ENTRY EXAMS FORM 4 PP2 MARKING SCHEME

1 (a) Allotropy is the existent of an element in more than one form without a change of state (1mark)

(b) (i) D – Graphite (1mark)

(ii) E – Diamond (1mark)

(ii) In electrolysis as an electrode or used as a lubricant lead pencils or atomic piles. (Anyone) (1mark)

(iii) D or diamond (1mark); all its 4 outermost electrons are involved in bonding. (½mark) Thus it has no free/mobile electron to conduct electricity. (½mark)

(c) (i) $CO_{2(g)}$ is denser than air (1mark)

$CO_{2(g)}$ does not burn (1mark) (Any two)

2. A (i) (a) Carbon (IV) oxide (CO_2) (1mark) (Any)

(b) $KOH_{(aq)} + CO_{2(g)} \rightarrow KHCO_{3(aq)}$ (1mark)

Wrong balanced = 0

State symbols wrong or missing (½mark)

(ii) Oxygen gas or $O_{2(g)}$ or (O_2)oxygen gas (1mark)

(iii) Nitrogen gas or $N_{2(g)}$ or nitrogen $N_{(2)}$ gas (1mark)

B (i) Moles of nitrogen= $\frac{1.54}{14}$ (½mark) = 0.11 (½mark)

Moles of oxygen = $\frac{3.53}{16}$ (½mark) = 0.22 (½mark)

(ii) Mole ratio

N	O
$\frac{0.11}{0.11}$ = 1(½mark)	$\frac{0.22}{0.11}$ = 2 (½mark)

Simplest formula NO_2 (1mark)

(iii) Compound has low melting and boiling points (1mark) because it has a weak Van der waal forces. (1mark) Continuous electricity supply (1mark) (any one)

3. (a) (i) Dehydration. (1mark)

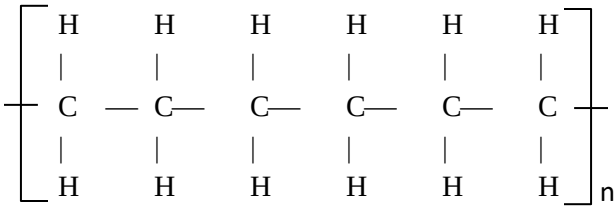
(ii) 170ºC/(heating). (1mark)

(iii) Chloromethane (1mark) Vinyl chloride.

(iv) Ethanol (1mark) *(4marks)*

(b) $C_nH_{2n+1}OH$ (1mark)

(c) (i)



(ii) Polythene. (1mark)

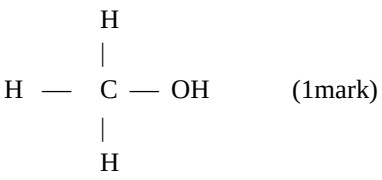
(d) (i) Molecular formula of compound T.

Element	O	H	C	
% by mass	50	12.5	37.5	
RAM	16	1	12	(½mark)
moles	3.125	12.5	3.125	(½mark)
Mole ratio	1	4	1	(½mark)

$(CH_4O)n = 32$

32n = 32
n = 1
Molecular formulae are CH_4O (½mark)

(ii)

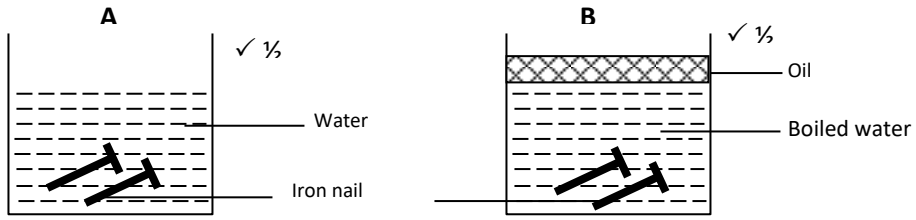


(1mark)

4. (a) (i) I Dust (1mark)
II Carbon (IV) oxide (1mark)
III Water vapour (1mark)

(ii) - 196ºC Nitrogen (1mark)
- 186ºC Argon (1mark)
- 183ºC Oxygen (1mark)

(b)



Set up the experiment as shown above. After 1 week, the iron nails in A rust but those in B do not rust (1mark)

(c) Mole ratio Fe: Fe_2O_3
Z: 1 (½mark)
(2 × 56) g of Fe → 1 mole of Fe2O3
∴1000g of Fe → $\frac{1000}{2 \times 56}$ (½mark)
= 8.929 moles (½mark)

5. (a) Electronic configuration N = 2:8:8:2
Group = 2 } should be placed
Period = 4 } below J in the grid (1mark)

(b) Ionic bond/electrovalent (1mark): There is complete transfer of electrons from D to H to form D^+ and H^-

(c) $2B_{(S)} + 2H_2O_{(l)} \rightarrow 2BOH_{(aq)} + H_{2(g)}$ (1mark)

(d) Atomic radius L is smaller than that of I. (1mark) This is because electrons in L experience higher force of attraction than those of I (1mark) (L has higher nucleus charge than I).

(e) Oxide of L has giant covalent structure (½mark) with strong covalent bond. (½mark)
While oxide of G has a molecular structure (½mark) with weak Van der waal forces. (½mark)

II (a) It exists as a dimmer. (1mark)
(b) $SiCl_4$ (½mark), SCl_2 (½mark)
They have a very low melting point. (1mark)
(c) $AlCl_3$ is covalently bonded (½mark) with a higher M.P and B.P.
MgCl2 has ionic bond (½mark) with a higher M.P and B.P.

6.MgCl2 (1mark) because it remains a liquid from a temperature of 710 – 1120 (Range of 710) (1mark)

(a) The ammonia and air mixture are heated to an optimum temperature of 900^0C.

(b) $4NH_{3(g)} + 5O_{2(g)} \longrightarrow 4NO_{(g)} + 6H_2O_{(g)} +$ heat

(c) temperature of nitrogen (II) oxide and air mixture is lowered up to 30^0C to allow the two gases combine and form nitrogen (IV) oxide gas.

(d) the reaction in the catalytic chamber is exothermic. The products of the chamber are taken back to the heat exchanger to pre-heat incoming ammonia and air gases.

(e) $4NO_{2(g)} + O_{2(g)} + 2H_2O_{(l)} \longrightarrow 4HNO_{3(aq)}$

(f) By fractional distillation of the nitric acid.

(g) Impurities poison the catalyst.

(h)– Carbon (IV) oxide

- Water vapour
- Carbon (II) oxide
- Dust particles.

(d)

(e)

7. I (a) Yellow (1mark) solid melts into amber liquid. (1mark) (2marks)

(b) $H_{2(g)} + S_{(g)} \rightarrow H_2S_{(g)}$ *Penalize (½mark) for wrong state.*

Penalize fully for unbalanced

II (a) K – Hydrogen sulphide (1mark) reject H_2S

M – Sulphur (IV) oxide (½mark)

(b) (i) Blue flame (½mark), Misty fumes (½mark), Choking smell (½mark)

(ii) - Temperature 450°C. (½mark)

- 2 to 3 atmosphere. (½mark)
- V_2O_5 (½mark)/finely divided platinum (pt) on silica.

(iii) Methylbenzene (1mark)

(iv) A vigorous reaction, that produce dangerous (1mark) poisonous fume occur (1mark)

(c) $Ca(OH)_{2(aq)} + SO_{2(g)} \rightarrow CaSO_{3(aq)} + H_2O_{(l)}$

(d) It makes the rubber tougher (1mark) less flexible and less soft; by reducing (1mark) number of double bonds.