1. a) $C_{(s)} + H_2O_{(g)} \xrightarrow{heat} CO_{(g)} + H_{2(g)}$ √1

2. a) Ammonium chloride/ NH_4Cl √1

   b) $NH_4Cl_{(s)} \rightarrow NH_{3(g)} + HCl_{(g)}$ √

3. a) Copper (II) Sulphide/CuS.√1

   b) $2Fe^{3+}_{(aq)} + H_2S_{(g)} \rightarrow 2Fe^{2+}_{(aq)} + 2H^{+}_{(aq)} + S_{(s)}$ √1

4. a) Yellow/orange solid turns grey.√1

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

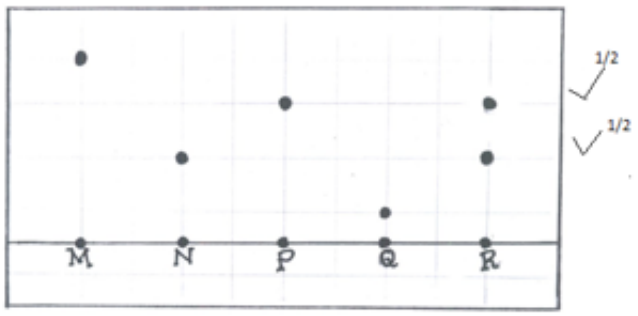
5. a) $[Zn(NH_3)_4]^{2+}$ √1

   b) Lead (II) Chloride√1

6. a) Graphite and diamond.√

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

7. a) Q



8. a) $C_2H_3 = (12\times2) + (1\times3) = 27$

   $(C_2H_3)n = 54$

   $27n = 54$

   $n = \frac{54}{27}$

   $n = 2$ √½

   $(C_2H_3)2 = C_4H_6$ √½ (1)

9. a) Mg has a stronger√½ metallic bond√½ than Na. because it donates more electrons into the electron sea though both have giant metallic structure.√½

10. a) Sodium chloride/NaCl/KCl√1 (1) accept any chloride.

b) Bubbling HCl gas through a delivery tube to the water as water will suck backs/lack of a funnel to prevent suck back.√1(1) or Use of a conical flask that doesn't require heat/ did not use round bottomed flask to spread heat.

c) $NaCl_{(s)} + H_2SO_{4(l)} \xrightarrow{heat} NaHSO_{4(s)} + HCl_{(g)}$ √1

11. a) Gay Lussac's Law states that when gases reacts they do so in volumes that bear a simple whole number ratio to one another and to the products if gaseous.√1

$CxHy + O_{2(g)} \rightarrow 2CO_{2(g)} + 2H_2O_{(l)}$

$10cm^3 : 30cm^3 : \quad 20cm^3$

Simplest ratio 1 : 3 : 2√1

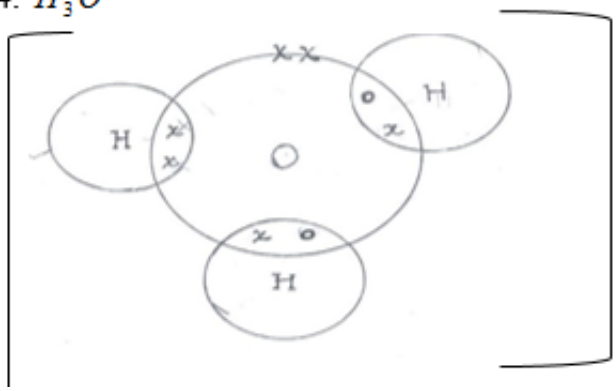
2 moles CO_2 contain 2 moles carbon

$Cx = C$, / $x = 2$ √1

13. . a) 8√1

b) Group VI √1 Period 2 √

14. 4. H_3O^+



15. . a) No white precipitate.√1

b))i) $2KOH_{(aq)} + CO_{2(g)} \rightarrow K_2CO_{3(aq)} + H_2O_{(l)}$ √1

(ii) $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$ √1

16.

