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CHEMISTRY

SELECTED QUESTIONS & ANSWERS FOR HSLC 2021

Chapter-1 Periodic Classification of elements

Q1. Why did Mendeleev leave some gaps in his periodic table?

Ans: Mendeleev left some gaps in his periodic table for the discovery of new elements.
Fore.g. Scandium, Gallium and Germanium were discovered later, have properties similar to eka- boron, eka- aluminium and eka-silicon respectively as predicted by the Mendeleev.

Q2. What are the two criteria used by Mendeleev in creating his periodic table?

Ans: (i) Mendeleev arranged the elements in order of increasing atomic masses.
(ii) Mendeleev considered the compounds formed by the elements oxygen and Hydrogen.

Q3. What were the limitations of Mendeleev's periodic table?

Ans: The limitations of Mendeleev's periodic table were that if the elements are arranged according to atomic masses, the isotopes have to be placed in different groups of the periodic table, but there were no place to keep them in Mendeleev periodic table.

Q4. How does the basic nature and acidic nature vary as moving from left to right in a period?

Ans:- As moving from left to right in a period, the basic nature of the oxides gradually decreases and the acidic nature of the oxides gradually increases. Eg: In the 3rd period of the modern periodic table, Sodium lies on the left side of Magnesium .So, Sodium oxide (Na_2O) is highly basic and Magnesium oxide (MgO) is comparatively less basic

Q5. What are the advantages of Modern Periodic table?

Ans:- The modern periodic table is a very satisfactory attempt to the classification of elements. It summarises the vast knowledge of the chemical elements and helps us to see the relationship between their physical and chemical properties and their electronic configuration to a very large measures.

Another Problem was that the atomic masses do not increase in a regular manner in going from one element to the next. So, it was not possible to predict how many elements could be discovered between two elements especially when considered, the heavier elements.

Q6. State Modern Periodic Law. How could Modern Periodic Table remove various anomalies of Mendeleev's periodic table?

Ans: Modern Periodic law states that the properties of elements are the periodic functions of their atomic numbers.
Modern Periodic Table removes various anomalies of Mendeleev's periodic table. They are
(i) Isotopes of an element occupy same position in the modern periodic table due to same atomic number.
(ii) It is based upon the fundament property of an element i.e atomic number.

Q7. Differentiate between Modern periodic Table and Mendeleev's periodic table.

	Mendeleev's Periodic Table	***Modern Periodic table***
Ans:	(i)The elements are arranged in mass number.	(i) The elements are arranged in order of increasing order of increasing atomic number.
	(ii)It has 8 vertical column called groups	(ii) It contains 18 vertical columns called groups.
	(iii)Inert gases are not included in this table.	(iii) Inert gases are included in this table.

Q8.What are Lanthanide and Actinide Series?

Ans: The series of fourteen elements which follow lanthanum having atomic numbers 58(Cesium) to 71(Lutetium) is called Lanthanide Series.

While The series of fourteen elements which follow Actinium having atomic numbers 90(Thorium) to 103(Lawrencium) are called Lanthanide Series.

Q9.Nitrogen (at no.7) and phosphorus (at.no.15) belong to group 15 of the periodic table. Which of them will be more electronegative and why?

Ans:-Nitrogen is more electronegative because electronegative character decreases down the group as phosphorus lies below Nitrogen in group 15.

Q10.How does metallic characters vary on moving from left to right in a period?

Ans:- On moving from left to right in a period, the metallic character of elements decreases i.e it changes from metallic nature to metalloids, then to non- metallic nature and finally the last element in a period is inert in nature.

Q11. What is Atomic radius? How do the atomic radii of the elements change in a group?

Ans:- Atomic radius is the distance between the centre of the nucleus and the outermost shell of an isolated atom. Atomic radius is generally expressed in "picometre (pm)" 1pm=10-12 m In a group, the atomic radii of the elements increase as we move down the group.

Q12.Atomic no. is considered to be more appropriate parameter than atomic mass in classification of elements in periodic table. Why? How does atomic size of elements vary on moving from

(i) left to right in a period

(ii) from top to bottom in a group. Give reasons for your answers.

Ans:- It is because Atomic number is a more fundamental property of an atom. As we move from left to right along a period, atomic radius decreases due to increases in effective charge. As we move from top to bottom in a group atomic radius increases. This is due to addition of new electronic shells.

