30.5.1 KCSE Chemistry Paper 1 Answers

1. Observations:
   - Crystal dissolves
   - Purple colour spreads in the way

   Explantion: The crystal break into small particles of potassium manganate (VII) which move in all directions.
   (2 marks)

2. Mass of hydrated salt=(33.111 – 30.296) =2.815g
   Mass of anhydrous salt =(32.781- 30.296) = 2.485g
   Mass of water =(2.815 – 2.485) =0.330g
   33.111 – 32.781 = 0.330 g ***(3 marks)***

   $CaSO_4$: xH_2O
   Mass 2.485 0.330

   Moles $\frac{2.485}{136} = 0.0183$ $\frac{0.330}{18} = 0.0183$

   Ratio $\frac{0.0183}{0.0183} = 1$ $\frac{0.0183}{0.0183} = 1$

   Formula $CaSO_4H_2O$
   (3 marks)

3. I The red litmus paper turns white/the litmus paper is bleached.
   II Put a filter paper dipped in acidified potassium dichromate (VI) into the gas.
   III The bromine water is decolourised. ***(3 marks)***

4. (a) $C_{13}H_{27}COO^-Na^+$ or $C_{14}H_{27}O_2^-Na^+$
   (b) Soap detergent or Soap
   (c) $(C_{13}H_{27}COO^-)_2Ca^{2+}$ or $(C_{13}H_{27}C00^-)_2 Mg^{2+}$ ***(3 marks)***

5. R.M.M of Ca3(PO4)2
   Ca=40 × 3 = 120
   P=31 × 2 = 62
   O=16 × 8 = 128
   $\frac{}{310}$
   H_3PO_4 H=1 × 3 = 3
   P=31× 1 = 31
   O=16 × 4 = 64
   98

   I mole $Ca_3(PO_4)_2$ gives 2 moles of H_3PO_4
   310g of $Ca_3(PO_4)_2$ gives 2 × 98g of H_3PO_4 = 196g
   Therefore 155 x 1000g $\frac{2\times98\times155\times1000}{310}$
   =98000g
   =98kg
   (2 marks)

6.
- Propanol
  (2 marks)
- Butanoic acid

7. (a) Atoms of the same element having different masses.

   (b) (18-8)=10 neutrons
   (2 marks)

8. (a) A black solid.

   (b) $FeS_{(s)} + 2HCl_{(aq)} \longrightarrow FeCl_{2(aq)} + H_2S_{(g)}$

   (c) The powder has a larger surface area than the iron fillings hence the reaction is faster.

   (3 marks)

9. $Zn_{(s)} + H_2SO_4(aq) \longrightarrow ZnSO_{4(aq)} + H2_{(g)}$
   $Zn(s) + 2H_2SO_{4(1)} \longrightarrow ZnSO_{4(aq)} + 2H_2O_{(1)}$ ***(2 marks)***

10. Magnesium burns in air to form MgO and Mg_3N_2
    Mg_3N_2 reacts with water to liberate ammonia gas ***(2 marks)***

11. (a) Ionic or Electrovalent

    (b) ***W:*** has 7 electrons in its outermost energy level and hence easily gains an electrons to complete the octet.
    (3 marks)

12. (a) Oxygen

    (b) The pH decreases
    HOCI decomposes to give more HCI in the mixture. ***(3 marks)***

13. Pass product E over anhydrous copper (II) Sulphate (1) which turns from white to blue.
    Or
    (Use Cobalt Chloride (anhydrous) which turns from blue to pink. ***(2 marks)***

14. (a) G

    (b) A_1
    (2 marks)

15. ***J:*** the solubility of the substance decreases with increase with temperature. ***(2 marks)***

16.
- Heat the metal in air to form the oxide (CuO).
- Add excess dcl HCI to the oxide to get $CuCl_2$.
- Concentrate the filtrate and leave to crystalise.
- Filter and dry the crystals at room temp/between pieces of filter paper. ***(3 marks)***

17. (a) Amphoteric
    (b) Lead, Zinc, and aluminium
    (3 marks)

18. (a) Position for silicon.

						R	S	
N	Q			V			T	U
P								

(b) U

(c) $2Q_{(s)} + T_{2(g)} \longrightarrow 2QT_{2(g)}$

(3 marks)

19. (a) $Zn_{(s)}/Zn^{2+}_{(aq)}//Ag^{+}_{(aq)}/Ag_{(s)}^{-}$

$Cu_{(s)}/Cu^{2+}_{(aq)}//Ag^{+}_{(aq)}/Ag_{(s)}$

(b)

- The solution changes to blue because Cu metal dissolves to form $Cu\,2+^{2+}_{(aq)}$
- Metal silver is deposited on the sides of beaker because Ag^{+} reduced to $Ag_{(s)}$

(3 marks)

20. (a) At constant temperature and pressure, the rate of diffusion of a gas is inversely proportional to the square root of its density.

