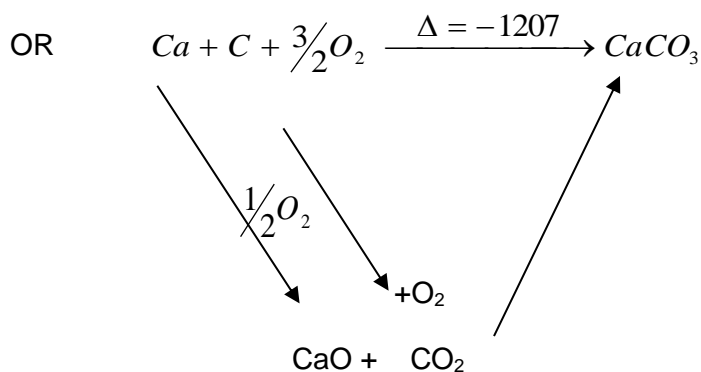
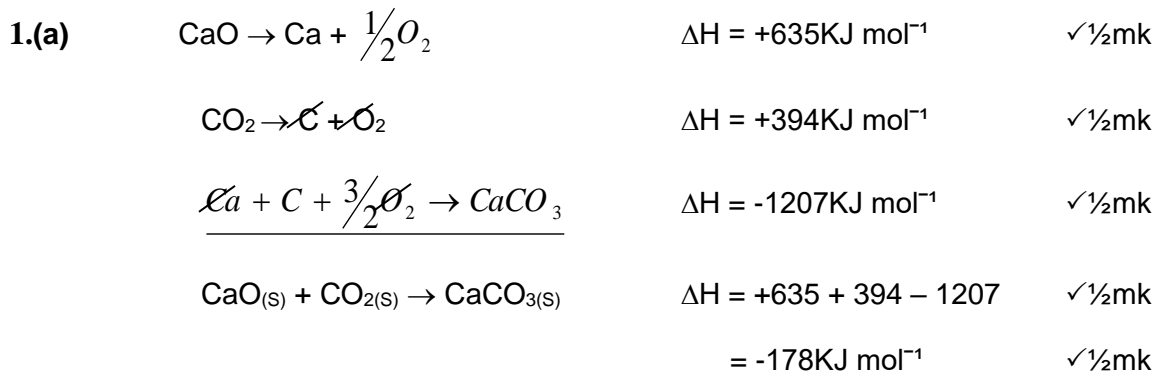


MARKING SCHEME CHEMISTRY PAPER 233/2



$$\Delta H_r = -635 + -394 = -1207$$

$$\Delta H_r = -1207 + 635 + 394 \checkmark 1\text{mk}$$

$$= -178\text{KJ mol}^{-1} \quad \checkmark \frac{1}{2}\text{mk}$$

- (b)
- Heating value.
 - Availability
 - Cost
 - Ease of storage
 - Ease of combustion
 - Effect on environment

- Ease of transport

Any 1mk

(c) (i) Mass of water $500 \times 1 = 500\text{g}$ ✓½mk

$$\Delta T = 44.5 - 25 = 19.5^\circ\text{C} \quad \checkmark \frac{1}{2}\text{mk}$$

$$\text{Heat evolved} = 500 \times 4.2 \times 19.5 \checkmark \frac{1}{2}\text{mk} = 409.50 \text{ Joules } \checkmark \frac{1}{2}\text{mk}$$

(ii) Mass of ethanol used = $121.5 - 120.0 = 1.5\text{g}$ ✓½mk

$$\text{RMM of ethanol} = 46 \quad \checkmark \frac{1}{2}\text{mk}$$

1.5g of ethanol produced 40950 Joules

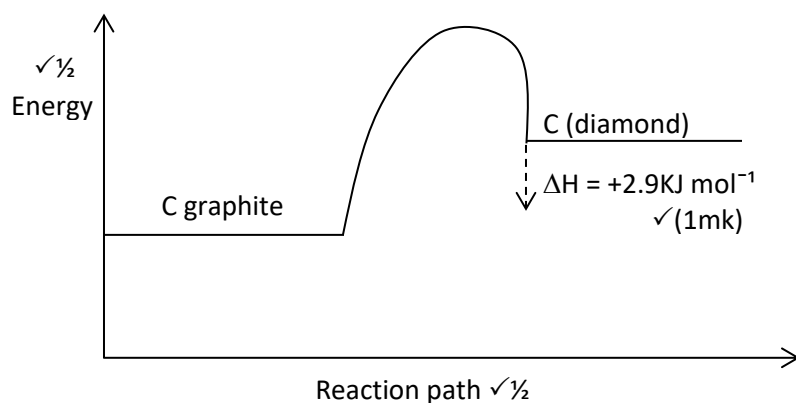
$$46\text{g of ethanol produce } \frac{40950}{1.5} \times 46 \checkmark \frac{1}{2}\text{mk}$$

$$= 1255800 \text{ Joules}$$

$$= -1255.8\text{KJ mol}^{-1} \checkmark \frac{1}{2}\text{mk}$$



(e)



(e) $\Delta H = 435 + 243 + 2(-431) (1\text{mk})$

$$= -862 + 678 \quad \frac{1}{2}\text{mk}$$

$$= -184\text{KJ} \quad \frac{1}{2}\text{mk}$$

2.(a) A solution which contains as much solute as can dissolve at a particular temperature in the presence of undissolved solid. (1mk)

(b)(i) Scale (1mk)

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Plotting (1mk)

Curve (1mk)

(ii).I.130g /100g of water ± 2 (1mk)

(Read from candidate graph)

II Solubility at 85°C = 53g/100g of H₂O

Mass dissolved = 53g (1mk)

