

Model Question Paper
Nuclear Chemistry - Part V

12th Standard

Chemistry

Reg.No. :

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I. Answer all the questions.

II. Use Blue pen only.

III. Question No 15 is compulsory.

Time : 02:00:00 Hrs

Total Marks : 60

5 x 1 = 5

Section-A

- 1) β^- particle is represented as:
(a) ${}_{+1}e^0$ (b) ${}_{-1}e^0$ (c) ${}_1H^1$ (d) ${}_2He^4$
- 2) In the nuclear reaction, ${}_{90}Th^{232} \longrightarrow {}_{82}Pb^{208}$, the number of α and β particles emitted are
(a) $1\alpha, 4\beta$ (b) $2\alpha, 1\beta$ (c) $6\alpha, 4\beta$ (d) $8\alpha, 4\beta$
- 3) ${}_{92}U^{235} + {}_0n^1 \rightarrow {}_{57}Xe^{139} + x {}_{-1}e^0 + 2{}_0n^1$. Then x is
(a) 2 (b) 3 (c) 5 (d) 7
- 4) In a first order reaction the time taken for 90% decay is 12 days. The time taken for 99.0 % decay is
(a) 24 days (b) 12 days (c) 36 days (d) 48 days
- 5) The rate of radioactive disintegration is
(a) directly proportional to the amount of radioactive substance present at that time (b) independent of the amount of radioactive substance
(c) remains constant throughout the reaction for a particular disintegration (d) inversely proportional to the initial concentration

Section-B

5 x 3 = 15

- 6) How radioisotopes are useful in industry and in agriculture
- 7) The $t_{1/2}$ of ${}_6C^{14}$ is 5700 years. Calculate the ages of an organic material that has undergone 93.75% decay
- 8) Write a note on nuclear fusion and hydrogen bomb
- 9) State and explain decay constant
- 10) Calculate the energy released in the following reaction ${}_{92}U^{235} + {}_0n^1 \rightarrow {}_{45}Mo^{95} + {}_{57}La^{139} + 2{}_0n^1 + 7 {}_{-1}e^0$. The isotopic mass of U^{235} , Mo^{95} , La^{139} and neutron are 235.118, 94.936, 138.95 amu, 1.009 a.m.u respectively. Mass of ${}_{-1}e^0$ negligible.

Section-C

5 x 5 = 25

- 11) The decay constant for ${}_6C^{14}$ is $2.31 \times 10^{-4} \text{ year}^{-1}$ calculate the half life period.
- 12) How many α and β particles will be emitted by an element ${}_{84}Po^{218}$ changing to a stable isotope of ${}_{82}Pb^{206}$?
- 13) Complete the following nuclear reactions.
(i) ${}_{18}Ar^{40} + \dots \rightarrow {}_{19}K^{40} + {}_0n^1$
(ii) $\dots + {}_1H^1 \rightarrow {}_2He^4 + {}_2He^4$
(iii) ${}_{88}Ra^{226} \rightarrow \dots + {}_2He^4$
(iv) ${}_{92}U^{238} \rightarrow {}_{56}Ba^{143} + \dots + {}_0n^1$
- 14) a) Determine the average life of U^{238} having $t_{1/2} = 140$ days.

(OR)

b) Complete the following nuclear reactions.

- (i) ${}_{42}Mo^{96} (\dots, n) {}_{43}Tc^{97}$
- (ii) $\dots (\alpha, 2n) {}_{85}At^{211}$
- (iii) ${}_{94}Pu^{246} + {}_6C^{12} \rightarrow \dots + 4({}_0n^1)$
- (iv) ${}_{7}N^{15} (p, \alpha) \dots$
- (v) ${}_{11}Na^{23} (n, \beta) \dots$
- (vi) ${}_{19}K^{39} (p, d) \dots$
- (vii) ${}_{27}Co^{59} (d, p) \dots$
- (viii) ${}_{13}Al^{27} (\alpha, n) \dots$
- (ix) ${}_{11}Na^{23} + \dots \rightarrow {}_{12}Mg^{23} + {}_0n^1$
