1.(a) (i) Cracking√1

(ii) When the gas is burnt in air√1 it burns with a pale blue flame. √1

OR

Does not decolourize √1purple acidified potassium manganate (VII). √1

(iii) I. A. Ethane√1

II. B 1- Chloroethane√1

(iv)

H H

C C

H H n√1

(v) (i) Combustion√1

(ii) Dehydration√1

(vi) Conc. H_2SO_4√1

Temperature of 170^0C. √1

(b) (i) Pent-2-ene√1

(ii) Prop-1-yne. √1

1. a) (i) Mass of Mg is 20.36-19.52=0.84g√½

Mass of MgO is 20.92-19.52=1.40g

Mass of oxygen is 20.92-20.36=0.56g√½

% mass of Mg in MgO is

=60%√½

%mass of O_2 in MgO is

=40%√½

(ii)

Elements	Mg	O
%comp	60	40
R. A. M	24	16
Moles	60 =2.5	40÷16 =2..5
Mole ratio	1√1	1√1

Empirical formula is thus MgO√ 1

b) (i) $2NaOH_{(aq)} + H_2SO_{4(aq)} \rightarrow Na_2SO_{4(aq)} + 2H_2O_{(l)}$ √ 1

(ii)

I. Moles of H_2SO_4 in $20cm^3$ is

=0.005moles√ 1

Mole ratio of base to acid is 2:1

Moles of NaOH is thus

=0.01 moles of NaOH√ 1

II. Moles of NaOH in 1L is thus

√ 1

=0.2moles√ 1

III. Mass of NaOH in 1L is

=8g

Mass of NaCl in the mixture is 8.8-8= 0.8g√ 1

% mass of NaCl is

= 9.09%√ 1

2. a) (i) Bonds Broken are 4C-H= 4 x 413 = 1652

1C = C = 1 x 610 =610

1Br – Br = 1 x 193 = 193

Total energy absorbed = 2455 kJmol^{-1} √1

Bonds formed are 4C-H= 4 x 413 = 1652

2C = Br = 2 x 280 =560

1C – C = 1 x 346 = 346

Total energy given out = 2558 kJmol^{-1} √1

ΔH = 2455 – 2558 = -103 **kJmol^{-1} √1**

(ii) Addition reaction √1

b) (i) $4C_{(s)} + 5H_{2(s)}$ ΔH_1 $C_4H_{10(g)}$

ΔH_3

ΔH_2 √1

$4CO_{2(g)} + 5H_2O_{(g)}$

$\Delta H^{\theta}_f (C_4H_{10}) = \Delta H_3 - \Delta H_2$
$= 4(-393) + 5(-286) - (-2877)$ √1
$= -3002 + 2877$
$= -125\ kJmol^{-1}$ √1

(ii) $\Delta H + \Delta Hhyd$
$= 690 + -322 + -364$
$= 690 - 686$
$= +4\ kJ / mol$

3. a) √1
   i. Burrete √1
   ii. Pippete√1
   iii. Measuring cylinder

   b)
   i. Due to incomplete combustion, it produces white hot carbon particles that emittes a lot of light √1

   ii. It produces soot that makes apparatus dirty √1
   It does not produce much heat √1

   c)
   i. Nitrogen √1and oxygen√1
   ii. It can be separated by physical means √1
   Components of air are not chemically combined √1
   iii. Pass air through lime water ($Ca(OH)_2$√)√1 the lime water forms white precipitate indicating presence of carbon(IV)oxide √1

4. (a) Alkali metals √1
   (b) Electron arrangement 2.8.5 √1
   position: group V period 3√1

(c) The atom of R is larger √ ½ // has a larger atomic radius than the ion √ ½
This is because the ion of R is formed when the atom loses the electrons in the outermost energy level √ ½ therefore, the ion has one less energy level than the atom.√ ½

(d) (i) P_2W √ ½

(ii) TY_4 √ ½

(e) S has a higher √ ½ melting point than Q √ ½

This is because e S has more valence electrons in its metallic structure hence a stronger metallic bond √ ½ than Q √ ½

