

FORM FOUR CLUSTER KCSE MODEL8

CHEMISTRY PAPER 1 ANSWER

1. Sooty because of the unburned carbon atoms. ✓1
-Yellow because of the glowing carbon atoms.
2. a) B ✓1
b) Metallic ✓1
c) C ✓1
3. a) Turns blue ✓1 addition of sodium hydroxide increases the concentration of hydroxide ions hence equilibrium shifts to the left. ✓1
b) Turns red ½ ✓. Addition of an acid lowers the concentration of hydroxide ions ✓½
4. In silicon (iv) oxide there are covalent bonds ✓1 between the atoms in its giant atomic structure while in carbon (iv) oxide, the molecules are tied together by the weak van-der-Waals forces. ✓1 This explains why one is a solid and the other gas. ✓1
5. Zinc is less dense than lead ✓1 hence during extraction its collected above lead in the vapour form. ✓1
6. The hydrogen bonds ✓1 in alkanols are stronger than the van-der-waals forces ✓1 in alkanes. This explains why alkanols have higher boiling points than alkanes. ✓1
7. i)

$$2x + 7(-2) = -2$$

$$2x = 12$$

$$x = +6 \checkmark$$

Chromium changes from $+6 \checkmark \frac{1}{2}$ to $+3 \checkmark \frac{1}{2}$

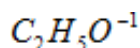
ii) Used as an oxidizing agent. ✓1

8.

$$\frac{(69 \times 3) + (71 \times 2)}{3 + 2} \checkmark \checkmark \frac{1}{2}$$

$$= 69.8 \checkmark 1$$

9.



✓1 is a base. It accepts a hydrogen ion from water. ✓1

10. -Add dilute Nitric (V) acid to PbO to obtain $Pb(NO_3)_2 \checkmark 1$

-React $Pb(NO_3)_2 \checkmark$

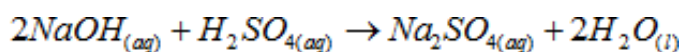
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with aqueous Sodium Carbonate to obtain $PbCO_3 \checkmark 1$

11. . X - Residue

Y - Filtrate

12.



Moles NaOH:

$$= \frac{25 \times 0.2}{1000} = 0.005 \text{ moles} \checkmark 1$$

Mole ratio 2:1

Moles of $H_2SO_4 = 0.005 \times \frac{1}{2}$

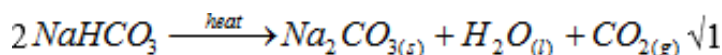
$$= 0.0025 \text{ moles} \checkmark 1$$

$$0.0025 \text{ moles} = 18 \text{ cm}^3$$

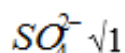
$$= \frac{1000 \times 0.0025}{18} = 0.1389 \text{ mol} \checkmark 1 = 0.1389 \text{ M}$$

13. a) Ammonia / 3 NH₃ $\checkmark 1$

b) Filtration $\checkmark 1$

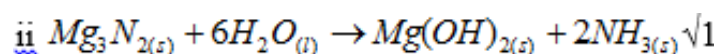


14. Al^{3+} or Mg^{2+} $\checkmark 1$



15. a) Fractional distillation of liquefied air. $\checkmark 1$

b) i) Oxygen/ Copper(II) Oxide $\checkmark 1$

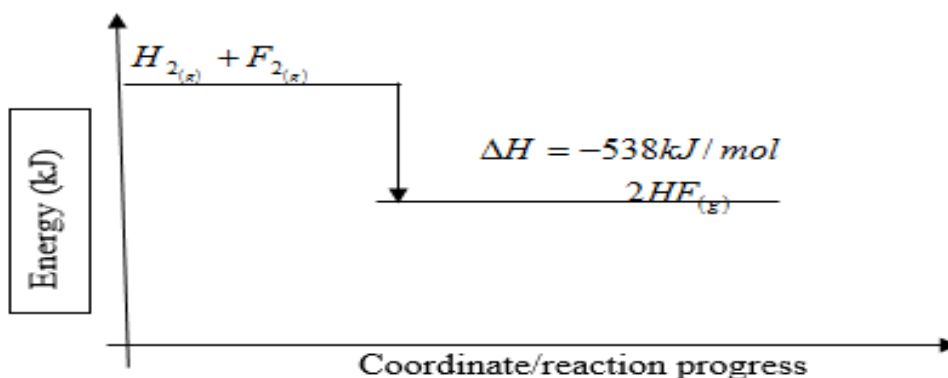


16. The boiling point increases from $\checkmark \frac{1}{2}$

Fluorine to Bromine due to increase in the size of the molecules hence increased intermolecular forces of attraction that requires $\checkmark 1$ more heat break. $\checkmark \frac{1}{2}$

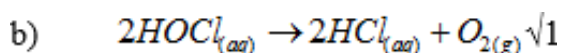
17. The sugar is charred/turns to black, concentrated Sulphuric (VI) acid removes the water elements i.e H and O $\checkmark 1$ from sugar leaving a black carbon.

