FORM FOUR CLUSTER KCSE MODEL8

CHEMITRY PAPER 2 ANSWER

1. (a) (i) P : Protons 13√½, mass number = 27√½

Q: Neutrons 18√½ E.C = 2.8.6√½

(ii) Period 3√1. Has three occupied energy levels.√1

(b) (i) X√ Readily accepts electrons because of its smaller atomic size.√1

(ii) Y, Z, and Q .√1. Ionic radii are smaller than atomic radii.√1

iii)

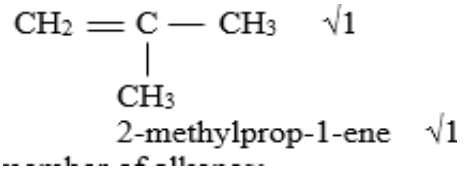
$$4Na_{(s)} + Q_{(s)} \rightarrow Na_4Q_{(s)} \surd 1$$

(iv) Ionic bond√1

(v) Acidic√1

2. (a) (i) $CH_3CH_2CH_2C \equiv CH$
Pent-1-yne

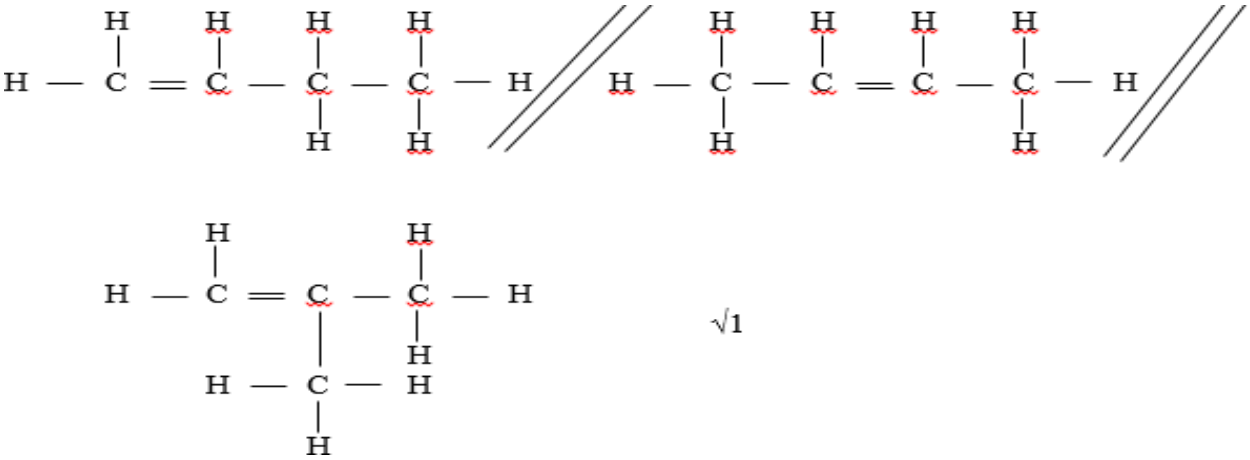
ii)



√1

2-methylprop-1-ene √1

b)



√1

(c) (i) (I) cpd N-Propane √1

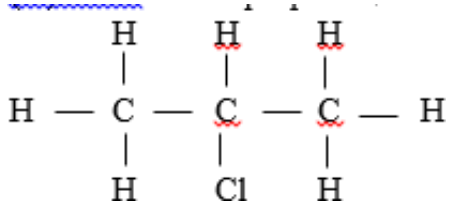
(II) cpd P -Chloropropane//Monochloropropane.√1

(ii) Process x –Dehydration.√1

(iii) (I) Addition reaction //hydrogenation (step 2)

(II) Step 3 –substitution//chlorination reaction.

