

Model Question Paper
Nuclear Chemistry - Part II

12th Standard

Chemistry

Reg.No. :

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I. Answer all the questions.

II. Use Blue pen only.

Time : 01:00:00 Hrs

Total Marks : 70

5 x 1 = 5

Section-A

- 1) Radioactivity is due to
(a) Stable electronic configuration (b) Stable nucleus (c) Unstable nucleus (d) Unstable electronic configuration
- 2) In the following radioactive decay, ${}_{92}X^{232} \rightarrow {}_{89}Y^{220}$, how many α and β particles are ejected.
(a) 3α and 3β (b) 5α and 3β (c) 3α and 5β (d) 5α and 5β
- 3) ${}_{92}U^{235}$ nucleus absorbs a neutron and disintegrates into ${}_{54}Xe^{139}$, ${}_{38}Sr^{94}$ and x. What will be the product x?
(a) 3 neutrons (b) 2 neutrons (c) α particle (d) β particle
- 4) Loss of a β -particle is equivalent to
(a) Increase of one proton only (b) Decrease of one neutron only (c) Both (a) and (b) (d) None of these
- 5) Which of the following is used as neutron absorber in the nuclear reactor?
(a) Water (b) Deuterium (c) Some compound of uranium (d) Cadmium

Section-B

6 x 3 = 18

- 6) Explain the principle behind the Hydrogen bomb.
- 7) What is Radio carbon dating?
- 8) State two uses of radio carbon dating.
- 9) What is binding energy of Nucleus?
- 10) The half-life period of a radioactive element is 100 seconds. Calculate the disintegration constant.
- 11) The atomic masses of Li, He and proton are 7.01823 amu, 4.00387 amu and 1.00715 amu respectively. Calculate the energy evolved in the reaction.

Section-C

3 x 5 = 15

- 12) Balancing of nuclear reaction ${}_{17}Cl^{37} + {}_1H^2 \rightarrow {}_{18}Ar^{38} + ?$
- 13) ${}_{92}U^{235} + {}_0n^1 \rightarrow {}_{45}Mo^{95} + {}_{57}La^{139} + 2{}_0n^1 + 7{}_1e^0$ The isotopic mass of ${}_{92}U^{235} = 235.118$ amu
The isotopic mass of ${}_{45}Mo^{95} = 94.936$ amu
The isotopic mass of ${}_{57}La^{139} = 138.95$ amu
The isotopic mass of ${}_0n^1 = 1.009$ amu Calculate the energy released in nuclear fission reaction
- 14) On neutron bombardment fragmentation of U-235 occurs according to the equation
 ${}_{92}U^{235} + {}_0n^1 \rightarrow {}_{42}Mo^{95} + {}_{57}La^{139} + x{}_1e^0 + y{}_0n^1$ Calculate the values of x and y.

Section-D

3 x 10 = 30

- 15) a) On neutron bombardment fragmentation of U-235 occurs according to the equation.
 ${}_{92}U^{235} + {}_0n^1 \rightarrow {}_{42}Mo^{98} + {}_{54}Xe^{136} + x{}_1e^0 + y{}_0n^1$ Calculate the values of x and y.
b) After 24 hours, only 0.125 g out of the initial quantity of 1g of a radioisotope remains behind. what is half-life period?
- 16) a) Half-life period of a radioactive element is 100 seconds. Calculate the disintegration constant and average life period. How much time will it take for 90% decay?
b) The half-life of cobalt - 60 is 5.26 years. Calculate the % activity remaining after 4 years.
- 17) a) Wooden artifact and freshly cut tree are having 7.6 and 15.2 counts $\text{min}^{-1}\text{g}^{-1}$ of carbon ($t_{1/2} = 5700$ years) respectively. Calculate the age of the artifact.
b) Half life period of a radioactive element is 1500 years. Find the value of disintegration constant in s^{-1} .
