



VIVA VOCE

CHROMATOGRAPHY

Q.1 What is meant by chromatography?

Ans. "Chroma" means colour and graphic means measurement. So, it is qualitative as well as quantitative measurement of coloured compounds as well as colourless compounds.

Q.2 What is principle of chromatography?

Ans. The main principle of chromatography is distribution law. In paper chromatography each of solute from mixture of solutes is separated on the basis of solubility and adsorption of different solutes in various solvents.

Q.3 On what principle the separation of mixture of inks by paper chromatography is based?

Ans. Different pigments have different solubilities or rates of flow in different mobile phase. The substances having high R_f value will be taken by solvent.

Q.4 What is distribution law?

Ans. A solute distribute itself between two immiscible liquids in a constant ratio of concentration irrespective of the amount of solute added.

Q.5 What is R_f value?

Ans.

$$R_f = \frac{\text{Distance travelled by solute (Cm)}}{\text{Distance travelled by solvent front (Cm)}}$$

It has not unit.

Q.6 What is Chromatogram?

Ans. The finished paper with the bands of various components obtained as a result of chromatography is known as chromatogram.

Q.7 What is eluent?

Ans. The solvent used in chromatography is called as eluent.

Q.8 What is locating agent?

Ans. The spraying agent used to detect the colourless substances on chromatogram is called locating agent. It forms a coloured complex with solute substance.

Q.9 Why H_2S is used as locating agent for Pb^{2+} and Cd^{2+} ions?

Ans.

$$Pb^{2+} + H_2S \longrightarrow PbS \text{ (Black Spot)}$$

$$Cd^{2+} + H_2S \longrightarrow CdS \text{ (Yellow Spot)}$$

Q.10 What is stationary phase and mobile phase in paper chromatography?

Ans. Some moisture held in paper and cellulose of paper acts as stationary phase. Solvent which is used in jar is called mobile phase or solvent.

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C OMMON ION EFFECT

Q.1 Define common Ion Effect?

Ans. "The phenomenon in which degree of ionization of an electrolyte is suppressed by the addition of an other electrolyte containing a common ion is called common ion effect".

Q.2 Define saturated solution?

Ans. A solution which cannot dissolve more quantity of solute at given temperature, is called saturated solution.

Q.3 Define Solution?

Ans. A homogenous mixture of solute and solvent is called solution.

Q.4 Define Solubility?

Ans. The maximum amount of solute dissolve in 100g of solvent at a given temperature to saturate that solution is called solubility of that substance.

Q.5 Define Solubility product?

Ans. It is the product of concentration of oppositely charged ions in equilibrium state with the solid ionic salt in its saturated solution at a given temperature. It is denoted by K_{sp} .

Q.6 Which common ion is used for purification of NaCl?

Ans. Chloride ion (Cl).

Q.7 What is the difference between hydrochloric acid and Hydrogen Chloride?

Ans. Hydrogen chloride is a gas in molecular form while aqueous solution of HCl gas is called hydrochloric acid.

Q.8 What is table salt or common salt?

Ans. Sodium chloride (NaCl).

Q.9 What is brine?

Ans. Saturated solution of NaCl is called brine.

Q.10 Name a chemical compound responsible for hygroscopic nature of common salt?

Ans. Magnesium Chloride ($MgCl_2$).

Q.11 Why NaCl cannot be purified by the process of crystallization?

Ans. Because of its very small difference in solubility at ordinary temperature and at high temperature 36g at 25C and 39g at 100C.

Q.12 What type of impurities are present in common salt or rock salt?

Ans. CaCO_3 , MgCl_2 , CaCl_2 , Na_2SO_4 , MgSO_4 (about 5%).

Q.13 The impurities like MgCl_2 and CaCl_2 are not precipitated out by passing HCl gas, why?

Ans. Since the solution is not saturated with respect to these impurities so when HCl gas is passed, the equilibrium of saturated NaCl is disturbed only. According to le-Chatelier's principle by increasing the concentration of Cl^- ion, NaCl is precipitated out.