Mass undissolved = 90 – 53 \checkmark ¹/₂ = 47g \checkmark ¹/₂

III Solubility of X at 30°C = 44g/100g H₂O \checkmark ¹/₂

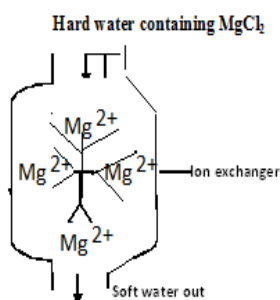
$$\text{Mole of X} = \frac{44}{122.5} = 0.3592 \text{ mol } \checkmark$$

0.3592mol contained in 100cm³

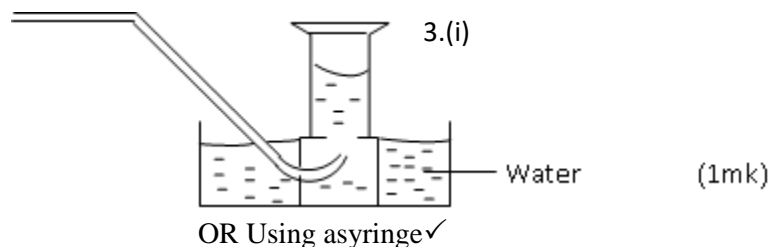
Y mol contained in 1000cm³

$$Y = \frac{0.3592 \times 1000}{100} \checkmark = \underline{\underline{3.592\text{mol}}}$$

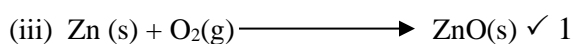
(c)(i)



(ii).by adding brine to the column \checkmark 1



- (ii) I To displace air ✓ 1 inside the aspirator.
 II To absorb/remove carbon (IV) oxide ✓ 1 from air.



(b).(i)-dust, ✓ 1 CO_2 and ✓ 1 moisture

(ii) iron ✓ 1

(iii) reduces wastage ✓ 1 hence economical on the running cost

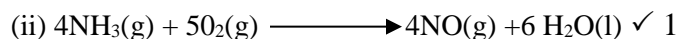
(iv) temperatures of 450° ✓ 1

(c) ☐ manufacture of fertilizers ✓ 1/2

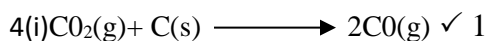
-raw material in the solvay process ✓ 1/2

-manufacture of nitric acid

(d).(i) platinum rhodium ✓ 1



(iii) formation of acid rain which corrodes buildings ✓ 1



(ii) Potassium hydroxide solution ✓ 1

(iii) bubble ✓ 1/2 the gases separately in lime water ✓ 1/2, CO_2 forms a white ppt ✓ 1/2 while CO does not form a ppt ✓ 1/2

(iv) to absorb any unchanged ✓ 1 CO_2 /unreacted CO_2

(v) It is slightly ✓ 1/2 soluble in water/insoluble in water

(vi)- used as a reducing agent during extraction of metals ✓ 1

-used as a fuel

(b).(i)the reaction between brine and ammonia is highly exothermic ✓ 1

(ii) $2 \text{NaHCO}_3(\text{s}) \longrightarrow \text{Na}_2\text{CO}_3(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$ ✓ 1

(iii) KHCO_3 ✓ ½ from which K_2CO_3 is obtained, and ammonium chloride are equally soluble ✓ ½, hence separation will not be easily possible

5.(a)(i) Zinc hydroxide ✓ 1, $\text{Zn}(\text{OH})_2$ ✓ 1

(ii) Zincate ion, ✓ 1 $[\text{Zn}(\text{OH})_4]^{2-}$ ✓ 1

(b) it is amphoteric ✓ 1mk

(c) $\text{Zn}(\text{OH})_2(\text{s}) + 2\text{OH}^-\text{aq} \longrightarrow [\text{Zn}(\text{OH})_4]^{2-}$ ✓ 1

(d).
 -React zinc hydroxide with nitric (v) acid to form zinc nitrate ✓ ½
 -Dissolve potassium carbonate in distilled water.
 -React Zinc nitrate solution with potassium carbonate solution ✓ ½
 -Filter ✓ ½ to obtain zinc carbonate as residue.
 -Wash ✓ ½ residue and dry it. ✓

(e) a weak acid is partially ionized while strong acid is strongly ionized ✓ 1

(f) water, it donates a proton ✓ 1

6.(a) Q- ✓ 1 This is because it has the highest number of energy levels. ✓ 1

(b) U ✓ 1 – This is because U has the highest nuclear charge due to its small atomic radius among the transition metals. ✓ 1

(c) P has bigger atomic radius than R. this is because P has higher nuclear charge than R ✓ 1.

(d)(i) S^{2-} ✓ 1

(ii). R^{2+} ✓ 1

(e). $P = 18$ $N = 40 - 18 = 28$

$P = 18$

$N = 22$ ✓ 1

(f)(i) RX_2 ✓ 1

- (ii).-Compounds with the above structures are soluble in water but insoluble in organic conduct. ✓ 1
 - Compounds with the above structure conduct electricity in molten and aqueous state but they are non conductors in solid state.
 -Compounds with the above structure exist in crystalline form
 -Compounds with the above structure have very high melting and boiling point.

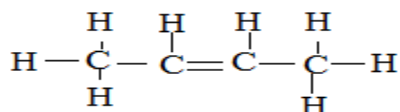
Any 1

7.(b)(i) water ✓ 1

(ii) $\text{H}-\text{C}\equiv\text{C}-\text{H}$ ✓ 1

(iii) polymerization ✓ 1

(b) But-2-ene, ✓ 1



✓ 1

(d)(i) L1- soapless detergent ✓

L2-Soap ✓

(ii) L1- non biodegradable ✓

L2-forms scum with hard water ✓ 1

(d)(I) Esterification ✓ 1

II. Alkanoic acid ✓ 1

(e)