18.



$$\begin{aligned}
 -538 \text{ kJ} &= 2 \text{ moles} \\
 &\quad 1 \text{ mole}^{\sqrt{1/2}} \\
 &= \frac{1 \times -538}{2} = -269 \text{ kJ/mol}^{\sqrt{1/2}}
 \end{aligned}$$

19. a) Oxygen $\sqrt{1}$



c) Mixed with Helium is used with mountain climbers and deep sea divers. $\sqrt{1}$ (any correct one)

20. a) X - Cathode $\sqrt{1}$

Y - Anode $\sqrt{1}$

b) The solid 2 PbCl doesn't conduct electricity since the ions are fixed/ no source of heat. $\sqrt{1}$

21. i) Mass increase; copper combines with oxygen to form Copper (II) Oxide that remains in the crucible.

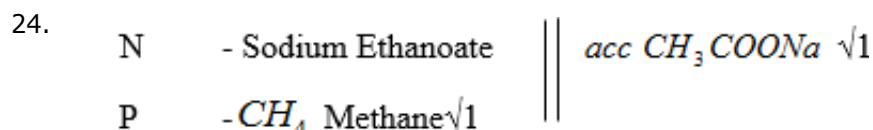
ii) Mass decreases; Sulphur combines with Oxygen to form Sulphur (IV) Oxide which escapes to the atmosphere. $\sqrt{1}$

22.

	C	H	O
% mass	60	13.33	26.67
R.A.M	12	1	16
No of moles	$\frac{60}{12} = 5$	$\frac{13.33}{1} = 13.3$	$\frac{26.67}{16} = 1.667 \sqrt{1}$
Mole ratio	$= \frac{5}{1.667} = 2.9$	$\frac{13.3}{1.667} = 7.9$	$\frac{1.667}{1.667} = 1$
	$= 3$	$= 8$	$= 1 \sqrt{1}$
EIF	$= \text{C}_3\text{F}_8\text{O} \sqrt{1}$		

23. a) Is the minimum amount of energy that is required to completely remove an electron from a gaseous atom. $\sqrt{1}$

b) A is more reactive than B; A has a lower ionization energy thus loses an e-easily.√2



ii) Substitution of copper (II) sulphate solution√1

25. Mass of Sodium solution = : $50cm^3 \times \frac{1g}{cm^3} = 50g$ √1/2

$$C = 4.2kJ/kg/K$$

$$\Delta T = 28 - 21 = 7^{\circ}C / 7K \quad \sqrt{1/2}$$

$$\Delta H = MCDT$$

$$\frac{50 \times 4.2 \times 7}{1000} \quad \sqrt{1/2}$$

$$= 1.47kJ \quad \sqrt{1/2}$$

No of moles of Cu^{2+}

$$\text{If } 1000cm^3 = 0.2 \text{ moles}$$

$$50cm^3 = \frac{50 \times 0.2}{1000} \sqrt{1/2} = 0.01 \text{ moles} \sqrt{1/2}$$

$$\text{If } 0.01 \text{ mole} = 1.47kJ$$

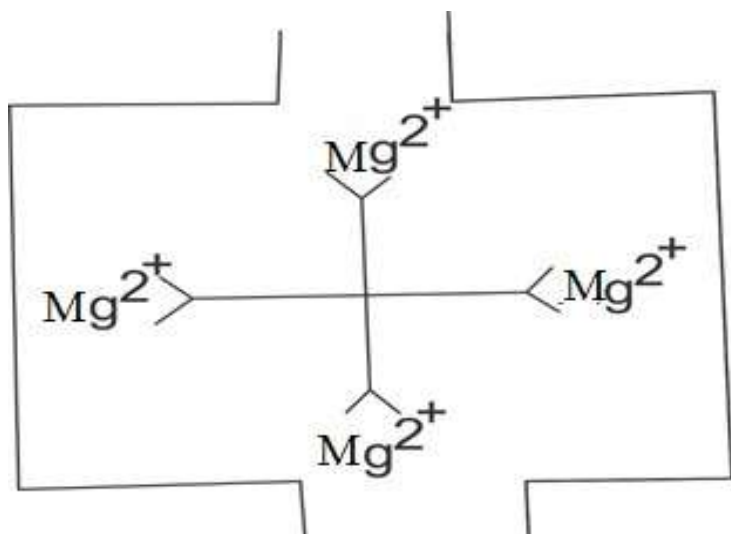
$$1 \text{ mole} = ?$$

$$= \frac{1 \times 1.47}{0.01} \sqrt{1/2} = -147kJ/Mol \sqrt{1/2} = -147kJ/Mole$$

no units -1/2

no sign ignore

26.



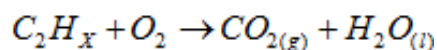
1 mark

ii) By adding brine/concentrated sodium chloride.√1

iii) Provide Ca^{2+} for strong bones/teeth.√1

27. a) When gases react they do so in volumes which bear a simple ratio to each other and to the products if the products are also gases√1

b)



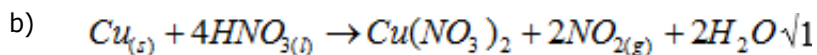
$$\frac{10}{10} : \frac{30}{10} : \frac{20}{10}$$

$$1 : 3 : 2$$

$$H_x = H_4$$

$$x = 4$$

28. a) Concentrated Nitric (II) acid is an oxidizing agent thus oxidises Copper √1 metal to Copper (II) Nitrate while concentrated√1 hydrochloric acid doesn't since it's a reduction agent.√1



29. a) Al_2O_3

b) MgO has a higher melting point than P_4O_{10} because MgO has strong ionic bond in the giant ionic structure thus more heat to break while P_4O_{10} has weak Van-der-Waals forces in the simple molecular structure thus need less energy to break.