SET 9

CHEMISTRY

PAPER 1

MARKING SCHEME

1.

a) So that it can be visible to avoid accidents
The luminous flame uses less gas

b) All the carbon in if <u>burns totally</u> to form co2 hence no unburnt carbon to form soot.

2. a. B√

b. Z√

3. i. $Zn_{(s)} + H_2SO_{4(aq)} \rightarrow ZnS0_{4(aq)} + H_{2(g)}$

ii. $Zn_{(s)} + 2H_2SO_{4(l)} \longrightarrow ZnSO_{4(aq)} + 2H_2O_{(l)} + SO_{2(g)}$

NB. Equation must be balanced to earn a mark.

c) Pass the gas through a test-tube containing about 1 cm^3 of acidified potassium chromium(iv) where it changes its colour from orange to green.

4. i. Concentrated sulphuric (vi) acid to dry the gas.

ii. $2Na_2O_{2\,(s)} + 2H_20_{(l)} \longrightarrow 4\ NaOH_{(aq)} + O_{2(g)}$

iii. - Increasing the temperature of the water

- Using powdered sodium peroxide.

5. The colour of the sulphur becomes dark red.(1m)

ii) The S_8 molecules break forming chains which join together to form long chains with 100000 atoms
The long chain becomes intertwined hence increasing the viscosity of sulphur that it could be turned upside down without pouring out.

6. i. ammonium nitrate/ $NH_4\ NO_3$

ii. $NH_4NO_{3(S)} \longrightarrow N_2O_{(g)} + 2H_2O_{(g)}$

iii. Its colourless gas
Has sweet smell
Slightly less denser than air
Fairly soluble in cold water
any two for ½ each); N:B wrong response negates any correct response after it)

7. a) $H_{2\,(g)} + Cl_{2\,(g)} \longrightarrow 2\ HCl_{\,(g)}$ √1mk
$60cm^3$ $40cm^3$ $80cm^3$

The volume of the resulting gas mixture

= 80cm3 + 20cm3 => $100cm^3$√ 1mk

b) Volume of the residue = $100cm^3 - 80cm^3 = 20\ cm^3$ √1

8. i. $4HCl_{(l)} + PbO_{2(s)} \longrightarrow PbCl_2 + 2H_2O_{(l)}$

ii The mixture must be heated for the reaction to proceed.

iii. In a functional fume chamber or in the open to prevent chlorine from poisoning people

9. i. H_2/ hydrogen gas

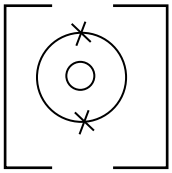
ii. NO, hydrogen gas is less reactive than calcium hence it cannot remove oxygen from calcium

iii. $H2_{(g)} + CUO_{(s)} \longrightarrow H_2O_{(g)} + CU_{(S)}$

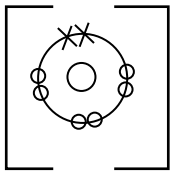
10. a) P and R
Have the same atomic number but different mass number
b) R
- It has more electrons than protons.
- number of neutrons = 27 -13 = 14

11. (a) Elements found in group seven of the periodic table/// Elements with seven electrons in the outer shell.✓1
(b) Iodine has stronger .✓1 intermolecular forces (under) of attractions while chlorine has weak intermolecular forces of attraction.

12.



P^{2+}



R^{2-}

(i) Both must be drawn and electrons shown to earn marks/Also charges must be shown.
(ii) (a) Ionic bonding (½ mk)
(b) Giant ionic structure (½mk)

13. (i) Polythene (1mk)
(ii) – It pollutes the environment. It is non-biodegradable/burns to form harmful gases (1mk)

14. (a) React Lead (II) Carbonate with dilute nitric acid to get a solution of lead nitrate ½ . Dissolve Sodium Sulphate in distilled water to get its solution, mix lead (II) nitrate solution and sodium sulphate to obtain lead (II) sulphate residue ½ . Filter to obtain lead (II) sulphate. Dry the residue.✓1 (2mks)
(b) $Pb^{2+}(aq) + SO_4^{2-}(aq) \rightarrow PbSO_4\ (s)$.✓1 (1mk)

15. (a) $P_{4(s)} + 10N_2O_{(g)} \rightarrow 2P_2O_{5(s)} + 10N_{2(g)}$.✓1
(b) – Manufacture of nitric acid ½
- Manufacture of explosives/nylons/plastics ½

16. (a) Flourine is more reactive ½ than chlorine. It has few energy ½ levels where the nuclear force of attraction is least blocked ½ hence attracts the incoming electrons ½ easier.
(b) – Flourine has a smaller atomic radius than chlorine ½
- It has fewer energy levels ½

17. (i) B – Cathode ½

A – Anode ½

(ii) The copper (II) chloride should be heated✓1 to melt it.

