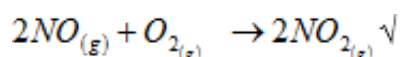


FORM FOUR CLUSTER KCSE MODEL 1

CHEMISTRY PAPER 2 ANSWER

1. (a) (i) I-Used dilute Nitric (V) acid instead of concentrated Nitric (V) acid.✓ //Collected the gas by over water method nitrogen (IV) oxide soluble in water. II Gas V- Nitrogen (II) oxide.✓
 (ii) A brown solution was formed.✓ Nitrogen (II) oxide react with Iron (II) sulphate to form a complex
 $FeSO_4 \cdot NO$ ✓

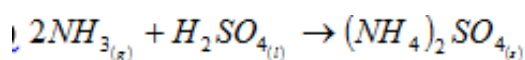
(iii) Brown fumes of nitrogen (IV) oxide form.✓



(b) (i) U-Nitrogen (II) oxide //NO ✓½ V-Nitrogen (IV) oxide //NO₂ ✓½

(ii) Catalyst –Platinum /Rhodium ✓½ Unit IV✓½

(iii) It undergoes slow decomposition on exposure to light//decomposes in sunlight.



$$\text{Moles of } (NH_4)_2SO_4 = \frac{330 \times 1000}{132} = 2,500 \checkmark \checkmark \checkmark \checkmark \checkmark$$

$$\text{Moles of } NH_3 = 2,500 \times 2 = 5,000 \text{ moles } \checkmark \checkmark \checkmark \checkmark \checkmark$$

$$\begin{aligned} \text{Volume of } NH_3 &= 5,000 \times 24.0 dm^3 \checkmark \checkmark \checkmark \\ &= 120,000 dm^3 \checkmark \checkmark \end{aligned}$$

2. (a) (i) 4-Methylpent-1-yne.

(ii) Propylpropanoate.✓ 2

(b) -Add bromine water to each separately.✓

But-1-ene decolourizes Br₂ (aq) ✓½

Propane does not.✓½

-Add $H^+ / KMnO_4$ to each separately

But-1-ene decolourizes 4 KMnO

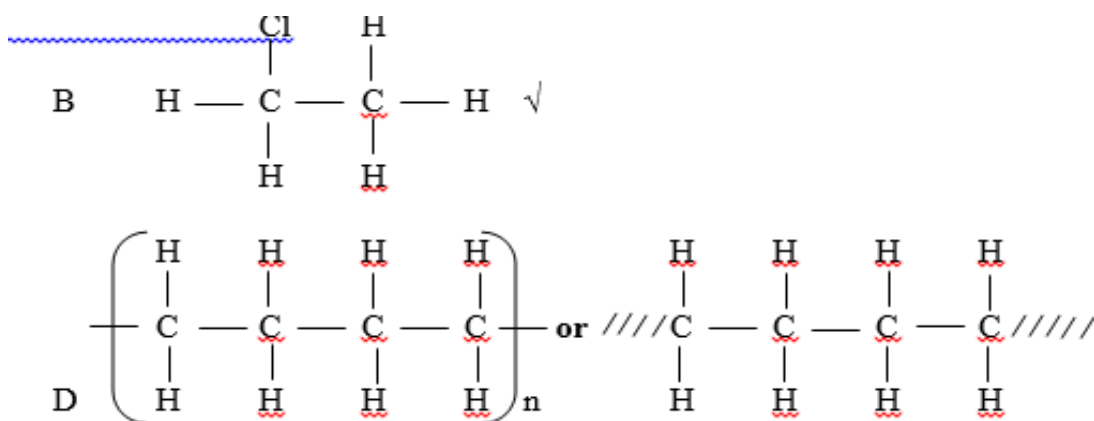
Propane does not/Burn separate sample But-1-ene burns in a sooty flame while propane burns in a blue flame.

(c) (i) Ethylethanoate.✓ A-Ethane.✓ 2

(ii) Concentrated 4 2SOH ✓½ C 0180 ✓½ Penalise for a range of temperature.