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CRYSTALLIZATION

Q.1 What is crystallization?

Ans. Formation of regularly shaped crystals by cooling a hot saturated solution is called crystallization. By decreasing temperature, the solubility of substance decreases and it comes out in the form of crystals.

Q.2 What is formula of benzoic acid?

Ans. It is $\text{C}_6\text{H}_5\text{COOH}$ or 

Q.3 Is benzoic acid soluble in cold water?

Ans. It is almost insoluble in cold water. Even at room temperature it dissolved in water to about $0.5\text{g}/\text{dm}^3$.

Q.4 Define mother liquor?

Ans. The saturated solution left behind after getting crystals is called mother liquor.

Q.5 Write down some characteristic of solvent for crystallization?

- Ans.**
- (1) An ideal solvent should dissolve a large amount of solute at its boiling point and only a small amount at room temperature.
 - (2) It should not chemically react with solute.
 - (3) It should be safe to use.
 - (4) On cooling, it should readily deposit well formed crystals of purified compound.
 - (5) It should be inexpensive

Q.6 From where benzoic acid is obtained?

Ans. Benzoic acid is obtained from gum benzoin. It is a resin of plant and also obtained from balsams of Peru and Tolu plants.

Q.7 Name the important salts of benzoic acid?

Ans. C_6H_5COONa (Sodium benzoate). This salt is used as food preservative and in medicine for curing bronchial infection.

Q.8 What is decantation?

Ans. Separation of crystals from mother liquor by pouring it out is called decantation.

Q.9 What is filtration?

Ans. The process by which soluble substances can be separated from insoluble substance by passing through filter paper is called filtration.

Q.10 Define the term residue and filtrate?

Ans. A clear solution which passes through the filter paper is called as filtrate and the insoluble substance which is left behind over filter paper is called as residue.

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HEAT OF NEUTRALIZATION

Q.1 Define neutralization?

Ans. The process in which an acid reacts with base to form salt and water is called neutralization.

Q.2 Define heat of neutralization?

Ans. The amount of heat evolved when one mole of water is formed by complete neutralization of an acid with a base.

Q.3 Define strong acid?

Ans. Acid which ionizes completely in aqueous solution to give H^+ ions.



Q.4 Give name of three strong acids and three weak acids?

Ans. Strong Acids:

(1) HCl (2) H_2SO_4 (3) HNO_3

Weak Acids:

(1) CH_3COOH (2) H_2CO_3 (3) $H_2C_2O_4$

Q.5 What is the difference between strong acid and weak acid?

Ans. Strong acid ionizes completely in water, has high K_a value and low P_{ka} value. Weak acid ionizes partially in water, has low value of K_a and high value of P_{ka} .

Q.6 What are weak bases?

Ans. Bases which do not ionize completely in aqueous solution e.g NH_4OH , $Ca(OH)_2$, $Ba(OH)_2$ etc.

Q.7 Name three strong and three weak bases?

Ans. Strong Bases: NaOH, KOH, LiOH

Weak Bases: NH_4OH , $Al(OH)_3$, $Mg(OH)_2$

Q.8 What is heat of neutralization of a strong acid with a strong base?

Ans. It is 13.7 kcal/mole or 57.32KJ/mol.

Q.9 What is the principle of calorimeter?

Ans. Heat gained = Heat lost.

Q.10 Define specific heat?

Ans. The amount of heat required to raise the temperature of one gram of water by 1C or 1K.

Q.11 Define molar heat capacity?

Ans. The amount of heat required to raise the temperature of one mole of substance by 1C or 1K.

Q.12 What happens when KNO_3 is dissolved in water?

Ans. Heat is absorbed and temperature of water falls down.

Q.13 What is specific heat of water and copper?

Ans. The specific heat of water is 1Cal/gC or 4.184 J/gk. The specific heat of copper calorimeter is 0.091 Cal/gC or 0.3807J/gk.

Q.14 What is heat of neutralization of weak base and weak acid?

