

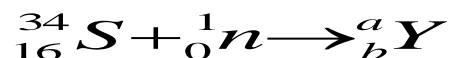
REVISION QUESTIONS ON MODERN PHYSICS

1. The mass of a radioactive substance decays to a $\frac{1}{16}$ th of its original mass after 16 days. What
 - (a) is its half –life?
 - (b) fraction of the original mass will have decayed after 20 days ?
2. The activity of a radioactive source decreases from 4000 counts per minute to 250 counts per minute in 40 minutes. What is the half-life of the source?
3. The half-life of a radioactive substance is 24 days. Calculate the mass of the substance which has decayed after 72days if the original mass is 0.64g.
4. The half-life of a radioactive substance is 3h. Find how long it takes for the mass of the substance to reduce to one-quarter of its original mass.
5. A radioactive substance has a half-life of 5 days and its initial mass is 20g. find
 - (a) the mass of the substance that remains after 20 days.
 - (b) the mass of the substance decayed after 25 days.
 - (c) the fraction of the original mass present after 15 days
6. A radioactive substance has a half-life of 10 seconds. Find the fraction of the substance decayed after one hour.
7. The half-life of a nuclide Zinc-71 is 150seconds. Initially its mass is 240g. What mass would be available after 600seconds.
8. A radioactive substance has a mass of 100g and half-life of 2 hours. Find
 - (a) the mass of the substance left after 8 hours.
 - (b) the mass of the substance decayed after 6 hours.
9. (a) A material is wrapped in a photographic film and kept in a dark room. When the photographic film is removed, it is found to be darkened.
 - (i) Identify the material.
 - (ii) Explain this observation.(b) A radioactive substance of mass 60g takes 400 years for its mass to be reduced to 15g. Find its half-life.
 - (c) State; (i) two industrial and two medical uses of radioactivity.

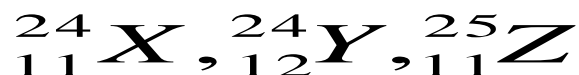
- (ii) two health hazards associated with radioactive substances
- (iii) two precautions taken when handling radioactive substances.
10. (a) Define the term **radioactivity**.
- (b) A radioactive material has a half-life of 5 minutes. If the mass of the material is 120g, calculate the mass decayed after 20 minutes.
- (c) Sketch a graph of the number of atoms of a radioactive material present against the time and show how such a graph is used to determine the half-life of the substance.
11. (a) Distinguish between **nuclear fission** and **nuclear fusion**.
- (b) State any two conditions necessary for;
- (i) nuclear fission reaction to occur.
- (ii) nuclear fusion reaction to occur.
- (c)
$${}_{92}^{235}\text{U} + {}_0^1\text{n} \rightarrow {}_{92}^{236}\text{U} \rightarrow {}_x^{144}\text{Ba} + {}_{36}^y\text{Kr} + 2{}_0^1\text{n} + \text{Energy}$$
- The equation above shows the reaction which takes place in a nuclear reactor.
- (i) Name the reaction shown in the equation.
- (ii) State the significance of this reaction.
- (iii) Find the values of x and y
- (iv) Explain why a neutron instead of a proton is used in this reaction.
- (d) A radioactive element has a half-life of 4 minutes. Given that the original count rate is 256 counts per minute,
- (i) Find the time taken to reach a count rate of 16 counts per minute.
- (ii) What fraction of the original number of atoms will be left by the time the count rate is 16 counts per minute?
12. (a) Name the radiations emitted by radioactive substances.
- (b) Explain the nature of tracks formed by the radiations named in 12(a) above.
- (c) How does the passage of beta particles through an electric field differ from that of X-rays
- (d) Distinguish between (i) cathode rays and beta particles
- (ii) beta particles and cathode rays

(iii) X-rays and gamma rays.

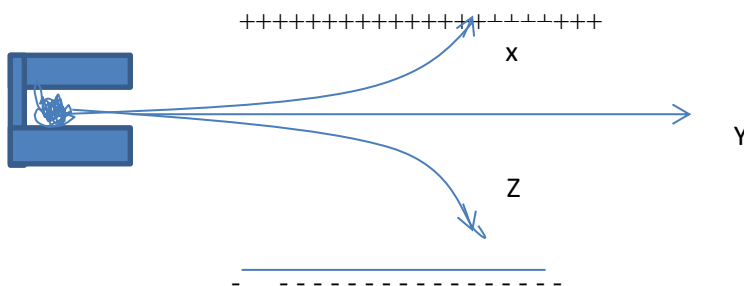
13. (a) The following nuclear reaction takes place when a neutron bombard a sulphur atom.



- (i) Describe the composition of the nuclide, Y formed.
 (ii) The nuclide, Y decays by emission of an alpha particle and a gamma ray. Find the changes in mass number and atomic number of the nuclide.
 (iii) The half-life of the isotope of cobalt -60 is 5 years. What fraction of the isotope remains after 15 years.
14. (a) What are isotopes?
 (b) Which of the following nuclei belong to the same element



- (c) State two medical and two industrial uses of radioisotopes.
 (d) The diagram below shows radiations from a radioactive substance.



Identify the radiations X, Y and Z.