# CHEMISTRY

FORM 3 PAPER 2

END OF YEAR 2025 EXAM (OCTOBER)

MARKING SCHEME

1 a) Ostwald process

  b) X – ammonia

  c) Haber process

  d) i) $2NO_{(g)} + O_{2(g)} \rightarrow 2NO_{2(g}$

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

  e) Platinum – rhodium

  f) In presence of light HNO_3 undergoes decomposition

  g) Making of explosives

   Manufacture of fertilizers

   Manufacture of dyes and drugs

   Purification of metals

2. (a)

   $$\begin{array}{cccc} & & H & \\ H & & | & \\ \diagdown & C = C & - C & - H \\ H\diagup & | & | & \\ & H & H & \end{array}$$
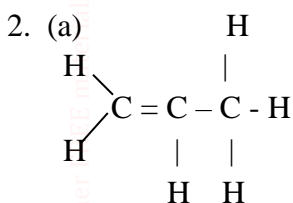
b) Reagent: Hydrogen gas.✓1

   Conditions – Nickel catalyst /platinum

    -temperature of 180^0C-200^0C✓1

c) (i)1, 2 – Bromopropan -1-ol ✓½

(ii) K = Carbon (IV) oxide✓½

   (iii) L = 1,2- dichloropropane✓½

iv) M = Polypropene.✓½

(d) Conditions ;- U-V light /sunlight; excess chlorine.✓1

(e)(i)$CH_3- CH= CH_2 +Cl_2 \longrightarrow CH_3 –CH Cl –CH_2 Cl$✓1

 (ii) Addition reaction ✓1

(f) (i) M- polypropene✓1

   (ii) - Making buckets✓1

      - Making plastic chairs and tables.

   (iii)- They lead to environmental pollution.✓1

      - They are non- biodegradable since bacteria cannot degrade it , it persists in the environment.

3. a)i) –Sodium chloride and concentrated Sulphuric (IV) acid.✓1

    ii)- Concentrated sulphuric acid, Anhydrous Calcium chloride.✓1

   iii) $NaCl_{(S)} + H_2SO_{4(l)} \longrightarrow Na H SO_{4(aq)} + HCl_{(aq)}$✓1

iv) Introduce a glass rod dipped in ammonia solution into a gas jar containing Hydrogen chloride gas.

   Formation of dense white fumes confirms presence of Hydrogen Chloride gas.

b) (i)$2HCl_{(g)} + Fe_{(s)} \longrightarrow FeCl_{2(s)} + H_{2(g)}$✓1

   (ii)$2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(g)}$✓1

   (iii)From the above equation (i)

      56g of Fe produce – 24000cm³✓1

1.96g ------------ produce ?

$$\frac{1.96}{56} \times 24000 = 840cm^3 \checkmark^1$$

c)i)From electrolysis of brine $\checkmark^1$
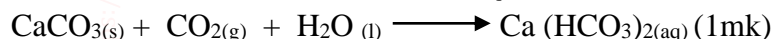
ii)Hydrogen$\checkmark^1$

-From electrolysis of brine $\checkmark^1$ -from cracking of alkanes$\checkmark^1$

4. a) white precipitate is formed   (1mk)

 CO_2 reacts with $Ca(OH)_{2(aq)}$ to form insoluble $CaCO_{3(s)}$ (1mk)

b) The white ppt dissolves to form a colourless solution (1mk)
$CaCO_{3(s)}$ is converted to $Ca(HCO_3)_{2(aq)}$ which is soluble
$CaCO_{3(s)} + CO_{2(g)} + H_2O_{(l)} \longrightarrow Ca(HCO_3)_{2(aq)}$ (1mk)

c) Hissing sound.
    Effevervesence/Bubbles of colourless gas are seen. (3mks)
    Sodium darts on Surface.

d) To suck gas produced.(1mk)

e) In graphite 3 out of 4 electrons are used in bonding. One electron is delocalized hence it conducts electricity .(1mk)
In diamond all the 4 electrons are used in bonding hence no delocalized electrons.(1mk)

f) - Fire extinguishers.
   - Refrigerant.   (2mks)
   - Fizzy drinks.

5. a) Used a beaker in strong heating.(1mk)

       No heat.(1mk)

  b) Bulb lights. (1mk)

      Cathode - purple vapor.(1mk)

      Anode – Grey beads.(1mk)

  c) Ions.(1mk)

  d) Cathode $2I^-_{(l)} \rightarrow I_{2(g)} + 2e^-$(1mk)

  Anode $Pb^{2+}_{(l)} + 2e^- \rightarrow Pb_{(s)}$(1mk)

  e) From the positive terminal to the negative terminal of the battery(arrow on the wire).

  f) -Extraction of reactive metals or extraction of metals e.g. Na, Al, Mg.

    -Electroplating.

      -Purifying metals.

-Manufacture of NaOH and chlorine.   (any two 2mks

6. i) A and E or D and C

   ii) A b and c

   iii) Halogens

b) Atomic radius of B is smaller than that of A. because B has more protons hence stronger nuclear forces of attraction

c) Making of electric cables

   Making of cooking pots

d) A is more reactive than E. because A has a larger atomic radius hence weaker forces of attraction

e) AD_2

f) Ionic bond – it involves complete transfer of valence electrons from metal to non metals

7. (a) (i) Thistle should be dipped inside acids otherwise gas would escape in air (1/2 mk)
(ii) Hydrogen should be collected by upward delivery because is less denser than air. (1/2 mk)
(iii) Delivery tube should not be touching the solid, no gas would be collected.

(b) Conc Sulphuric (vi) acid or $H_2SO_{4(l)}$ (1mk)
(c) Zinc granules or Magnesium (1 mk)
(d) $CuSO_{4(s)}$ or Copper(ii)Sulphate crystals. (1 mk)
(e) (i) Reducing agent (1 mk)
(ii) $H_{2(g)} + Pb_{(s)} \longrightarrow Pb_{(s)} + H_2O_{(l)}$ (1 mk)
(iii) Copper(ii)oxide or $CuO_{(s)}$ (1 mk)