(iii) Step 2-Substitution chlorination✓½ /Substitution. 1 Step -3 Esterification.✓½

(iv)



Non-biodegradable. ✓½

Pollute environment ✓½

3. (a) Similarity –both have a mass of one. ✓

Difference-Protons a charge of +1 ✓½

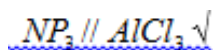
Neutrons have a charge 0 ✓½ 2

(b) (i) N-27

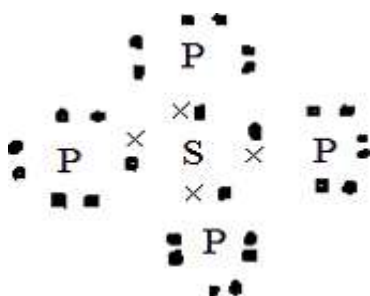
(ii) I -R ✓ 2 II -P ✓

(iii) Ionic. ✓

(iv)



(v)



(vi) S ✓½ and T ✓½ Have same number of protons but different number of neutrons. ✓

(vii) N is smaller than Q ✓½

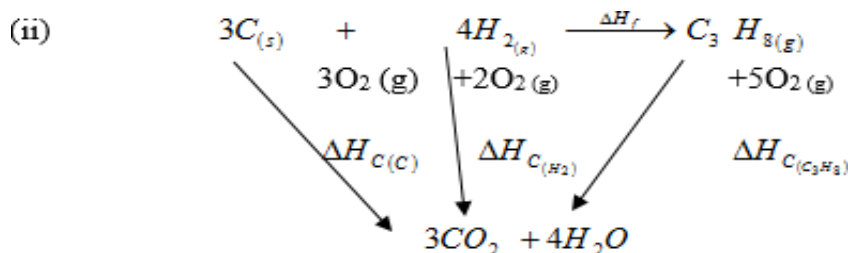
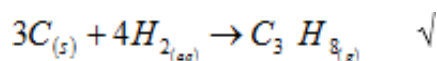
N has a higher nuclear charge than Q ✓½

(viii) Group –I ✓½

Period -4√1/2

4. (a) Enthalpy change that occur when a given mass of a substance changes from solid to liquid at its M.P

(i)

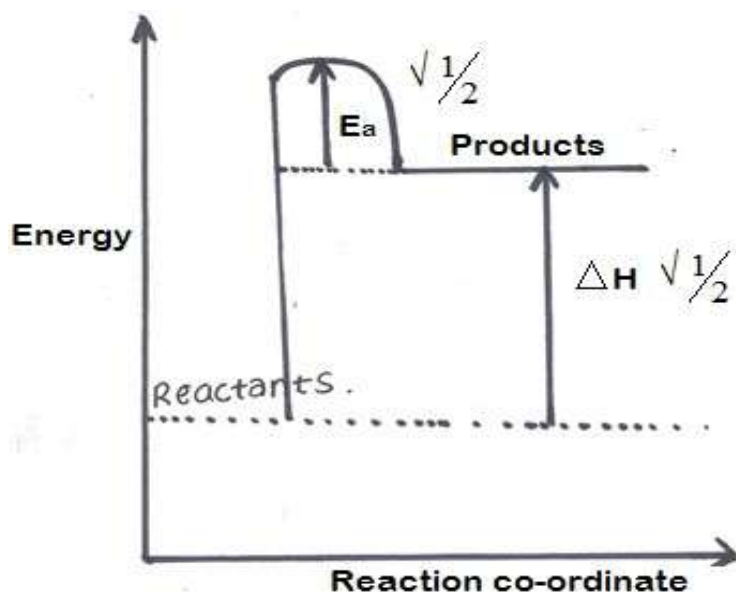


(iii)

$$\begin{aligned}
 \Delta H_{c(C)} + \Delta H_{c(H_2)} &= \Delta H_{f(C_3H_8)} + \Delta H_{c(C_3H_8)} \quad \checkmark \\
 &= -373 \times 3 + 4 \times -286 = \Delta H_f + -2184 \quad \checkmark \\
 \Delta H_f &= -2323 + 2184 \quad \checkmark \\
 &= -139 \text{ kJ mol}^{-1} \quad \checkmark
 \end{aligned}$$