Q13. What are zero group elements or Group 18 elements or Noble gas elements?

Ans: Noble gas elements are the elements present in group 18 of the periodic table which is also called zero group. They have zero valency. They are called noble gases because they don't take part in chemical combination.

Q14.How does the electronic configuration of an atom relate to its position in the Modern periodic table?

Ans: By knowing the electronic configuration of an element, we can know its period number from the number of shells present in its atom and from number of electrons in the valence shell of its atoms, we know its group number. Eg: Atomic No. of Sodium(Na) = 11

Its electronic configuration = 2, 8, 1 Number of shells = 3 Sodium belongs to 3rd period

Q15. Give reason why the noble gases are placed in a separate group?

Ans: These gases were discovered very late because they are inert and placing them in a separate group, do not disturb the existing order put forward by Mendeleev.

Q16. Give an account of the process adopted by Mendeleev for the classification of elements. How did he arrive at "Periodic Law".

Ans: (i) Compounds of the 63 elements with Oxygen and Hydrogen (Oxides and hydrides of the elements).

(ii) Elements with similar properties were arranged in a group. Mendeleev observed that elements get automatically arranged in the order of increasing atomic masses and the elements having similar properties occurred in the same vertical column called group.

Q17. Why is Mendeleev's classification appreciated?

Ans: Advantage of Mendeleev Periodic Table

1.He left blank Places which help scientist to discover new element

2.When Noble gasses was discovered Hel could add it to periodic table without any major change

3.He predicted the property of new element

Q18. What is the basis for classification of elements in the modern periodic table? Describe the essential features of the modern periodic table.

Ans: The basis for classification of elements in the modern periodic table is Atomic Number.

The main features of modern periodic table

The long form of periodic table consists of vertical columns called groups and horizontal rows called periods.

Elements are arranged in the increasing order of atomic numbers.

Elements in the modern periodic table are arranged in 7 periods and 18 groups.

Horizontal rows are called periods and vertical columns are called groups.

Elements are placed in periods based on the number of shells in their atoms.
The shortest period is the first period which contains only two elements – Hydrogen and Helium.
The second period contains elements from Lithium to Neon.
The third period contains elements from Sodium to Argon.
The fourth period contains elements from Potassium to Krypton.
The fifth period contains elements from Rubidium to Xenon.
Sixth period is considered as the longest periods in the periodic table. It contains elements from Cesium to Radon
Seventh period is incomplete period
Two series of elements, 14 each called Lanthanide and Actinide series are placed at the bottom of the modern periodic table.

Q19. Fluorine, Chlorine and bromine belong to group 17 of the periodic table. What similarity is there in the atoms of these elements?

Ans: They have same valency i.e 1

"or"

They have same valence electrons i,e 7

Q20.Nitrogen (at no.7) and phosphorus (at.no.15) belong to group 15 of the periodic table. Which of them will be more electronegative and why?

Ans:-Nitrogen is more electronegative because electronegative character decreases down the group as phosphorus lies below Nitrogen in group 15.

Q21. What ate Electropositive/Metallic character and Electronegative/non metallic characters? Give examples.

Ans: The tendency of an element to lose electrons, and form positive ions (cation) is called Electropositive/Metallic character.

Eg: Sodium (Na) is electropositive as it has high tendency to lose electrons

$Na \longrightarrow Na^{+} + e^{-}$

The tendency of an element to accept electrons, and form negative ions (anion) is called electronegative/non-metallic character.

Eg: Fluorine (F) is electronegative as it has high tendency to gain electrons

$F + e^{-} \longrightarrow F^{-}$

Q22. What is valency of an element?

Ans: Valency is defined as the combining capacity of the element. It is determined by the number of valence shell electrons present in the atom.

Chapter 2 - CHEMICAL BONDING

By: Omesh Konsam

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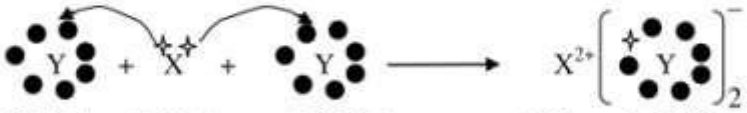
★ ***Q2. The atomic number of two elements X and Y are 20 and 35 respectively. What type of bonding is expected when they combine chemically? Give the formula and the electron dot structure of the compound formed.***

Ans: Electronic configuration of X = 2, 8, 8, 2
Electronic configuration of Y = 2, 8, 18, 7
Since valence electron of X is less than 4, X can donate its 2 valence electrons to get stable electronic configuration.Since valence electrons of Y is more than 4, Y can accept a valence elrctrons to get stable electronic configuration.So the bond to be formed is Ionic or Electrovalent bond.
The formula is XY_2



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Q4. How are Kernels held together in a metal?