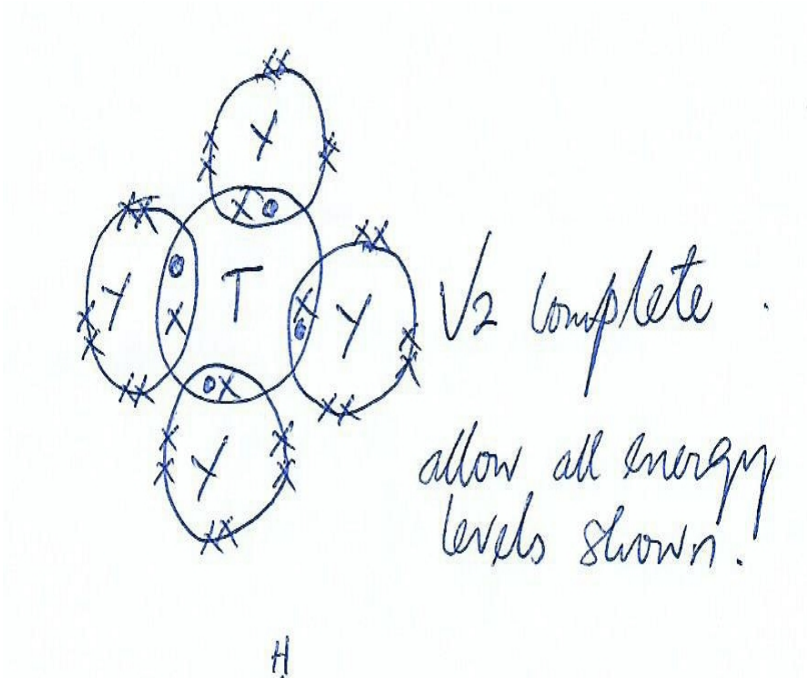
(f) M √1

It has a completely filled outermost energy level √ ½ and therefore, does not need to react with other elements to gain stability √ ½

(g) S has a higher electrical conductivity than Q√ 1.

S does not corrode easily like Q. √ 1

(h)



5. (a) A – Ammonia √1
B – Calcium oxide √1

(b) $CaO_{(s)} + H_2O_{(l)} \rightarrow Ca(OH)_{2\,(aq)}$ √1

(c) Reaction is exothermic √1

(d) Filtration √1

(e) - Ammonia √1
- Carbon (IV) oxide √1

(f) (i) $C_{(s)} + 2H_2SO_{4(l)} \rightarrow CO_{2(g)} + 2H_2O_{(l)} + 2SO_{2(g)}$ √1

(ii) Oxidising property √1

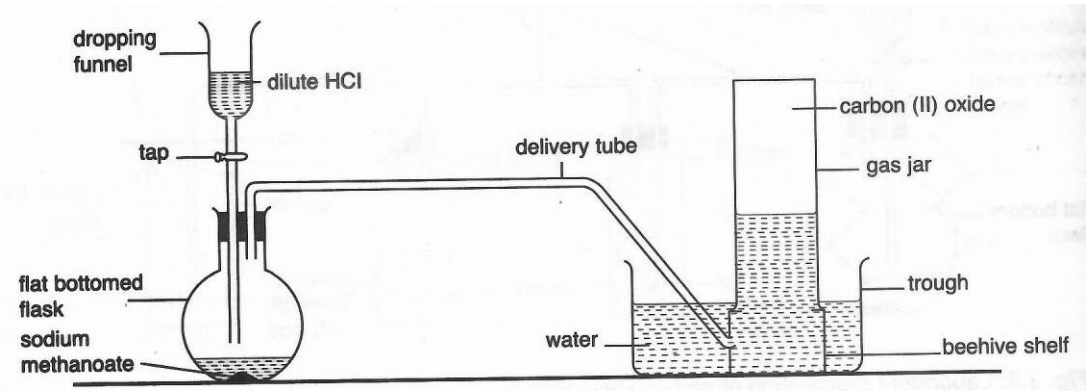
(g) - Manufacture of glass √½
- Softening of hard water √½
- Making of soaps and detergents
- For making sodium hydrogen carbonate used in baking soda and fire extinguishers

(Any 2 correct answers each ½ mk)

6. (a) (i)

Substance	Carbon (IV) oxide	Carbon (II) oxide
K	Dilute hydrochloric acid √½	Concentrated sulphuric (VI) acid √½
L	Marble chips or calcium carbonate √½	Sodium methanoate or ethanedioc acid (oxalic acid) √½

(ii)



Complete diagram = 1 mark, Labelling = 1 mark

(iii) Carbon (IV) oxide reacts with lime water / calcium hydroxide solution √½ to yield white precipitate while carbon (II) oxide does not. √½

Carbon (II) oxide burns √½ with blue flame while carbon (IV) oxide does not burn. √½

(b) (i) $CO_{2(g)} + C_{(s)} \rightarrow 2CO_{(g)}$ √1

(ii) Reducing agent in extraction of some metals from their oxides. √1

(c) The bulb lights in set up I or conducts electricity while set up II does not. √ √1

In graphite, three out of four valence electrons of carbon atom are bonded leaving one delocalised √1 electron thus conducts electricity while in diamond, all the four valence electrons are bonded and is without delocalised electrons. √1