(c) HCl and HNO₃ are strong acids //ionize hence fully produce more heat✓. CH₃COOH is a weak acid, some energy is used to complete ionization

(d)



(e) Energy for bond breaking.

$$C-H-4 \times 413 + 612 \times 1 + 192 \times 1 \sqrt{1/2}$$

$$= 1,652 + 612 + 192 = 2,456 \sqrt{1/2}$$

Bond formation

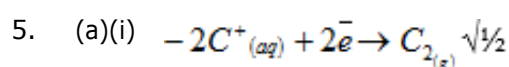
$$4 \times 413 + 347 \times 1 + 288 \times 2 \sqrt{1/2}$$

$$1652 + 347 + 576 = 2575 \sqrt{1/2}$$

$$\Delta H = \Delta H_{bb} + -\Delta h_{bf}$$

$$= 2456 - 2575 \sqrt{1/2}$$

$$= -119 kJ \sqrt{1/2}$$



-No resultant flow of electrons. $\sqrt{1/2}$ hence is 0.00V/has electrode potential of 0.00v hence used as standard.

(ii) A wears out as it dissolves in the solution. $\sqrt{1/2}$

Being more electropositive than copper. $\sqrt{1/2}$

iii)

$$E^0 - E^0_0$$

$$= +0.8 - 0.13 \sqrt{1/2}$$

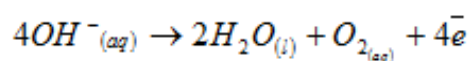
$$\underline{\underline{+0.93V \sqrt{1/2}}}$$

(b)(i) W -Hydrogen/H₂

(ii) Y-Anode $\sqrt{}$ Z-Cathode $\sqrt{}$

(iii) Q=1 t

$$= 0.5 \times 0.72 \sqrt{1/2} \times 60 = 2160 c \sqrt{1/2}$$



4F

$$\therefore 4 \times 96500 c \text{ produce } 24000 cm^3 (1 \text{ mole})$$

$$2160 c \text{ produce } \frac{24000}{4 \times 96500} \times 2160 \quad (3)$$

$$\underline{\underline{= 134.3 cm^3}}$$

(vi) - Electroplating.√½

- Extraction of reactive metals √½

- Purification of copper.

- Manufacture of NaOH

-Mercrycathode cell

6. (a) Haematite// 3 2OF √1

b) (i) Limestone (calcium carbonate)√½

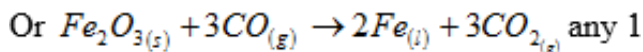
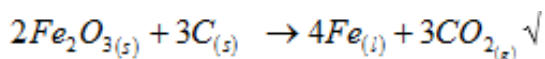
To remove impurities in form of slag.√½

(ii) Coke //carbon √½

A reducing agent.√½

(c) Combustion of coke in sufficient air is highly exothermic.√/There is complete combustion of carbon due to presence of enough air. 1

d)



(e) -Slag is less dense √½

-Slag and molten iron are immiscible.√½(do not react)

(f) (i) NO₂ dissolve in water to form acid rain. Corrodes buildings.√ Lower soil and water pH.√ Chlorosis in plants.

(ii) Air is blown in hot iron to reduce the quantity of C and other impurities.√1/air that is blown in oxidizes the elements to oxides that escape to the atmosphere.

(iii) Galvanizing.

Tinplating.

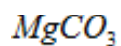
Oiling.

Painting.

Sacrificial protection. Any 2 correct @ ½mk

7. (a) (i) Water that does not lather easily with soap/√water that forms scum with soap.