Ans: Kernels remain embedded in a sea of valence electrons in a three dimensional array.

★ ***Q5. Why do ionic compounds (i) possess crystalline structure and (ii) have high melting and boiling points?***

Ans: (i) Ionic compounds do not exist as single molecules but as ions which are arranged in well defined geometric pattern.
(ii) Large amount of energy is required to break strong electrostatic force between the large network of ions.

Q6.Sodium loses an electron to form sodium ion. Identify the compound formed by sodium ion with another ion having the same number of electrons. Predict the solubility of the compound.

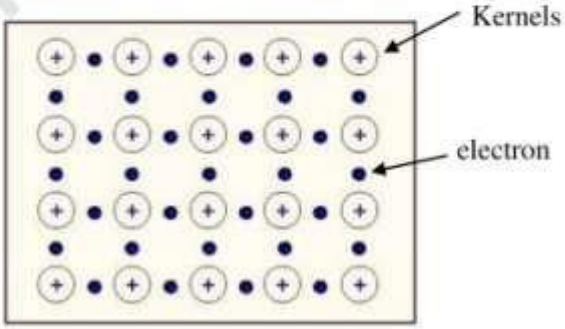
Ans: The compound is NaF or Na_2O. The compound being ionic will be soluble in polar solvents like water.

Q7.How is a covalent bond formed? Why are the covalent compounds non-conducting and low melting/boiling?

Ans:A covalent bond is formed by sharing between the combining atoms. Covalent compounds are made up of neutral molecules and no ions or free electrons are present. Hence, they are non- conducting. There is only weak inter molecular force of attraction between the neutral molecules and hence they have low melting/boiling.

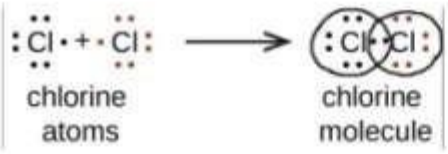
★ ***Q8. Draw a neat diagram of electron sea model of metallic bonding and label the kernels and valence electrons.***

Ans:



Q9.Give the electron dot structure of Chlorine molecule.What is the covalency of Chlorine in HCl molecule?

Ans: Electronic configuration of Cl(17) = 2, 8, 7



The covalency of chlorine in HCl is 1.

★ ***Q10.A compound PQ is formed by transferring of two electrons from P to Q . What is the type of chemical bond is in between P and Q? Give the two possible properties of PQ?***

Ans: Electrovalent or Ionic bond is formed.

The properties of PQ are

(i) It has high melting and boiling point.

(ii) It can conduct electricity in fused or in aqueous solution

Q11. Give the limitation of electrovalency? What can overcome it?

Ans: The limitation of electrovalency is that it is unable to explain the chemical combination between the identical atom or atoms of similar chemical nature from their molecule. It is overcome by co-valency

Q12. What is covalency?

Ans: The number of electron in which an atom contributes of covalent molecule is called co-valency.

★ ***Q13. Give reason, covalent compound***

(a) have low melting point. ***(b) poor conductor of electricity.***

(c) have particular geometry. ***(d) possess non- ionic reaction or have slow rate of reaction?***

Ans: (a) Because of weak force of attraction between the molecule, small amount of energy is necessary to break the bond

(b) Because they do not have the free charge to carry electricity.

(c) Because covalent bonds are directional.

(d) Because they are molecular in nature and posses molecular reaction.

Q14. What are lone pairs and bond pairs of electrons?

Ans: Those valent electron pairs which are not taking share in the covalent bond formation are known as the lone pairs of electrons.

Those valent electron pairs which are taking share in the covalent bond formation are known as the bond pairs of electrons.

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★ ***Q16. Distinguish between ionic and covalent compound.***

Ans:

Ionic compound	Covalent compound
(i) It has high melting and boiling point	(i) It has low melting and boiling point.
(ii) It is soluble in polar solvents	(ii) It is soluble in organic solvents.
(iii) It can conduct electricity in fused or aqueous solution.	(iii) It can't conduct electricity in fused or aqueous solution

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Q19.What is metallic bond?

