ANSWER KEY- Assignment 3

1. The nuclear reaction is

   $X240 \rightarrow Y110 + Z130 + Q$

   As per given data

   $Q = 110 \times 8.5 + 130 \times 8.5 - 240 \times 7.6$

   $= 240(0.9)\,MeV = 216MeV$

2. Since the unstable parent nuclei fuse to form a heavier stable daughter nuclei in a nuclear fusion reaction releasing some energy. So, daughter nuclei is more stable than parent nuclei. Thus daughter nucleus has more binding energy per nucleon than parent nucleus

3. In a nuclear reaction, the aggregate of the masses of the target nucleus ($_1H^2$) and the bombarding particle may be greater or less than the aggregate of the masses of the product nucleus ($_2He^3$) and the outgoing particle ($_0n^1$).

So, from the law of conservation of mass- energy some energy (3.27 Mev) is evolved or involved in a nuclear reaction. This energy is called Q-value of the nuclear reaction.

4. Let R_{Au} be the nuclear radius of the gold isotope and R_{Ag} be the nuclear radius of the silver isotope.

   We have the mass number of the gold (Au)is 197

   the mass number of the silver(Ag) is 107.

   The ratio of the radii of te two nuclei is related with their ass number as:

   $(R_{Au}/R_{Ag}) = (197/107)^{1/3} = 1.2256 = 1.23$