Ans. It is less than 57.32KJ/mole. In such cases, neutralization process involved not only the union of H^+ with OH ions but also the dissociation of weak acid or weak base.

VIVA VOCE

A ACID-BASE TITRATION

Q.1 What is volumetric analysis?

Ans. It is the branch of quantitative analysis which involves the measurements of the volumes of reacting substance.

Q.2 What is titration?

Ans. The process of determining practically the volume of a solution, which completely reacts with a known volume of other substitution is called titration.

Q.3 What is titrant?

Ans. The solution which is taken in burette is called titrant.

Q.4 What is titrand?

Ans. The solution which is taken in conical flask is called titrand or titrate.

Q.5 What is the strength of a solution?

Ans. It is defined as the amount of solute in grams dissolved per dm^3 of solution.

Q.6 What is decimolar solution?

Ans. 0.1M solution is called decimolar solution.

Q.7 What is end point?

Ans. The point at which-completion of a reaction is indicated.

Q.8 What are concordant readings?

Ans. The burette readings, which do not differ by more than 0.05cm^3 are called concordant readings.

Q.9 Define primary standards?

Ans. It is a substance which is 100% pure or of known purity. Other standards may be compared with it.

Q.10 What happens when NaOH or KOH is dissolved in water?

Ans. Heat is produced. The reaction is exothermic.

Q.11 What is the colour of Methyl orange in basic medium?

Ans. It is yellow.

Q.12 What do you understand by a standard solution?

Ans. It is the solution whose concentration is known.

Q.13 Why NaOH and KOH are not primary standards?

Ans. Because they absorb CO_2 and water or moisture from air during weighing.

Q.14 Name two primary standard acids?

Ans. Oxalic acid and succinic acid.

Q.15 What is formula of succinic acid?

Ans. $\text{CH}_2 \cdot \text{COOH}$

$\text{CH}_2 \cdot \text{COOH}$

Q.16 Define Molarity?

Ans. No. of moles of solute dissolved per dm^3 of solution is called molarity. Mathematically, it is denoted as mol/dm^3 or 'M'.

$$\text{Molarity} = \frac{\text{No. of moles of solute}}{\text{Volume of solution in } \text{dm}^3}$$

Q.17 Define Molality?

Ans. Number of moles of solute dissolved per 1000g of solvent is called molality. Mathematically, it is denoted as 'm'.

$$\text{Molality} = \frac{\text{No. of moles of solute}}{\text{Volume of solvent 1 kg's}}$$

Q.18 What is indicator?

Ans. A chemical compound which shows the completion of a chemical reaction by changing the colour.

Q.19 Define Solubility?

Ans. It is the maximum amount of a solute which can dissolve in 100g of a solvent at a given temperature to form a saturated solution.

Q.20 What is the effect of temperature on solubility?

Ans. Generally the solubility of many substances increases with increase in temperature e.g. KCl, KNO_3 , KClO_3 .

Q.21 Name a salt whose solubility is not affected by a change in temperature?

Ans. NaCl (Sodium Chloride).

Q.22 For which salt there is a decrease in solubility?

Ans. Calcium acetate $\text{Ca}(\text{CH}_3\text{COO})_2$.

Sodium sulphate Na_2SO_4 .

Q.23 What is water of crystallization?

Ans. No. of water molecules that are physically associated with one mole of any hydrated substance during the process of crystallization is called water of crystallization e.g., $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ etc.

Q.24 What is the difference between hydrated and anhydrous CuSO_4 ?

Ans. Hydrated copper sulphate $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is blue in colour while anhydrous copper sulphate CuSO_4 has no water of crystallization and is white in colour.

Q.25 How water of crystallization can be removed?

Ans. By simple heating.

Q.26 What is blue vitriol?

Ans. It is hydrated $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$.

Q.27 How is vinegar prepared?

Ans. It is prepared by the fermentation of starchy substances. Vinegar is Dilute aqueous solution of acetic acid.

Q.28 What is the amount of acetic acid in vinegar?

Ans. It is usually 3-6%.