Ans: The simultaneous force of attraction between the positively charged kernals and the mobile electrons which bind the metal atoms together is called metallic bond.

Q20.State the two conditions for the formation of ionic compound.

Ans: The two conditions are

(i) The combining element should be metals with non-metals.

(ii) All the valence electrons of a metal should be completely transferred to the non-metal.

Q21.Sodium reacts vigorously with water but sodium ion does not.Why?

Ans: Because Sodium ion is more stable than Sodium atom as it acquires the nearest electronic configuration of noble gas Neon.

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Q23.Distinguish between Ionic and Covalent compound in their formation.

Ans: (i)Ionic compound is formed by combining a metal with a non- metal but a covalent compound is formed by combining a non-metal with a non-metal.

(ii) Ionic compound is formed by transferring valence electron from one to another atom but covalent compound is formed by sharing electron between the combining atoms.

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Q28.What are valence electron?

Ans: The number of electrons present in the outermost shell of the atom or valence shell is called valence electrons.

Q29. Which electronic configuration favour inert or noble behavior of element?

Ans: Two electrons in the first (K-Shell) and the only shell of helium (He) and eight electrons in the outermost shells of other noble gases give a stable configuration of electrons.

Q30.What is a Molecule?

Ans: The smallest particle of an element or compound that is capable of an independent existence and

shows all the properties of that substance is called a molecule.

Q31. What is a chemical bond?

Ans: A chemical bond is one which holds the atom together in a molecule.

Q32. Explain why is element with atomic No.18 (Argon) stable?

Ans: We know that the electronic configuration of Argon is 2, 8, 8

So, it has no valence electron to transfer to other atoms or to share with other atoms or among themselves. That is why Argon atom is stable.

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Q35. What is Octet rule?

Ans: The principle of attaining eight electrons in the valence shell of atoms is called octet rule.

Q36. State electronic theory of valency?

Ans: It states that atoms combine to acquire the nearest noble gas electronic configuration by losing, gaining or sharing electrons.

Q37. What is covalent bond?

Ans: The bond formed by mutual sharing of electrons between the combining atoms is called covalent bond.

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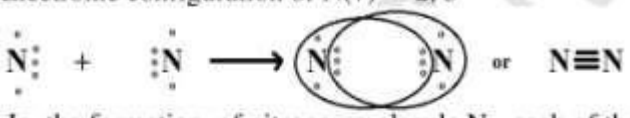
Q39. Explain the formation of N_2 molecule.

Ans: Electronic configuration of N(7) = 2, 5



In the formation of nitrogen molecule N_2, each of the twp nitrogen atoms having 5 valence electrons, provides three electrons to form three electron pairs for sharing. Thus, a triple bond is formed between the two atoms.

Q40. Explain how is an electrovalent bond formed?

Ans: An ionic (or electrovalent) bond is formed between two ions of opposite charges. During the formation of an ionic bond, one of the reacting elements should form a positively charged ion (cation), and the other should give a negatively charged ion (anion). This is possible only if, one of the atoms loses one or more electrons and the other gains one or more electrons.

The two oppositely charged ions, i.e., the cation and the anion are then held together by an ionic bond due to the electrostatic force of attraction between the ions.

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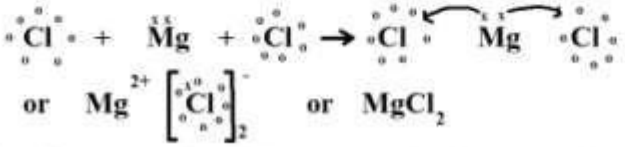
Q42. Explain the formation of $MgCl_2$ molecule?

Ans: Electronic configuration of Mg(12) = 2, 8, 2.

Electronic configuration of Cl(17) = 2, 8, 7.

If the magnesium atom loses its valence electrons, its electronic configuration would become 2, 8, which is the electronic configuration of the inert gas neon.

On the other hand, if each chlorine atom gains one electron, its electronic configuration would become 2, 8, 8. Thus, it would attain the configuration of the inert gas argon.



