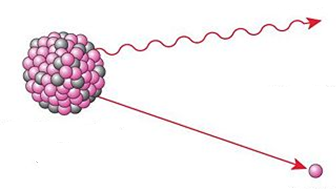
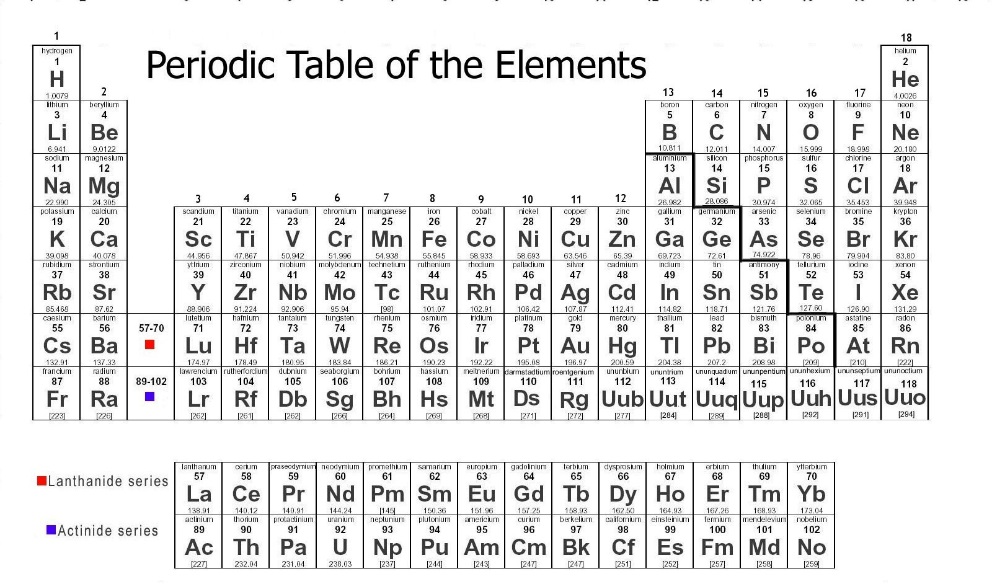
Nuclear Energy

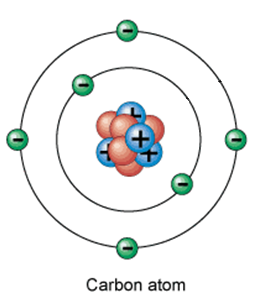
1. What are **radioactive atoms**?
2. What is **ionizing radiation**?
   1. List three examples of ionizing radiation.



1. Label the diagram below.
2. Indicate the radioactive elements on this periodic table:



1. What happened to the most of the particles that Geiger and Marsden aimed at the sheet of gold foil?
   1. What happened to the others?
2. What two conclusions were drawn from the gold foil experiment?

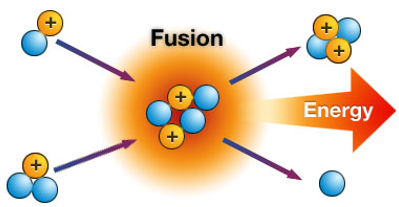


1. Describe the *charge* and *location* of each of these particles within an atom. Label the carbon atom shown to the right.
   1. Proton
   2. Neutron
   3. Electron
2. How are **isotopes** of the same element different from each other?
3. Write the three isotope notations used to indicate the uranium isotope with a mass of 235AMU.
4. What happens to an atom undergoing **nuclear fission**?
   1. What is released during nuclear fission reactions?
   2. What occurs during a **fission chain reaction**?

**Nuclear Testing**

1. What was the purpose of the 100-ton (0.1 kiloton) test?
2. What was found in the desert following the Trinity test detonation?
3. Describe the purpose of the three main components of a nuclear bomb.
   1. Critical mass –
   2. Neutron generator –
   3. Bullet –

1. What was the yield of the Hiroshima and Nagasaki nuclear bombs?
2. Where was all of the post-World War 2 nuclear testing conducted?
3. What was the purpose of the **Operation Crossroads** nuclear testing?
   1. Why were lab animals strapped to the surface of the ships?
4. Why did Glenn Seaborg refer to Shot Baker as a nuclear disaster?
5. Define **radioactive fallout** –
6. Define **radiation sickness** –
7. Describe each of the factors that determine the severity of radiation sickness:
   1. Dose –
   2. Route of exposure –
   3. Acute –
   4. Chronic –
8. Why were the first atomic bombs considered inefficient?
9. How are **hydrogen bombs** different than the original fission bombs?



1. Define **nuclear fusion** –
   1. Label the diagram of nuclear fusion.

1. What damage was caused by the **Castle Bravo** hydrogen bomb test?
2. What did countries that signed the **Partial Test Ban Treaty** agree to do?

**Nuclear Reactors**

1. What shift occurred following the the **Atoms for Peace** speech delivered by Eisenhower?
2. Describe the role of each of these parts of a nuclear power plant:
   1. Steam generator –
   2. Turbine –
   3. Generator –
   4. Cooling tower –
   5. Fuel rods –
   6. Control rods-
   7. Moderator –
   8. Containment building –
3. Do nuclear power plants produce pollution?
4. About when did all nuclear plant construction stop in the United States?
5. What is a **meltdown**?
6. What was the primary cause of the **Three Mile Island** partial meltdown?
   1. What damage was caused by this meltdown?
7. List the three design flaws that led to the **Chernobyl** full meltdown.
8. What is the Chernobyl **exclusion zone**?
9. What was the primary cause of the **Fukushima Daiichi** full meltdown?
   1. What damage was caused by this meltdown?

**Nuclear Waste**

1. What is **low-level nuclear waste**?
2. What is **high-level nuclear waste**?
3. What is a **half-life**?
   1. Given enough time, what will happen to a radioactive isotope?
4. Cesium-137 has a half-life of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. How much would be left after…
   1. 30 years?
   2. 60 years?
   3. 90 years?
5. How long are the half-lives of short-lived isotopes?
6. How long are the half-lives of longer-lived isotopes?