(b) $$\frac{RW}{RX} = \sqrt{\frac{MMX}{MMW}} = \sqrt{\frac{44}{16}}$$

$$\frac{12.0}{RX} = \frac{\sqrt{44}}{4}$$

$$RX = \frac{12 \times 4}{\sqrt{44}} = \frac{48}{6.63} = 7.24 cm^3 S^{-1}$$

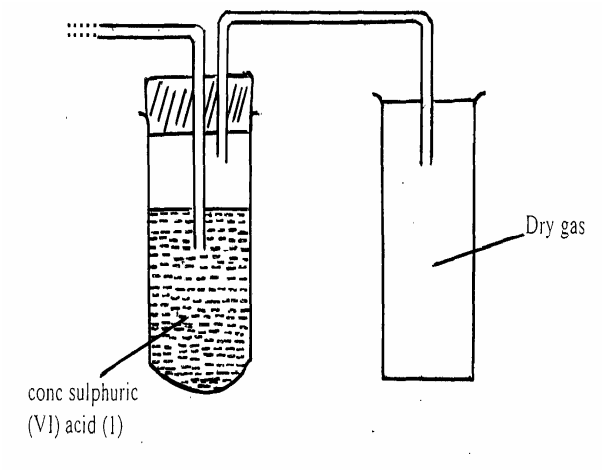
(3 marks)

21. (a) $Cu^{2+}(1)$ moving towards the cathode .

(b) $40H^{-} - 4e \longrightarrow 2H_2O_{(1)} +)_{2(g)}^{-}$

(3 marks)

22.



(3 marks)

23. The brown colour of the mixture intensifies/increases and the green colour of the mixture fades/decreases. Iron (II) is converted to Fe^{3+} ***(2 marks)***

24. (a) $^{4}_{2}H_e$

(b) (i) $Z_1 = 235,(½)\ Z_2=54$

(ii) Nuclear fission ***(3 marks)***

25. (a) Cooling

(b) Latent heat of fusion
(2 marks)

26. (a) I – Pb^{2+}
II – CO^{2-}_{3}

(b) $PbO_{(s)} + 2H^{+}_{(aq)} \rightarrow Pb^{2+}_{(aq)} + H_2O_{(1)}$
(3 marks)

27. (a) $Mg(0H)_{2(ag)} + 2HCI_{(aq)} \rightarrow MgCl_{2(aq)} + H_2O_{(1)}$ or mole ratio
No of moles of acid = $\frac{0.1\times 23}{1000} = 0.0023$
Moles of $Mg(OH)_2$ in antacid
$=0.00115 \times 58=0.067g$

(b) % of Mg(OH)2 in anticid
$Mg(OH)^{1}_{2} = \frac{0.067}{0.50}\times 100=13.4\%$
(3 marks)

28. (a) (i) C-$_1$Cryolite
(ii) D-$_1$ Electrolysis
(2 marks)

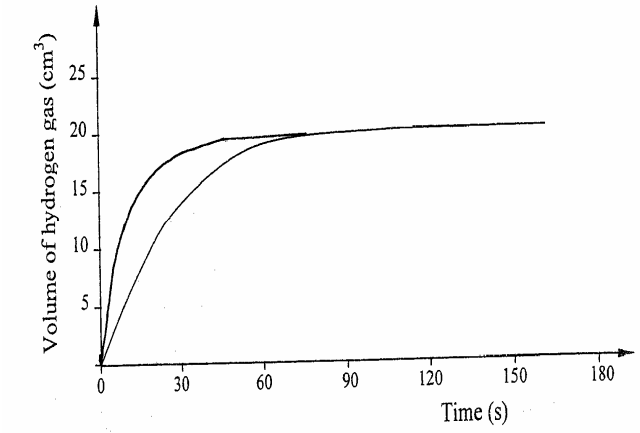
(b)

- Good conductor.
- Meleable.
- Light.
- Does not corrode easily.
- High melting point.
- Does not rust.

(1 mark)

29. (a) Gas syringe/graduated gas cylinder.

(b) (i)



(ii) The molecules of the reactants have higher energy the reaction is faster.

(3 marks)

30. It burns to form SO2 which is a pollutant as it causes breathing problems and acid rain.
(1 mark)

31. (a) Neutralization

(b) (i) Calcium hydrogen carbonate.

(ii) Drying agent. ***(3 marks)***