Radioactivity

1. ***u= 234 √*** ***V = 91√***

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) $^{230}_{90}Th \longrightarrow {}^{230}_{91}Pa \quad {}^{4}_{2}He$

3.
$$^{238}_{92}U \longrightarrow {}^{234}_{90}Y + {}^{4}_{2}He \quad \surd 1 \quad (1\ mk)$$
$$^{234}_{90}Y \longrightarrow {}^{234}_{91}Z + {}^{0}_{-1}e \quad \surd 1 \quad (1\ mk)$$
2

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

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

∴half –life is 10days ✓1

(c) Destroys physical properties of metals e.g. lower tensile strength ✓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√ ½
II- Beta√ ½
ii) Z = 234√ ½
A= 92√ ½

$1^{st}\ t^{1/2}$ $2^{nd}\ t^{1/2}$

II. 100% $\longrightarrow$ ***50%*** $\longrightarrow$ ***25%***
2t ½ = 48hours
$t^{1/2}$***=?***
$t^{1/2} = \frac{48}{2}$ ***= 24hours***

6. ***(a) 8 (protons number same as atomic number)*** ✓1
(b) 27 -13 = ✓1 ***14***

7. ***(a) No. of half –lifes (n) =*** $\frac{120}{} = 6$

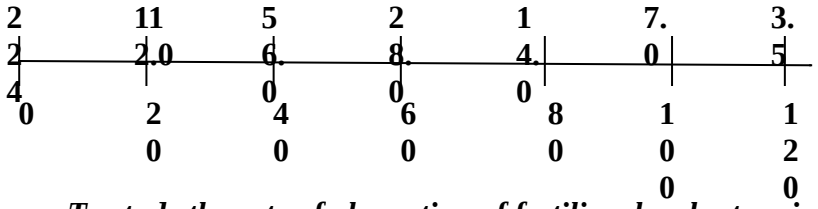
$$Y \times (\tfrac{1}{2})^{6} = 3.5 \quad \checkmark \tfrac{1}{2}$$

$$Y = 3.5 \times 2^{6} \quad \checkmark \tfrac{1}{2}$$

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

(all steps for equation)

OR:



✓1

(b) – To study the rate of absorption of fertilizer by plants using radioactive phosphorous
- Tracing chemical and physiological processes such as photosynthesis ✓1
- Sterilizing equipment ✓1 ***(1ny one)***

8. a) $^{14}_{6}Y$ ***_____*** $^{14}_{7}Z + {}^{0}_{-1}$

b) carbon dating

9. - Gramma rays are used to sterilize surgical equipment
- Detection and treatment of goiter

10. i) U,V,Y,Z ***All the 4 or nay 3 exclusively correct penalize ½ mk if wrong answer***
ii) YZ ***is/are included any 2 correct ½ mk***