(iii) $2Cl^-_{(l)} \rightarrow Cl2_{(g)} + 2e^-$.✓1

18. (i) NO, the gas collected will be a mixture of carbon (II) oxide gas and carbon (IV) oxide gas hence impure. (2 mks)

(ii) $C_2H_2O_{4(s)} \xrightarrow[H_2SO_{4\,(l)}]{\text{Conc.}} CO(g) + CO_2(g) + H_2O_{(l)}$ (1mk)

19. (i) $\frac{RH_2}{R_w} = \frac{\sqrt{M_rW}}{\sqrt{M_rH_2}}$ ½

$\sqrt{M_w} = \frac{RH2 \times \sqrt{M_rH_2}}{R_w}$

$M_rW = \frac{R^2H_2 \times MrH2}{R^2W}$ ½

$= \frac{62 \times 2}{1}^{½}$

$= 36 \times 2$

$= 72$ ½

(ii) $C_nH_{2n+2} = 72$

$C_nH_{2n} = 72 - 2 = 70$

$14n = 70$

$n = 5$

$MF = C_5H_{12}$ ½

20. Moles of sulphuric acid = $\frac{50 \times 0.25}{1000} = 0.125$

$M(s) + H_2SO_4(aq) \rightarrow MSO_4(aq) + H_2(g)$

$2NaOH(aq) + H_2SO_4(aq) \rightarrow Na_2SO_4(aq) + 2H_2O(l)$

Moles of NaOH = $\frac{5.0 \times 1.0}{1000}$

$= {}^5/_{1000}$

= 0.005 moles ½

Moles of H_2SO_4 that reacted with NaOH = ½ moles of NaOH

= ½ x 0.005 moles.

= 0.0025 moles

Moles of H2SO4 that reacted with M = original/moles of H_2SO_4 moles that reacted with NaOH

Original moles = $\frac{50 \times 0.25}{1000}$ = 0.0125 moles ½

$\Rightarrow$ 0.0125 – 0.0025 moles $\Rightarrow$ 0.01 moles ½

Moles of M that reacted = 0.01 moles.

0.01 moles = 0.24g

1 mole = x

x = $\frac{1 \times 0.24}{0.01}$ ✓ ½

= 24g

21. – The brown traces of copper metal changed slightly to black due to oxidation by oxygen ✓1 from air.
- The white powder changed to yellow in colour when hot and turned to white ✓1 on cooling.
- There was no reaction between the two reactants because Cu cannot displace Zinc from its oxide since it is less reactive than Zinc metal. (1mk)

22. (a) W – Sodium ethanoate 1mk
B – Methane 1mk
(b) Substitution. 1 mk

23. (i) Nitrogen (II) Oxide /NO (1mk)
(ii) $Zn (s) + 4HNO_{(3)} \rightarrow Zn(NO_3)_2 + 2H_20 (l) + 2NO_2$ (1mk)
(iii) – Brown in colour (1mk)
- Irritating punget smell
- Denser than air (Any 2 x ½ = 1 mk)

24. a) Sodium sulphite
b) i) Sulphur (IV) oxide is denser than air
ii) It was bleached/turn white

25. (a) oxygen
(b) The ph decreases.
HOCl decomposes to give more HCL, in the mixture.

26. $2Fe^{2+}_{(aq)} + MnO^{-}_{4(aq)} + 8H^{+}_{(aq)} \longrightarrow 5Fe^{3+}_{(aq)} + Mn^{2+}_{(aq)} + 4H_20_{(l)}$

0.4M, $20cm^3$
Moles of MnO^{-}_4
=0.4 X 20/1000
= 0.008moles

Moles of Fe^{2+} = 5x 0.008 moles
= 0.04 moles
Mass of Fe = 0.04 x 56 = 2.24 g.
Moles of Al = (2.8 - 2.24) = 0.56 g.
% of Al = 0.56/2.8 x 100%
= 20%

27. (i) Copper (II) Carbonate/$CuCO_3$ (½ mk)
(ii) Carbon (IV) Oxide/CO_2 (½ mk)
(iii)($CuCO_3 (s) \longrightarrow CuO(s) + CO_2 (g)$ (1 mk)
(iv) (a) A pale blue precipitate is formed (½ mk)
(b) A deep blue solution is formed (½ mk)