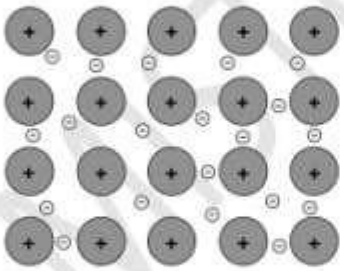
or $Mg^{2+}\left[\cdot\underset{\cdot}{\overset{\cdot}{\underset{\cdot}{\overset{\cdot}{Cl}}}}\cdot\right]^{-}_{2}$ or $MgCl_2$

Therefore, to attain stability, magnesium loses two electrons, and the two chlorine atoms gain one electron each from magnesium. In this process, magnesium forms the positively charged ion and chlorine atom forms the negatively charged ion.

The magnesium and chloride ions, being oppositely charged, are attracted to each other. This leads to the formation of magnesium chloride.

Q.43. What is electron sea model? Draw a structure of it.

Ans: A metal lattice consists of positively charged kernels arranged in a regular way surrounded by loosely held valence electrons. Kernels are metal nuclei and other electrons except valence electrons.



Acids, Bases and Salts

by: Omesh Konsam

Q1. What is Neutralization Reaction?

Ans: The reaction between an acid and a base producing a salt and water is called neutralization reaction.

Eg: $NaOH + HCl \longrightarrow NaCl + H_2O$

Q2. What are organic and inorganic acids? Give examples.

Ans: Acids present in foods materials are generally called organic acids.

Eg: Oxalic acid , Lactic acid etc.

Acids which are usually obtained from minerals are called Mineral acids.

Eg: HCl , H_2SO_4

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Q4.What are indicators or acid-base indicators?

Ans: Acid-base indicators are the dyes which are used to indicate acidic, basic or neutral nature of a solution.

Eg: Methyl orange, Litmus paper, Phenolphthalein etc.

Q5.Why does dry HCl gas not change the colour on the dry litmus paper?

Ans:-This is because dry HCl is a covalent compound and it does not undergo dissociation to give hydrogen ion (H+) and hence no change in the colour of the dry litmus paper.

Q6. On which factors does the strength of an acid depend? Why don't all acids have the same strength?

Ans: The strength of an acid depends upon the amount of H_3O^+ ion, it can produce in equimolar solutions. However all acids do not produce the same amount of H_3O^+ ions. Therefore, all acids do not have the same strength.

Q7. On which factors does the strength of a base depend? Why don't all bases have the same strength?

Ans: The strength of a base (alkali) depends upon the amount of OH^- ions ,it can produce in equimolar solutions. However all alkalis do not produce the same amount of OH^- ions in solution. Therefore, all alkalis do not have the same strength.

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Q9.What are the different types of salts?

Ans: The different types of salts are :

(i) Normal Salts: These salts contain neither replaceable hydrogen ion (H^+) nor hydroxide ion (OH-). These are obtained by complete neutralization of an acid with a base.

Eg: NaCl, KNO_3, $MgCl_2$, $CuSO_4$ etc.

Eg: $NaOH + HCl \longrightarrow NaCl + H_2O$

(Normal salt)

(ii) Acid Salts: These salts contain replaceable hydrogen ion (H+) and further react with a base to give normal salt. Eg: $NaHSO_4$, $NaHCO_3$ etc.

$H_2SO_{4(aq)} + NaOH_{(aq)} \longrightarrow NaHSO_{4(aq)} + H_2O_{(l)}$

$NaHSO_{4(aq)} + NaOH_{(aq)} \longrightarrow Na_2SO_{4(aq)} + H_2O_{(l)}$

(iii) Basic salts: These salts contain replaceable hydroxide ion(OH^-) and further react with an acid to give normal salt. Eg: Mg(OH)Cl.

$Mg(OH)_2 + HCl \longrightarrow Mg(OH)Cl + H_2O$

$Mg(OH)Cl + HCl \longrightarrow MgCl_2 + H_2O$

Q10. How does Hydrogen prepared in Laboratory?

Ans:

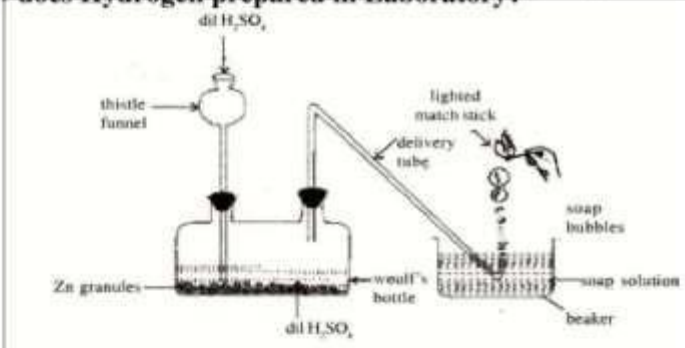

Fig . Zinc granules react with dilute sulphuric acid to give hydrogen gas. Hydrogen burns in air with a pop sound.

