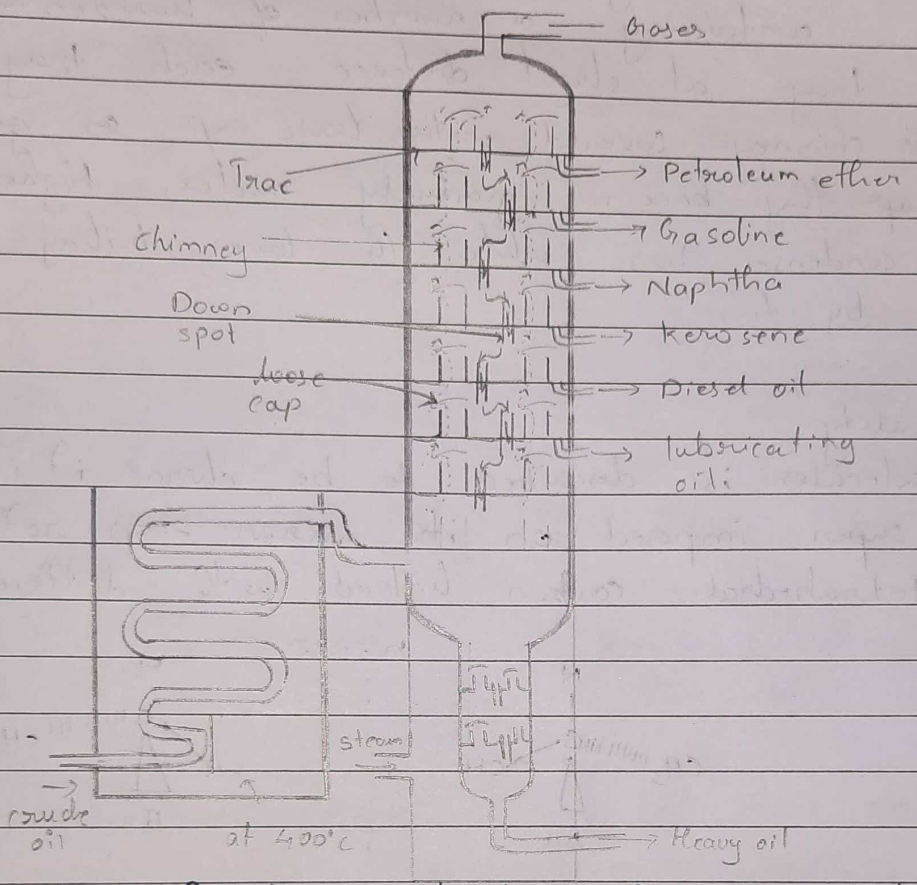
Q1 Refining of crude oil:

The crude oil is separated into various useful fractions by fractional distillation and finally converted to desired specific products. The process is called refining of crude oil and the plant set up for this is called oil refineries



Fractional distillation of crude petroleum

The process of refining involves the following steps.

Step1: Separation of water (Cottrell's process):

The crude oil from the oil well is an extremely stable emulsion of oil and salt water. The process of freezing oil from water consists in allowing the crude oil to flow between two highly charged electrodes. The colloidal water droplets coalesce to form large drops, which separate out from the oil.

step 2. Removal of harmful sulphur compounds:

involves in treating oil with copper oxide. reaction occurs with sulphur compounds, which results in the formation of copper sulphide (a solid) which is then removed by filtration.

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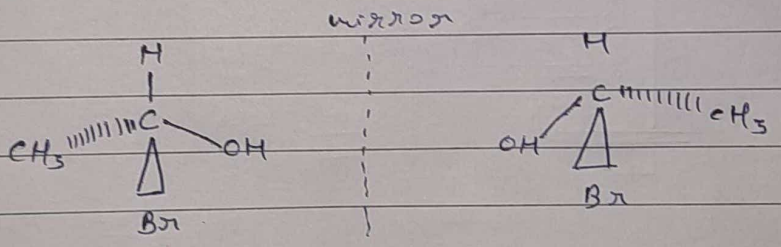
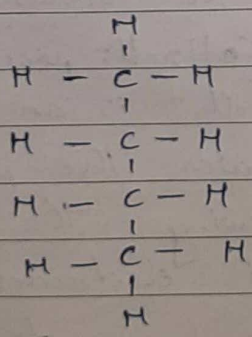
step 3: Fractional distillation:
The crude oil is heated to 400°c in an iron retort, all the volatile constituents, except the residue (alphalt or coke) are evaporated. The hot vapours are then passed up a 'fractionating column' which is a tall cylindrical tower containing a number of horizontal stainless steel trays at short distance. each tray have a small chimney covered with loose cap. as ~~get~~ vapours go up they becomes gradually cooler. Higher boiling fraction condenses first while the lower boiling fraction turn by turn.

