuclei can under go fusion. **[Only small nuclei can undergo fusion because they have less protons, which means there will be less electrostatic repulsion according to $F_e = kq_1q_2/r^2$. With less electrostatic repulsion, two smaller nuclei can fuse together as oppose to larger nuclei with a greater amount of electrostatic repulsion.]**