We set up an apparatus as shown in the figure. We take 2-3 pieces of Zinc granules in a double necked woulf's bottle, fitted with a thistle funnel and a delivery tube. We add some dilute sulphuric acid through the funnel to cover the zinc granules. We can see that the end of the thistle funnel is under the acid.We observe the surface of Zinc granules. We see bubbles formed on it and allow the gas formed to pass through the soap solution. Then, we put a lighted matchstick . We observed that the gas burns with a pop sound. This gas is Hydrogen gas.

Q11.Why isn't advisable to keep curd in copper or Brass Vessels?

Ans: Lactic acid in curd react with copper or Brass producing copper Lactate which is toxic in human. So, It is not advisable to keep curd in copper or Brass Vessels.

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Q13.What will happen when metal reacts with dilute H_2SO_4 acid. Give examples.

Ans: When metals reacts with dilute H_2SO_4 acid, a salt and hydrogen gas are formed.

$$\text{Metal + Acid} \longrightarrow \text{Salt} + H_2 \text{ gas}$$

$$Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2 \text{ gas}$$

Q14. When CO_2 gas is passed into lime water, the clear water becomes milky. When CO_2 is passed into lime water for a longer period , the milkyness of the solution get disappeared . Give reason with reaction in support of your answer.

Ans: When CO_2 gas is passed into lime water, the clear water becomes milky, it is due to the formation of insoluble calcium carbonate.

$$Ca(OH)_{2(aq)} + CO_{2(g)} \longrightarrow CaCO_{3(s)} + H_2O_{(l)}$$

When CO_2 is passed into lime water for a longer period ,the milkyness of the solution get disappeared, this is due to the conversion of insoluble Calcium carbonate into soluble calcium hydrogen carbonate.

The reaction is $CaCO_{3(s)} + H_2O_{(l)} + CO_2 \longrightarrow Ca(HCO_3)_{2(aq)}$

Q15. Why is lime water used in the treatment of acidic salt?

Ans: The acids in soil are released by the decay of organic matter. Lime neutralizes these acids . Nitrifying bacteria (those bacteria which can increase nitrogen content of the soil) which cannot function in acidic soils ,become active again when the soil is treated with lime.

Q16. What are the metals which can react with sodium hydroxide liberating hydrogen gas?

Ans:- Aluminium, Zinc, Tin and Silicon.

Q17. Write the reaction for producing hydrogen gas which is used by the commercially gas balloon seller.

Ans: $2NaOH + 2Al + 2H_2O \longrightarrow 2NaAlO_2 + 3H_2$

Q18.What are milk of lime and lime water?

Ans: A suspension of lime (CaO) in water is called milk of lime but the clear supernatant liquid is called lime water.

Q19.You are given an acid, a base and a salt solution. How will you distinguish them by using litmus solution?

Ans: We can distinguish acid, base and salt solution by using litmus solution. When they are treated with litmus solution, the sample which can change blue litmus into red is the acid, the sample which can change red litmus into blue is the base. But the sample which is unaffected to the litmus is the salt solution.

Q20. When dissolved in water, $FeCl_3$ is hydrolysed to an acid and a base. How will the solution response to litmus? Give reason in support of your answer?

Ans:- We have $FeCl_3 + H_2O \rightleftharpoons Fe(OH)_3 + 3HCl$

(Weak base) (strong acid)

The soluble acid salt gives the solution acidic to litmus. So, this solution turns blue litmus red. Thus, $FeCl_3$ solution is highly acidic due to the formation of strong acid HCl.

Q21. Why is Mg(OH)Cl a basic salt? Write the reaction for its formation?

Ans:- Mg(OH)Cl is a basic salt because it can further react with acid to form normal salt.

$Mg(OH)_2 + HCl \longrightarrow Mg(OH)Cl + H_2O$

$Mg(OH)Cl + HCl \longrightarrow MgCl_2 + H_2O$

Q22. Why is $NaHSO_4$ an acid salt? How is it formed? What will happen when it is treated with NaOH?

Ans: $NaHSO_4$ is an acid salt because it can further react with a base to form a normal salt.

