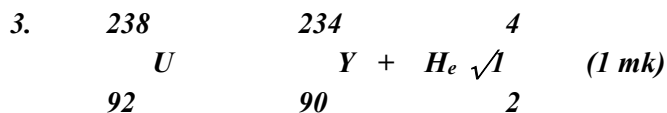


Radioactivity

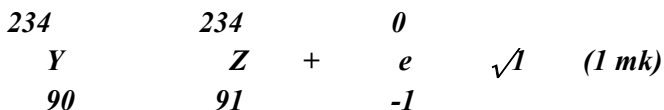
1. $u = 234 \checkmark$ $V = 91 \checkmark$

2. (a) *Nuclear fusion is a process whereby smaller nuclei combine to form a larger one at high temperatures;*
Nuclear fission is whereby a large nuclide splits to form smaller one when hit by a neutron

(b)	230	230	4
	90	91	2



2



4. (a) Is an atom or atomic nucleus characterized by its atomic number and mass number

(b) $\frac{14}{2} = 7 \quad \checkmark 1$ from the graph

\therefore half-life is 10 days $\checkmark 1$

(c) Destroys physical properties of metals e.g. lower tensile strength $\checkmark 1$

5. a) nuclear reactions involve the nucleus of an atom but chemical reactions involved valence elections

- Nuclear reactions are independent of external factors but chemical reactions depend on external factors
- In nuclear reactions new elements are formed but no new elements are formed in chemical reactions (any one of them)

b) i) step I-Alpha $\checkmark 1/2$

II- Beta $\checkmark 1/2$

ii) $Z = 234 \checkmark 1/2$

$A = 92 \checkmark 1/2$

1st $t^{1/2}$

2nd $t^{1/2}$

II. 100%

50%

25%

$2t^{1/2} = 48 \text{ hours}$

$t^{1/2} = ?$

$t^{1/2} = \frac{48}{2} = 24 \text{ hours}$

6. a) Hydrogen. $\checkmark 1$

b) (i) A No effervescence takes place. $\checkmark 1/2$

(ii) B There is effervescence $\checkmark 1/2$ and the gas produced turns lime water into white precipitate. $\checkmark 1/2$

7. (a) 8 (protons number same as atomic number)

(b) $27 - 13 = 14$

8. (a) No. of half-lives (n) = $\frac{120}{20} = 6$

$Y \times (\frac{1}{2})^6 = 3.5 \quad \checkmark 1/2$

$Y = 3.5 \times 2^6 \quad \checkmark 1/2$

$Y = 224 \text{g} \quad \checkmark 1/2$

(all steps for equation)

OR:

- (b) – *To study the rate of absorption of fertilizer by plants using radioactive phosphorous*
- *Tracing chemical and physiological processes such as photosynthesis*
- *Sterilizing equipment* (Iny one)

9. a) $14 \text{ Y} - \frac{14}{6} \text{ Z} + 0$

b) carbon dating

10. - Gamma rays are used to sterilize surgical equipment
 - Detection and treatment of goiter

11. i) U,V,Y,Z All the 4 or nay 3 exclusively correct penalize 1/2 mk if wrong answer
 ii) YZ is/are included any 2 correct 1/2 mk

12. No. of $t_{1/2} = \frac{90}{15} = 6$
 Remaining Fraction = $(1/2)^6 = 1/64$
 Mass left = $1/64 \times 2 = 0.03125\text{g}$

13. a) -1 C

b) $100 - 50 - 25 = 12.5$
 $3t_{1/2} = 15.6$
 $T_{1/2} = \frac{15.6}{3} = 5.2 \text{ years}$