(ii) Boiling decomposes √½ $Ca(HCO_3)_2$ or $Mg(HCO_3)_2$ 1 to forms insoluble $CaCO_3$ √½ or



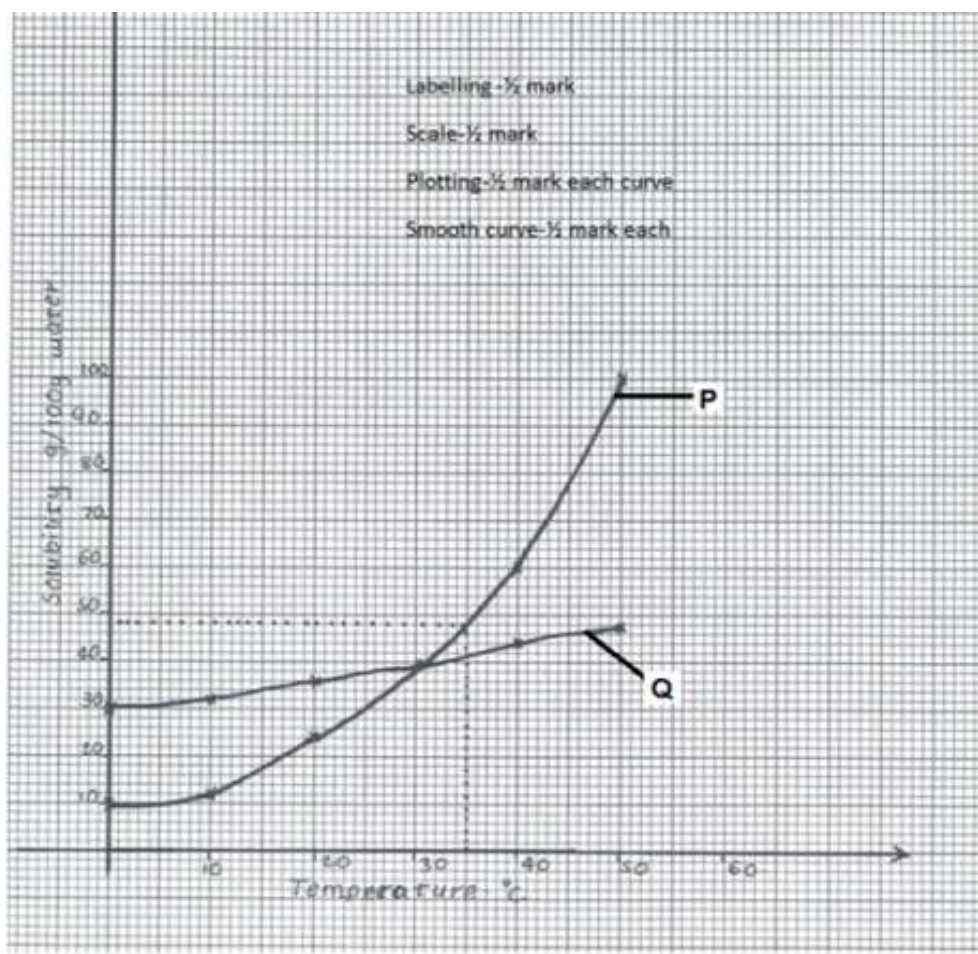
(b) Lowers the solubility of soap in the aqueous layer/causes salting out of soap. (1mk) (c)

(i) Z-water vapour✓

(ii) -Effervescence✓ $\frac{1}{2}$ /fizzing/bubbles. 2 -Solution turn pale green to brown/yellow.✓ $\frac{1}{2}$

iii) A queous ammonia//potassium hydroxide.✓ any one correct. 1

(d) (i)



ii)

$$\begin{array}{ll} \text{I} & 35.5^\circ \text{C} \pm 0.5^\circ \text{C} \\ \text{II} & \begin{array}{l} 35.5^\circ \text{C} \quad \underline{\hspace{1cm}} \quad 50\text{g} \\ 10^\circ \text{C} \quad \underline{\hspace{1cm}} \quad 13\text{g} \\ \hline \quad \quad \quad 37\text{g} \end{array} \end{array}$$

iii)

At 50° C _____ solubility = 48 g/100g water

∴ 100g contain 48g

∴ 60g contain $\frac{48}{100} \times 60$

28.8g