$NaOH = 23+16+1 = 40$

Molarity NaOH $= \frac{4}{40} = 0.1M$ √½

Moles NaOH $= 0.1 \times \frac{20}{1000} = 0.002\,moles$ √½

$2NaOH_{(aq)} + H_2SO_{4(aq)} \rightarrow Na_2SO_{4(aq)} + 2H_2($

$Moles\ H_2SO_4 = 0.002 \times \frac{1}{2} = 0.001\,moles$

$Molarity\ H_2SO_4 = \frac{0.001}{8} \times 1000$ √½

$= 0.125M$ √½

17. a) Concentrated nitric acid.√1

b) Prepare the gas in open air/fume.√1 chamber because the gas has a pungent choking smell and is poisonous (½ mark).

18. . a) Coke as an alternative source of Carbon (IV) Oxide.√1

b) To cool the machines√1/slaking CaO to $Ca(OH)_2$

c) To react and produce ammoniacal brine. √1

19. . a) Purple acidified $KMnO_4$ remains purple with C_2H_6 √1. Purple acidified $KMnO_4$ decolourised by

C_2H_4 / turns to colourless.√1

20. .a) Mg_3N_2 √1 magnesium nitride.√1

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

21. . a) Is the energy required to remove one electron from the outermost energy level of an atom in gaseous state.√1

b) S,√1has the smallest atomic size, highest nuclear attraction to outermost electrons and does not easily loose an electron as it requires more energy.√1

22. $CuCO_{3(s)} \xrightarrow{heat} CuO_{(s)} + CO_{2(g)}$ √1

$CuCO_3 = 64+12+(16\times3) = 124$

Moles $CO_2 = \frac{300}{22400} = 0.0134\,moles$ √½

Moles $CuCO_3 = 0.0134 \times \frac{1}{1} = 0.0134\,moles$

$83\% = 0.0134\,moles$

$$\therefore 100\% = \frac{100 \times 0.0134}{83} \sqrt{1/2}$$

$$= 0.0161 moles$$

$$1 mole\, CuCO_3 = 124g$$

$$0.0161 moles CuCO_3 = \frac{0.0161 \times 124}{1}$$

$$= 1.9964g\ CuCO_3\ \sqrt{1/2}$$

23. a) Solution turns from colourless to brown.√1 because chlorine displaces bromide from solution forming bromine.√1 Reject displace bromine.

b) $Cl_{2(g)} + 2Br^-_{(aq)} \rightarrow 2Cl^-_{(aq)} + Br_{2(aq)}\sqrt{1}$

24. . a) Manganese (IV) Oxide.√½ speeds up the decomposition of Hydrogen peroxide to produce oxygen √½. Reject catalyst

b) First bubbles are mixed with air/impure.√1

c) It is slightly soluble in water.√1

25. a) $2H_2S_{(g)} + SO_{2(g)} \rightarrow 2H_2O_{(l)} + 3S_{(s)}$ √1

b) SO_2√1 because the oxidation number of Sulphur in SO_2 has reduced from +4 to 0.√1 (3)

26. 2 electrons.√1

27. A suspension is a mixture formed when an insoluble solid is mixed with a liquid.√1 A precipitate is a solid substance formed when two fluids are mixed.√1

28.

$$39.5\left(\frac{38 \times 0.01}{100}\right) + \left(\frac{39 \times (99.99 - x)}{100}\right) + \left(\frac{40 \times x}{100}\right)$$

$$39.5 = \frac{0.38}{100} + \left(\frac{3899.61 - 39x}{100}\right) + \frac{40x}{100}$$

$$39.5 = \frac{3899.99 - 39x + 40x}{100}$$

$$39.5 \times 100 = 3899.99 - x$$

$$3950 = 3899.99 - x$$

$$3950 - 3899.99 = -x$$

$$-x = -50.01$$

$$x = 50.01\%\sqrt{1}$$

$$V - 40 = 50.01$$

$$V - 39 = 49.98\sqrt{1}$$

29. a) Inflammable/catches fire easily.√1

    b) Toxic/poisonous/fatal.√1

30. a) Solid √½, melting point above room temperature(250C/298K)√½ (1)

    b) Has an impurity.√1