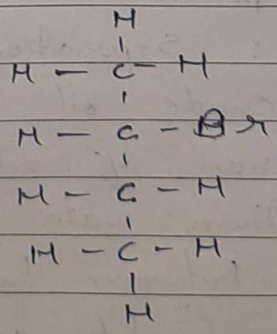
Q 2. Chirality.
A molecules is described to be chiral if it cannot be super-imposed on its ~~mirror~~ ~~rep~~ reflection
ex Tetrahedral carbon linked with different groups



Chiral compounds.



Butane
plane of symmetry
(A chiral)



2-Bromo butane
No plane of symmetry
(Chiral)

ii) Enantiomers
enantiomers are optical isomers that are mirror images of each other ~~mirro~~

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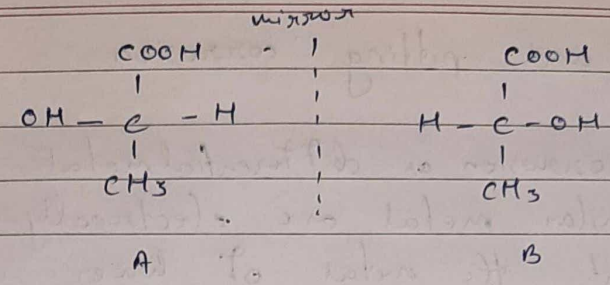

two isomers of acitic acid.

enantiomers have identical properties in all aspects ~~exp~~ except in interaction with plane of polarised light.

Enantiomers have the same melting point. ~~desire~~ density. ~~easily~~ solubility, and reactivity. ~~however~~ acids & bases. they differ however in the direction in which they rotate the polar plane of polarised light both rotate the plane of polarised light to exactly to the same extent (same angle) but one rotate the plane to right (clockwise dextro rotation) while the other rotates the plane to the left (anticlokwise labor rotatory)

A mixture of equal amount of two enantiomers is called a racemic mixture such a mixture is optically in active that is it dextro rotate the plane of polarised light because the two components rotate the plane of polarised light equally in the opposite direction and cancel each other.

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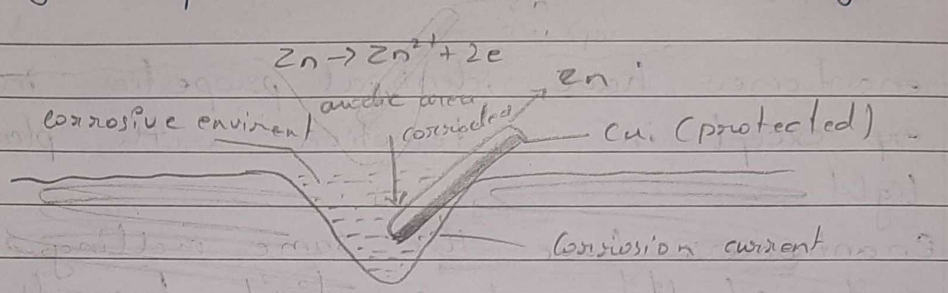
Q3. Galvanic and pitting corrosion

Galvanic corrosion or differential metal corrosion when dissimilar metal are electrically exposed to a environment the metal of lower reduction potential (or higher up in the emf series) undergoes corrosion



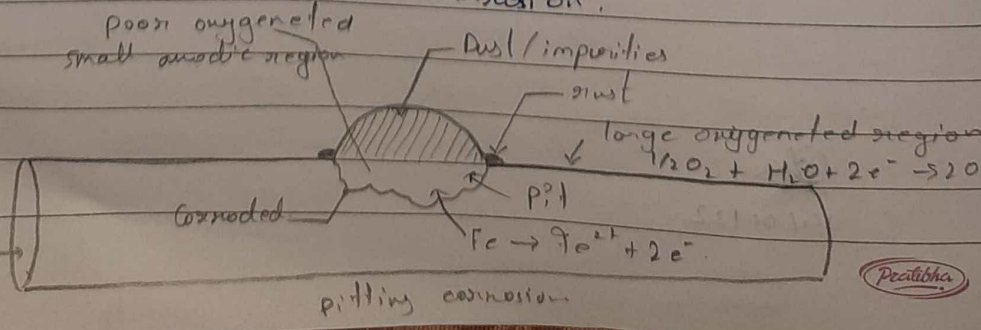
Zinc in contact with copper and is imersed to a corrosive environment (soil) zinc metal being higher up in the emf series acts as anodic area gets corroded as show in the fig. whereas copper metal which is lower in emf series is protected behaves as cathodic area of the dissimilar metal.

