

Fission

Name - _____

1.) What is the atomic number of the largest naturally occurring element on Earth?

Of the naturally occurring radioactive elements, uranium is the largest.

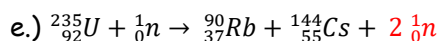
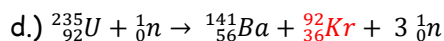
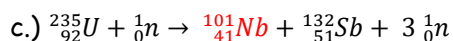
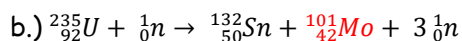
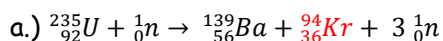
2.) In your own words write a definition for nuclear fission.

Nuclear fission is the splitting of a nucleus using a neutron to produce large amounts of energy.

3.) Uranium-238 is the most common isotope of uranium on the earth. Would a 10 kg sample of uranium-238 be dangerous?

A 10 kg sample of uranium-238 is dangerous for a few reasons. First, 10 kg is over 20 pounds and could be wielded as a weapon. Secondly, and more importantly all uranium is radioactive and as such is dangerous to living organisms. As far as being dangerous as an explosive form from a nuclear fission reaction, the answer is no.

4.) Complete the following nuclear equations:



5.) One possible outcome of the fission reaction of uranium is the production of strontium-90 and xenon-143 along with three neutrons. Write the nuclear equation for this reaction beginning with the addition of a neutron to a uranium-235 nucleus.

The nuclear fission reaction of uranium-235 that produces xenon-143 is as follows.



6.) How does the total mass of the uranium-235 atom plus the neutron compare with the total mass of the products? Explain your answer.

The mass of the products of a nuclear fission reaction is less than the mass of the reactants as a small amount of mass is lost as it is converted into energy.

7.) When an atom undergoes nuclear fission, it releases a relatively large amount of energy. Where does the energy come from?

The energy of a nuclear fission reaction comes from the conversion of a small amount of mass into energy. This is described by Einstein's equation $E = mc^2$, where E is energy, m is mass, and c is the speed of light.

8.) What is meant by the term "critical mass"?

Critical mass is a term used to describe the minimum amount of radioactive material which will self sustain a fission or fusion reaction. If the mass is less than this amount then the reaction will not continue once started.