

Essay {Paper02}

[SBPmidyearF406-07a]

- a(i) 1 Electron arrangement of element atom W: 2.8.1 1
 2 Electron arrangement of element atom Z: 2.8.7 1
- (ii) 3 Group 1 1
 4 Because has one valence electron. 1
 5 Period 3 1
 6 Because has three shells occupied with electrons. 1
- (iii) 7 Z 1
 8 atom Z has more proton number / positive charge increased 1
 9 Attraction / electrostatic forces between nucleus atom and electrons increased 1

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[SBPdiag06-08a]

Helium atom has **two electrons in its valence shell** / helium atom has achieved a **duplet electron arrangement**. 1

Helium atom will not gain, lose nor share electrons with other atoms. 1

Chlorine atom has an electron arrangement of 2. 8. 7, **needs one electron** to achieve the octet electron arrangement. 1

Thus, two chlorine atoms **share one pair of electrons** so that both atoms can achieve the octet electron arrangement. 1
4

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[SBPmidyearF407-07a]

- (a) • Group 18 / 18 1
 • Argon atom has attained **octet** electron arrangement/
 Argon atom has **8 valence electrons**/
 Argon atom's outermost shell is **completely filled with electrons**. 1
- This electron arrangement is **stable** //Argon is inert / unreactive. 1
- Argon atom does not need to **gain, lose or share** electrons with other elements. 1

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[SBPmidyearF407-07b]

- (b)(i)
- Correct symbol/formula of the reactants. 1
 - Correct symbol/formula of the product. 1
 - Balance equation 1
- Answer:
 $4X + O_2 \rightarrow 2X_2O$
- (ii)
- **Atom Y is more reactive** than **atom X.** 1+1
 - The atomic size Y / the size of atom Y is greater than **atom X.** 1+1
 //The valence electron of atom Y is further away from the nucleus compare to atom X.
 - The **attraction forces** between nucleus and valence electron of **atom Y** is **weaker** than **atom X.** 1+1
 //It is easier for atom Y to donate / release / lose the valence electron compare to atom X.
- Or
- Atom Y is more reactive. 1
 - The valence electron of atom Y is further away from the nucleus 1
 //Atom Y has bigger atomic size.
 - The attraction forces between nucleus and valence electron of atom Y is weak. 1
 - Atom X is less reactive.
 - The valence electron of atom X is closer to the nucleus 1
 //Atom XY has smaller atomic size. 1
 - The attraction forces between nucleus and valence electron of atom X is strong. 1
- (iii)
- The reaction of lithium with oxygen is **less reactive.** 1

[MRSM06-07a,b]

(a) Electron arrangement atom potassium is 2.8.1 and electron arrangement atom lithium is 2.1.

The valence electron for atom potassium is further from nucleus.

The nucleus attractive force between electron valences is weaker for atom potassium. the valence electron atom potassium more easier to lose/ donate.

(b) (i) Mole of potassium = $3.9 / 39 = 0.1$ mole

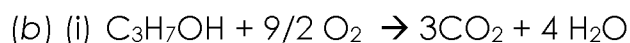
From equation:

4 mole K produce 2 mole K_2O

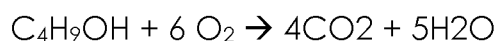
Then 0.1 mole K produce 0.05 mole K_2O

Mass $K_2O = 0.05 \times [2 \times 39 + 16] = 0.05 \times 92 = 4.6$ g

(ii) Potassium hydroxide

[MRS10-09b]

or



1. Correct formulae of reactants and products 1
2. Balanced equation 2

(ii)

1. Heat of combustion of butanol is higher than propanol.
2. The number of carbon atom per molecule butanol is bigger than propanol
3. Butanol produce more carbon dioxide and water molecules than propanol // more bonds are formed // energy content is higher in butanol.
4. Released more heat energy

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[SBPmidyearF407-07c]

- (c) (i) • The iron wool burns vigorously with a **bright flame**. 1
- A **brown** solid is formed. 1

(ii) Number of moles of iron = $\frac{2.8}{56}$

= 0. ✓ ① 1

2 moles of Fe produce 2 moles of FeCl₃

0.05 mole of Fe produce **0.05 mole** of ✓ ② Cl₃ 1

0.05 mole of FeCl₃ = 0.05 × (56+3(35. ✓ ③)) 1

= 0.05 × 162.5

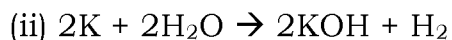
= **8.125** ✓ ④ 1

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[MRS08-07] – my answer

- (a) 1. Group 17
2. Chlorine atom has 3 shells, less than iodine atom, that is 5 shells // Chlorine atom has smaller size than iodine atom
3. The force attraction between nucleus to attract valence electron is stronger in chlorine atom
4. Chlorine atom easier to attract/receive electron

- (b) (i) 1. Electron arrangement of K is 2.8.8.1 and Na is 2.8.1
2. the valence electron of K and Na is same, that is 1 same valence number, the element have the same chemical properties



1. Correct formula of reactants and products
2. balance

(iii) 1. The solution produce is alkaline solution

2. that consist of present of hydroxide, OH^- ion in the solutionPresent OH^- , that change the red litmus paper to blue

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[SPM06-08]

a) i) The electron configuration is 2.8.7. The element is chlorine.



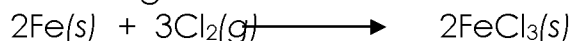
- b)
1. The atom in Diagram 8.2 has four electron shell
 2. The distance between the nucleus and the valence electrons of atom in Diagram 8.2 is greater than atom in Diagram 8.1
 3. **The attractive forces between the nucleus and the valence electron becomes weaker.**
 4. The **atom** in Diagram 8.1 has a **stronger attraction towards electron** compared to the atom in Diagram 8.2.
 5. The atom in Diagram 8.1 is **more electronegative** compare to atom in Diagram 8.2.
 6. Therefore atom in Diagram 8.1 is **more reactive** compared to the atom in Diagram 8.2.

c) Less reactive

- d) i) 1. **Concentrated** acid is **corrosive** and the experiment must be conducted in a fume chamber.
2. Make sure that the apparatus are **connected tightly** to prevent leakage of chlorine gas. Chlorine gas is poisonous.

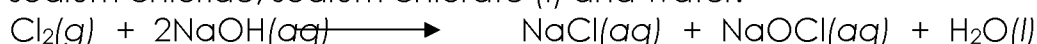
ii) Part G

Chlorine gas will react with iron wool to produce iron (III) chloride solid.



Part H

The excess chlorine gas will flow into sodium hydroxide solution to produce sodium chloride, sodium chlorate (I) and water.



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