$NaHSO_4$ is formed by the incomplete neutralization of H_2SO4 by NaOH.

$H_2SO_4 + NaOH \longrightarrow NaHSO_4 + H_2O$

When NaHSO4 is treated with NaOH ,a normal salt Na_2SO_4 and water are formed.

i.e. $NaHSO_4 + NaOH \longrightarrow Na_2SO_4 + H_2O$

Q23. Give reason. a) NaOH solution is stronger base than $NaHSO_4$

b) H_2SO_4 solution is stronger acid than CH_3COOH

Ans: a) NaOH has more OH^- ion concentration.

b) because H_2SO_4 has more H_3O^+ ion.

Q24. Three sample solutions A, B and C have pH value 13, 3 and 7 respectively. Identify acid, base and salt solution.

Ans: Acid solution- B Base solution – A Salt solution - C

Q25. What will be the change in colour when a drop of Methyl orange is added to $NaHCO_3$ Solution.

Ans: The colour of the mixture will become pink.

Q26. Both HCl solution and H_2O contains hydrogen atom however HCl is an acid but H_2O is not an acid . Give reason.

Ans: Because HCl contains replaceable hydrogen atom which can be replaced by a metal but H_2O does not contain replaceable Hydrogen atom.

Q27. What is pH scale? Explain

Ans: It is a scale in which the strength of an acid or a base is expressed.The scale of a pH value range from 0 – 14, acidic solutions have pH value less than 7 and that of basic solution above 7.

Q28. What will happen when acetic acid react with sodium metal, write the reaction.

Ans: Acetic acid reacts with sodium metal to form sodium acetate liberating hydrogen gas.

$2CH_3COOH(aq) + 2Na(s) \longrightarrow 2CH_3COONa(aq) + H_2(g)$

Acetic acid Sodium Sodium acetate

Q29. What are Alkalis? Give example.

Ans: Water soluble hydroxide and metal oxide ,which dissolve in water to form metal hydroxides are known as Alkalis.

eg; Sodium hydroxide is an alkali.

$$Na_2O + H_2O \longrightarrow 2NaOH$$

Sodium oxide Sodium hydroxide

30. What will happen when black copper(II) oxide reacts with dilute hydrochloric acid?

Ans: When the black copper(II) oxide reacts with dilute hydrochloric acid, then Copper(II) chloride and water are formed.

$$CuO_{(s)} + 2HCl_{(aq)} \longrightarrow CuCl_{2(aq)} + H_2O_{(l)}$$

Copper(II) oxide (Black) **Copper (II) chloride (Bluish green)**

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Types of Chemical Reactions

by: Omesh Konsam

Q. What is Precipitation reaction? Give example

Ans: The term 'precipitation reaction' can be defined as ***"*** *a chemical reaction occurring in an aqueous solution where two ionic bonds combine, resulting in the formation of an insoluble salt****".***

Eg: A **$AgNO_3$(aqueous) + KCl(aqueous) ——AgCl(precipitate) + KNO_3(aqueous)**

Q. What is double displacement Reaction? Give Example

Ans: When solution of barium chloride reacts with the solution of sodium sulphate, white precipitate of barium sulphate is formed along with sodium chloride.

Eg: $BaCl_2$ + Na_2SO_4 ⇨ $BaSO_4$ + 2NaCl

★ ***Q.11 . What is reactivity series of metal?***

Ans:- The arrangement of metals in the decreasing order of their reactivity is called reactivity series or activity series of metal.

Q12 What will happen when an iron rod is dip in copper sulphate solution?

Ans:- When an iron rod is deep in copper sulphate solution iron displaced copper from its solution.

$Fe(s) + CuSO_4(aq) \longrightarrow Cu(s) + FeSO_4(aq)$

Q.13 What are negative catalysts? Give examples.

Ans:- Catalyst which are used to slow down the rate of reactions are known as negative catalysts.

For example, glycerine is sometimes added to hydrogen peroxide as negative catalyst to slow down its rate of decomposition into hydrogen and oxygen.

Q14. What is catalyst? Give example.

Ans:- A catalyst is a substance which increases or decreases the rate of a chemical reaction without itself being consumed .

eg. In the manufacture of ammonia from nitrogen and hydrogen, finely divided iron is used as a catalyst.

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Q.26 Give reason why copper sulphate solution cannot be stored in vessel of zinc.