The corrosion current is due to the flow of electrons from anodic area (Zn) to the cathodic area (Cu)

Pitting Corrosion

This type of corrosion metals generally localised to very small area and accelerated corrosion takes place at the anodic region causing minute pits or pin holes on the surface of the metal. It is one of the most destructive types of corrosion that reduce the life of chemnical equipments and other metal parts, which results when small entraneous or dust particles get adhered to a metal surface.

Pitting type of corrosion can be explained in the light of differential aeration corrosion.



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It can be noted that the impurities (dust adhered region of metal surface acts as the anodic region. This tiny portion of covered surface of the metal is poorly oxygenated compared to the large exposed area. This is a type example of large cathode and small anode which results in the faster corrosion rate.

Q4. Electroplating of Chromium.
The article to be coated with chromium is given under coat of copper or nickel because the

Q4 Electroplating of Chromium
A process in which a coating metal is deposited on the base metal by passing direct current through the electrolytic solution containing soluable salt of coating metal.

The article to be electroplated is treated with an organic solvent to remove any air or gases. It is than treated with dilute HCl or H_2SO_4 to remove any scale of oxide layer. The cleaned article is made the cathode of the seal. The anode is the coating metal itself or an inert material like graphite the electrolyte is a solution of soluble salt of coating metal. The electrolyte cell is kept in a electroplating tank. The anode & cathode are dipped in the tank, when direct current passes coating metal ions migrate to the cathode & get deposited. Then a thin layer of coating metal is obtained on the article to be electroplated

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Electroplating of chromium. The article to be electroplated with chromium is cleaned & is given a undercoat of nickel because chromium plating is porous & non adherent. Chromium anodes are not used because they become passive in acidic medium & also form a black deposit.

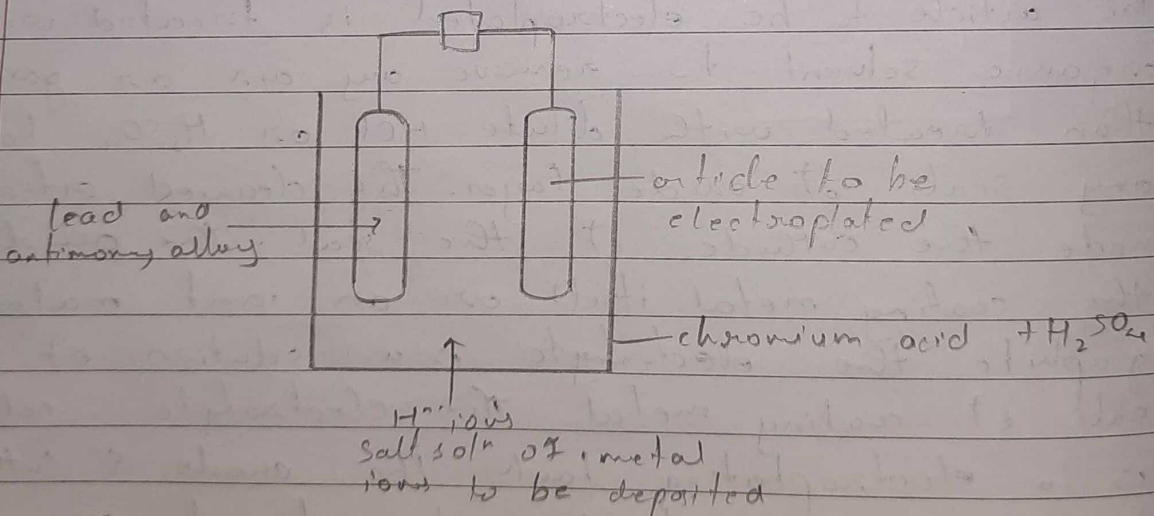
Plating bath: Chromium acid + H_2SO_4 (100:1)

Operating temp: 25-40°C

Current density: 100-200 mA/cm²

Anode: lead and antimoney alloy.

Cathode: Article to be electroplated.



Applications: Reduces friction, improves electrical conductivity etc.

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