Q.29 Which soap contains higher concentration of free alkali (i) bath soap (ii) lanndry soap?

Ans. Laundry soap contain higher concentration of free alkali.

Q.30 What is the difference between washing soap and beauty soap?

Ans. Beauty soap contains KOH as a base while washing soap contains NaOH as a base.

Q.31 What is the colour of methyl orange in acidic medium?

Ans. It is light pink.

Q.32 What is the formula of washing soda?

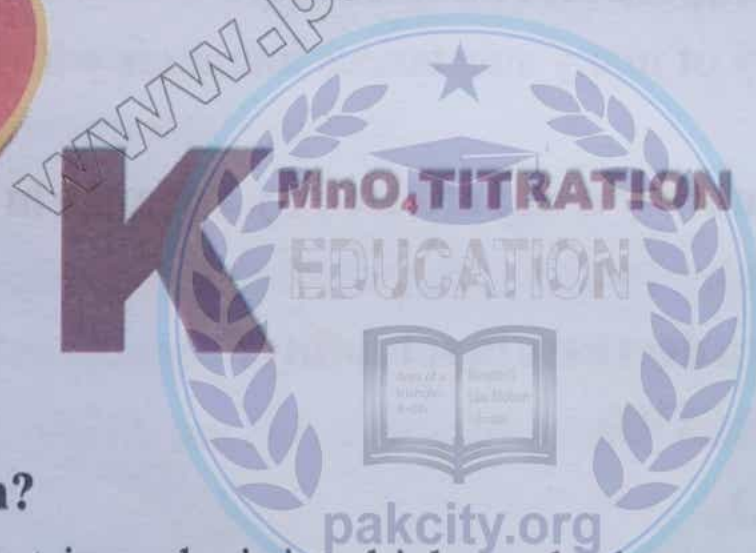
Ans. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$.

Q.33 What is formula of baking soda?

Ans. NaHCO_3 .

Q.34 Why do you not remove the last drop of solution from a pipette by blowing it out?

Ans. The last drop of solution in the jet of pipette is always in excess and is not included in the reading.



Q.1 What is redox titration?

Ans. It is the branch of volumetric analysis in which a reducing agent is titrated against an oxidizing agent or vice versa. The volume of one is being known while that of other is to be determined.

Q.2 What indicator is used in Redox titration?

Ans. KMnO_4 itself acts as an indicator.

Q.3 Is KMnO_4 a primary standard?

Ans. No because KMnO_4 cannot be obtained in pure form and its solution is not very stable.

Q.4 Why KMnO_4 and AgNO_3 should be placed in coloured and quick fit bottles?

Ans. To avoid decomposition due to exposure to light and air.

Q.5 Name the substance which produces atomic oxygen in redox titration?

Ans. KMnO_4 .

Q.6 Why we donot add any other indicator in KMnO_4 titration?

Ans. Because KMnO_4 is a self-indicator and is highly coloured. When it reacts with a reducing agent during titration, a colourless product is obtained. When the reaction is over, even one drop of KMnO_4 produces pink colour. Therefore, KMnO_4 acts as a self indicator.

Q.7 What is oxidation number of Mn (Manganese) in KMnO_4 and MnSO_4 ?

Ans. (i) In KMnO_4 it is +7.

(ii) In MnSO_4 it is +2.

Q.8 Why is it necessary to add sufficient dil H_2SO_4 , to the titration flask during KMnO_4 titration?

Ans. KMnO_4 cannot act as an oxidizing agent in the absence of H_2SO_4 . The oxygen is evolved by action of KMnO_4 with dil. H_2SO_4 and this oxygen is then utilized for the oxidization of Fe^{+2} salts or oxalic acid or oxalates etc.

Q.9 Why do you always take KMnO_4 in the burette? Can you take KMnO_4 in conical flask?

Ans. KMnO_4 acts as oxidizing agent in the presence of dil H_2SO_4 . If we will take it in conical flask, oxygen will liberated immediately by the addition of dil H_2SO_4 . A reducing agent is taken in flask with dil H_2SO_4 . Oxygen is liberated only when KMnO_4 is added dropwise in the flask and liberated oxygen will oxidize reducing agent easily.

