FORM FOUR CLUSTER KCSE MODEL4

CHEMISTRY PAPE1 ANSWERS

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) $2\times+7(-2)=-2$

$2x = 12$

$x = +6\ \surd$

Chromium changes from +6√½ to +3√½

ii) Used as an oxidizing agent.√1

Chromium changes from +6√½ to +3√½

$$\frac{(69\times3)+(71\times2)}{3+2}\ \surd\surd2$$

$=69.8\surd1$

9. $C_2H_5O^{-1}$ √1 is a base. It accepts a hydrogen ion from water. √1

a) Mg_3N_2

b) 2 $Mg_3N_{2(s)} + 6H_2O_{(l)} \rightarrow 3Mg(OH)_{2(aq)} + 2NH_{3(g)}$ √1

3 $3PbO_{(s)} + 2NH_{3(g)} \rightarrow 3Pb_{(s)} + 3H_2O_{(l)} + N_{2(g)}$ √1

11.

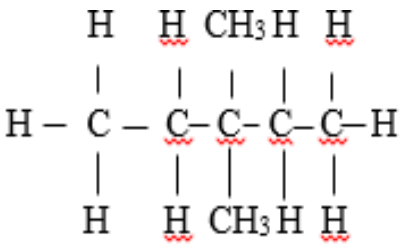
. Mass of solvent in the solution = 45-5=40g √1

$100\,g\ of\ water \rightarrow 25\,g\ of\ Q$

$\therefore 40\,g\ of\ water \rightarrow \left(\frac{25}{1W} \times 40\right) = 10\,g$ √√1½

12.

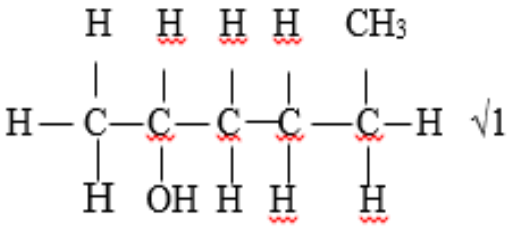
a)i)



√1

3,3 –dimethyl pentane

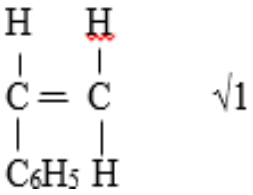
ii)



√1

2- bromo-4-methyl pentan-2-01

b)



√1

$60\,cm^3 \rightarrow 50\,\text{sec}$

$\therefore 90\,cm^3 \rightarrow \frac{50}{60} \times 90 = 75\,\text{sec}$ √1

$\frac{75}{TSO_2} = \sqrt{\frac{32}{64}}$ √½

$\frac{75}{TSO_2} = \frac{1}{\sqrt{2}}$ √½

$TSO_2 = 75\sqrt{2}$ sec

=106.1 sec √1

14. 2.8.8 √2

15. i) Covenant bond √1

ii) Ionic bond√1

16. a) Water that contains dissolved salts of either calcium or Magnesium or both.√1

b) $Ca(HCO_3)_{2(aq)} \rightarrow CaCO_{3(s)} + CO_{2(g)} + H_2O_{(l)}$ √1

OR

$Mg(HCO_3)_{2(aq)} \rightarrow MgCO_{3(s)} + CO_{2(g)} + H_2O$ √1

c) -Good for strong bones and teeth.
-Good for brewing industry.
-Good for the lather industry.

√ 1 for any one use

17.

(i) $M: 4OH^-_{(aq)} \rightarrow 2H_2O_{(l)} + O_{2(g)} + 4e$ √1

(ii) N : $4H^+_{(aq)} + 4e \rightarrow 2H_{2(g)}$ √1

18. - Place a fixed volume of dilute sulphuric (VI) in a glass beaker.√½

-Warm the acid in the beaker.√½

-Filter to remove the unreacted√½ copper√ II) oxide

-Allow the solution to cool slowly to form crystals.½√

19.

i) Al^{3+} ions√1

ii) $Al(OH)_{3(aq)} + OH^-_{(aq)} \rightarrow Al(OH)^-_{4(aq)}$ √1

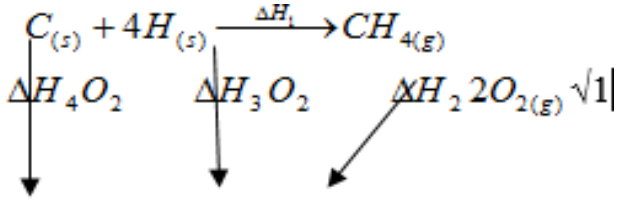
20.

$a = 1, ½ \quad s = 0 \sqrt{½}$

21. -Pale blue precipitate due to the formation of copper (II) hydroxide.√1½

-Deep blue solution is due to the formation of tetra-amine copper (II) complex.1½

22.



$CO_2 + \quad 2H_2O$

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

$\Delta H_1 = 4H_4 + \Delta H_3 - 4H_2$

$= -393 + -572 + 890$ √1

= -75kJ/mole√1

23. The nitrogen in the ammonia molecule has a lone pair of non-bonding electrons√1that allow it to share with a hydrogen ion.√1

24. i) Oxygen gas√1

ii) It bleaches litmus paper by producing an oxygen atom that oxidizes the dye in the litmus paper.√1

25.

$$2NaOH_{(aq)} + H_2A_{(aq)} \rightarrow Na_2A_{(aq)} + 2H_2O_{(l)} \surd 1$$

$$\left(\frac{22.2}{1000} \times \frac{4}{40}\right) \surd ½ \left(\frac{22.2}{1000} \times \frac{4}{40} \times \frac{1}{2}\right) \surd ½$$

0.0222 0.0111

$$0.0111 mole \rightarrow 1g$$

$$\therefore 1 mole \rightarrow \frac{1}{0.0111} \times 1$$

$$= 90.0g \surd 1$$

26. i) Y √1

ii) Cycle the spots where y and z have reached.√2

27. i) Any substance which when burned produce heat energy.√1

ii) In water gas, both carbon (II) oxide and hydrogen burn producing more heat energy

√1 unlike in the producer gas where only carbon burn.√1

28. i) Alloys of Alluminuim are stronger √1 and have higher tensile strength than pure alluminuim.√1

ii) It is coated with an oxide layer that prevents aluminuim pan from further reactions with chemicals used on it.√1

29. i) Saponification.√1

ii) To reduce the solubility of the soap in the glycerol.√1

iii) Not a pollutant.√1