

Radioactivity

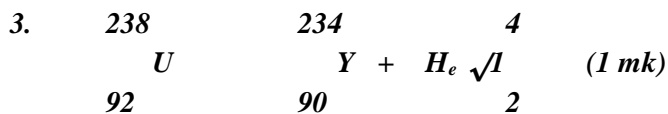
1. $u = 234 \sqrt{\quad}$ $V = 91 \sqrt{\quad}$

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) $230 \qquad \qquad \qquad 230 \qquad \qquad \qquad 4$

$90 \qquad \qquad \qquad 91 \qquad \qquad \qquad 2$



2



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

(b) $\frac{14}{2} = 7$ ^{P1} from the graph

\ half-life is 10days ^{P1}

(c) Destroys physical properties of metals e.g. lower tensile strength ^{P1}

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 $\sqrt{1/2}$

II- Beta $\sqrt{1/2}$

ii) Z = 234 $\sqrt{1/2}$

A = 92 $\sqrt{1/2}$

1st $t^{1/2}$

2nd $t^{1/2}$

II. 100%

50%

25%

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

$t^{1/2} = ?$

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

2

6. a) Hydrogen. $\sqrt{1}$

b) (i) A No effervescence takes place. $\sqrt{1/2}$

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

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

(b) $27 - 13 = 14$

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

$$Y \times \left(\frac{1}{2}\right)^6 = 3.5 \text{ P } \frac{1}{2}$$
$$Y = 3.5 \times 2^6 \text{ P } \frac{1}{2}$$
$$Y = 224g \text{ P } \frac{1}{2}$$

(all steps for equation)

OR:

P1

- (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) $14 \text{ Y} \xrightarrow{6} 14 \text{ Z} + 0$
 $7 \quad -1$

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 $\frac{1}{2}$ mk if wrong answer
ii) YZ is/are included any 2 correct $\frac{1}{2}$ mk

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

13. a) -1 C

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