Q.10 Which is oxidized in titration of KMnO_4 with FeSO_4 ?

Ans. FeSO_4 is converted into $\text{Fe}_2(\text{SO}_4)_3$ i.e., Fe^{+2} is converted into Fe^{3+} .

Q.11 Is there any harm if we heat ferrous salt solution during titration?

Ans. Yes, there is possibility of Fe^{2+} ions to be oxidized by atmospheric oxygen to Fe^{3+} and thus the volume of KMnO_4 used will be less than actually required.

Q.12 Sometimes during KMnO_4 titration, a brown precipitate is formed, why it is so?

Ans. If KMnO_4 is added slowly or due to incomplete oxidation during titration, a brown ppt due to formation of hydrated MnO_2 is obtained.

Q.13 Why oxalic acid solution is heated before titration?

Ans. The reaction is very slow due to slow production of Mn^{2+} . If we heat the solution, then there is rapid formation of Mn^{2+} and rapid production of CO_2 . Heating is the condition to carry out the reaction.

Q.14 Why do we add dil H_2SO_4 in all KMnO_4 titrations?

Ans. (1) It produces atomic oxygen which oxidizes reducing agent.

(2) It prevents formation of MnO_2 .

Q.15 What is the oxidation state of carbon in CO_2 and $\text{Na}_2\text{C}_2\text{O}_4$?

Ans. (1) In CO_2 , it is +4.

(2) In $\text{Na}_2\text{C}_2\text{O}_4$, it is +3.

Q.16 What is formula of Mohr's Satl?

Ans. $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$.

Q.17 What is meant by partially oxidized FeSO_4 .

Ans. The atmospheric oxygen slowly oxidizes ferrous sulphate of the container into Ferric Sulphate. This oxidation is not complete because ferrous sulphate is kept in closed container which prevents air to react freely with the compound..

Q.18 Which substance in Mohr's Salt is not oxidized or reduced?

Ans. $(\text{NH}_4)_2\text{SO}_4$.

Q.19 Name two coloured salts of potassium?

Ans. Potassium permanganate (KMnO_4).

Potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$).

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IODINE TITRATION

Q.1 Define Iodimetry?

Ans. Direct titration of Iodine solution with a reducing agent like sodium thiosulphate is called Iodimetry.

Q.2 Define Iodometry?

Ans. The titration in which iodine is liberated by reacting with an oxidizing agent. This liberated I_2 is titrated with $\text{Na}_2\text{S}_2\text{O}_3$.

Q.3 Is Iodine soluble in water?

Ans. Iodine is slightly soluble in water. Its solubility in water is $0.355\text{g}/\text{dm}^3$ at 25°C when some KI is added to the solution, it becomes more soluble due to formation of I_3^- ions.



It is soluble in organic solvents like CCl_4 , acetone etc.

Q.4 Why Iodine flask is used?

Ans. Iodine flask is a stoppered flask. The titration is carried out in these flasks because I_2 is highly volatile.

Q.5 Why fresh starch solution is used?

Ans. Starch solution decomposes on standing.

Q.6 Why starch is used as an indicator?

Ans. If starch is not added in the titration, then titration can be carried out but the end point will not be sharp i.e., brown yellow colourless. But with starch the disappearance of blue to colourless is easily visible.

Q.8 What is chemical composition of.

- (i) Pinky (ii) Surkh Kahi (iii) Hypo
(iv) Blue vitriol (v) Green vitriol

- Ans.** (i) Pinky KMnO_4
(ii) Surkh Kahi $\text{K}_2\text{Cr}_2\text{O}_7$
(iii) Hypo $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$
(iv) Blue vitriol $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
(v) Green vitriol $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

Q.9 What is physical state and colour of iodine?

Ans. Solid iodine is of shining black colour but vapours of iodine are violet in colour. It is volatile and sublime material.