(iv) 2- Chloropropane.√1



3. (a) The strength of an acid is the degree or extent of dissociation//ionization of an acid in aqueous state; while concentration of an acid refers to the number of moles√ or mass of an acid in a unit/volume.√ (2)

b)

$In \quad H_2O + H_2O \rightleftharpoons H_3O + HO_2^-$

Acid is H_2O_2 √1 donate a proton H^+ to H_2O to form H_3O^+

(i) (I) GRAPHS

(II) Solubility of KNO_3 at 70^0 =156/100g ±2g water.

$CuSO$ at 70^0 =54g /±2g/100 of water.√2

(III) At 4^0 c solubility of both salts use equal.√1

(IV) Solubility of KNO_3 *at* 100^0 *c* 250*g* / *water*.

Solubility of KNO_3 at 20^0 =30g/100 water=250-30=220g

350 g solution gave 220g√1

$\therefore 262.5\text{g of solution} \rightarrow \frac{262.5}{350} \times 220g$ √1

Mass of crystals =165 g√1

4. (a) (i) Dehydration.√1

(ii) To absorb CO_2 gas.√1

$PbO_{(s)} + CO_{(g)} \rightarrow Pb_{(s)} + CO_{2_{(g)}}$ √1

b)

(I) Unit I $NaCl_{(aq)} + NH_{3_{(g)}} + H_2O_{(l)} + CO_{2_{(g)}} \rightarrow NaHCO_{3_{(s)}} + NH_4Cl_{(aq)}$ √1

(II) Step II $2NaHCO_{3_{(s)}} \rightarrow Na_2CO_{3_{(s)}} + CO_{2_{(g)}} + H_2O_{(l)}$ √1

(ii) Filtration.√1

(iii) Calcium agent for gases.√2

(iv) -Manufacture of glass.√1

-Manufacture soap powder/detergents.√1 (Any one correct use)

-Softening hard water.

5. a) i) $\Delta H_1 \; and \; \Delta H_2$ √1

ii) Atomicisation of oxygen gas√1

iii) Condensation√1

iv)

$$\Delta Hf = \Delta H_1 + \Delta H_2 + \Delta H_3 + \Delta H_4$$

v) Exothemic. √1 Overall energy change is below reactants energy level.½1

b) i) -Blue colour of solution fades.√1

-Brown solid deposited at the bottom of the container.√1

ii)

$$-Cu^{2+}_{(aq)} + Zn_{(s)} \rightarrow Cu_{(s)} + Zn^{2+}_{(aq)} \sqrt{1}$$

iii)

$$\frac{0.2 \times 50}{1000} = 1.0 \times 10^{-2} \text{moles} \sqrt{1}$$

iv)

$$1 \times 10^{-2} mole \rightarrow 4.2 \times \frac{50}{1000} \times 7^0 C$$

$$1 mole \rightarrow \left(\frac{4.2 \times 5 \times 10^{-2} \times 7}{10^{-2}} \right) \sqrt{1}$$

$$= -147 \text{kJ/mole} \sqrt{1}$$

6. a)i) Complete and well labelled diagram including either water or sodium hydrogen carbonate and drying agent.√3

ii)

$$CaCO_{3(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + CO_{2(g} + H_2O_{(l)} \sqrt{1}$$

b) -White powder and black specks√1

-White powder is due to the formation of Magnesium Oxide.√1 Black specks due to the formation of carbon.√1

c) Litmus changed to blue√1 because the resultant solution is a base.√1

di) Sodium carbonate.√1 Do not accept formula.

ii)

$$2NaOH_{(aq)} + CO_{2(g)} \rightarrow Na_2CO_{3(s)} + H_2O_{(l)} \sqrt{1}$$

7. a)i) To lower the melting point of sodium chloride.√1

ii) Carbon.√1 It does not react with chlorine.√1

Anode

$$2Cl^-_{(g)} \rightarrow Cl_{2(g)} + 2e \sqrt{1}$$

Cathode

$$2Na^+_{(l)} + 2e \rightarrow 2Na_{(l)} \sqrt{1}$$

b) It requires a lot of electricity.√1 c)

-In street lights.

-Coolant in unclear reactors.