1. (a) What is Philosopher's wool ?
   (b) Balance the following equation :
   $3Cu + 8 HNO_3$ (dil.) $= 3 Cu(NO_3)_2 + 4H_2O +$ ------
   (c) What happens, when excess of chlorine reacts with acetic acid in presence of red phosphorus ?
   (d) Give an example of a homo nuclear diatomic molecule with paramagnetic behaviour.
   (e) Calculate the molarities of H_2O in pure water.

2. State whether the following statements are True or false.
   (i) Electron radiates energy while moving in a stationary orbit of an atom.
   (ii) Ethyl chloride on treatment with silver cyanide forms ethyl isocyanide
   (iii) Goldsmith's process is used for extraction of aluminium.
   (iv) Tetraethyl lead (TEL)increases knocking when mixed with gasoline.
   (v) ΔH is negative for endothermic reactions.

3. Fill in the blanks in the following statements.
   (i) Half life of a nuclide is 50 years. Starting with 200 g of it , the amount left at the end of 200 years will be ……..
   (ii) The size of a positively charged ion is ……, while that of a negatively charged ions …… that that of corresponding atom.
   (iii) Oxidation state of oxygen is usually ……… , but it is …… H_2O_2.
   (iv) Alcohols and ethers are …… isomers.
   (v) Benzyl alcohol and phenol can be distinguished by using ….. Reagent.

4. (a) Calculate the molality of 1 litre solution of 93% (w/v) sulphuric acid, if the density of this acid is 1.84 gm/ml.
   (b) One mole of H_2 two moles of I_2 and three moles of HI were injected in a 1 litre flask. What will be the concentration of H_2 , I_2 and HI at equilibrium at 444^0C ? The equilibrium constant for the reaction at this temperature is 45.9.

5. (a) Write the electronic configuration of Chromium (atomic number 24).
   (b) What is the oxidation number of Cr in $K_2Cr_2O_7$?
   (c) Give IUPAC name of of H_2N CO NH_2 .
   (d) How many σ and π bonds are present in $H_2C=C=CH_2$?
   (e) What is dolomite ?

6. (a) What is Rosenmund's reduction ?
   (b) What happens when aniline is treated with bromine ?
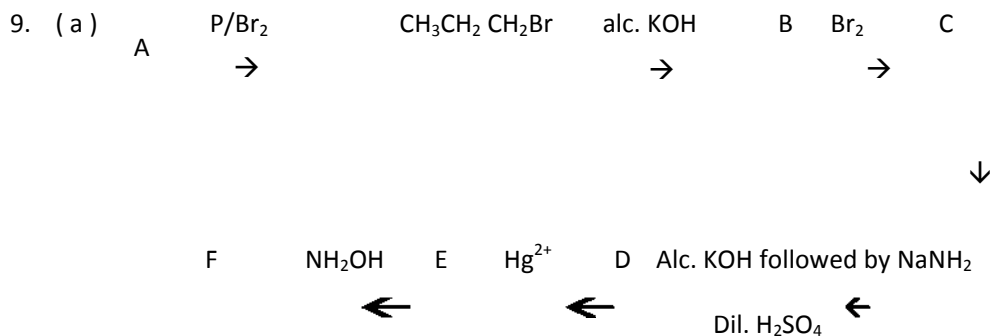   (c) Write all the four quantum numbers for an electron in $3p_z$ orbital.
   (d) Write Lane's process to prepare hydrogen gas from steam.
   (e) Write the expression for rate constant for first order reaction.

7. (a) Balance the following equations by ion-electron method :
   (i) $NO_3^{--} + H^+ + Cl^- \rightarrow NO + Cl_2 + H_2O$
   (ii) $Cl_2 + I_2 + H_2O \rightarrow IO_3^{--} + Cl^- + H^+$
   (b) how will you prepare acetaldehyde from acetylene ?

8. (a) A substance reacts according to the first order rate of law and the specific reaction rate is $1.0 \times 10^{-2} Sec^{-1}$. Calculate the
   (i) initial rate of the reaction
   (ii) the reaction rate after one minute, if the initial concentration of the substance is 1.0 M.
   (b) Write all possible isomers of the molecular formula C_3H_8O with their IUPAC names.

9. (a) A $\xrightarrow{P/Br_2}$ $CH_3CH_2\,CH_2Br$ $\xrightarrow{alc.\ KOH}$ B $\xrightarrow{Br_2}$ C

   $\downarrow$

   F $\xleftarrow{NH_2OH}$ E $\xleftarrow{Hg^{2+}}$ D $\xleftarrow[Dil.\ H_2SO_4]{Alc.\ KOH\ followed\ by\ NaNH_2}$

   (b) What happens when nitrobenzene undergoes electrolytic reduction in strongly acidic medium ?

   (c) Complete the equation: $_{13}Al^{27} + _{2}He^4 \rightarrow _{15}P^{30} + ...$

10. (a) Write the IUPAC nomenclature for the following :
    (i) Acetylene (ii) Diethyl ether (iii) Formic acid (iv) Ethylamine
    (b) A reaction is used for decreasing the number of carbon atoms in a molecule, which is named after Hoffmann. Give equation.
    (c) How many litres of oxygen at STP (NTP) are required to burn completely 2.2 g of propane (C_3H_8) ?