Ans:- As zinc is more reactive then copper, copper will be replaced by zinc producing $ZnSO_4$

$$CuSO_4 + Zn \longrightarrow ZnSO_4 + Cu$$

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Q34. Burning of Mg metal cannot be extinguished by CO_2 ? Give reason.

Ans:- Mg is a highly reactive metal its affinity for oxygen is higher than that of carbon.

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Q36. What are enzymes ? Give example.

Ans:- Enzymes are biocatalysts present in the living cells which catalyse reactions in living plants and animals.

For eg:- an enzyme called invertase can convert sucrose into glucose and fructose.

★ ***Q37. When iron is added to copper sulphate solution, copper is displaced and iron forms $FeSO_4$ in solution. Will Fe displaced Pb from $PbSO_4$ solution and Zn from $ZnSO_4$ Solution? Give reason in support your answer.***

Ans:- Fe will displaced Pb from $PbSO_4$ solution because Fe is more reactive than Pb .Fe will not displace Zn from $ZnSO_4$ solution because Fe is less reactive than Zn.

★ ***Q38. Hydrogen is more reactive than silver but less reactive than Zinc. What will happen when (i) A piece of silver metal is placed in dilute HCl? (ii) A piece of Zn metal is placed in aqueous $AgNO_3$ soln.***

Ans:- i) No reaction occured.

ii)$Zn(NO_3)_2$ and Ag will be produced.

$$Zn(s) + AgNO_3(aq) \longrightarrow Zn(NO_3)_2 + Ag(s)$$

Q.39 In two test tubes containing dilute HCl solution, Mg and Cu metals are added separately. Explain what will happen in each of the test tubes.

Ans:- When Mg is added ,Mg will displaced H from HCl solution and $MgCl_2$ and H_2 gas will be produced because Mg is more reactive than H. But when Cu is added no reaction takes place because copper is less reactive than H.

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Chapter - 5
Metals and Non Metals
by: Omesh Konsam

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Q3.What are ores? What is the most important ores of aluminium?

Ans: Those minerals from which a particular metal can be extracted economically are called ores. The most important ore of aluminium is Bauxite ($Al_2O_3.2H_2O$)

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★**Q7.Hydrogen is more reactive than silver zinc. What will happen when**

(i) A piece of Silver metal is placed in dilute HCl.

(ii) A piece of Zn metal is placed in aqueous $AgNO_3$ solution.

Ans: (i) No reaction occurred.

(ii) $Zn(NO_3)_2$ and free Ag will be produced.

$$Zn_{(s)} + AgNO_{3(aq)} \longrightarrow Zn(NO_3)_2 + Ag_{(s)}$$

Q8. What are Minerals and what are Gangue or matrix?

Ans: The natural materials in which the metal or their compound are found in Earth are called Minerals. The Unwanted impurities such as the earthy, Sandy, Rocky materials associated with the ores are called Gangue or Matrix.

Q9. Why are most of the metals occur as oxides?

Ans: Because O_2 is a very reactive element and is very abundant on the earth.

★**Q10. Why is Hydrogen gas not evolved when a metal react with Nitric acid?**

Ans: Hydrogen gas is not evolved when a metal react with Nitric acid because HNO_3 is a strong Oxidising agent. It oxidizes the H_2 produced to water and itself gets reduced to one of the Nitrogen oxides. (Nitrous oxide N_2O, Nitric oxide NO, Nitrogen dioxide NO_2)

Q11. What will happen when

(i) Sodium is treated with Cold water.

(ii) Mg is treated with hot water.

(iii) Iron is treated with steam?

Ans: (i) $2Na(s) + 2H_2O(l) \xrightarrow[\text{(cold)}]{} 2NaOH + H_2 + \text{heat.}$

(ii) $Mg(s) + 2H_2O(l) \xrightarrow[\text{(hot)}]{} Mg(OH)_2 + H_2$

(iii) $3Fe(s) + 4H_2O(g) \longrightarrow FeO.Fe_2O_3 + 4H_2$
(steam) Iron(II,III) Oxide

Q12.Describe the procedure of electrolytic refining.
"or" How are impure metals refined?

Ans: The most widely used method by refining impure metal is electrolytic refining. The procedure generally followed in this method are as follows:

(i) The impure metal, taken in the form of a thick block is made the anode in the electrolytic cell.
(ii) A thin sheet of pure metal is made the cathode.
(iii) A solution of the salt of the metal is taken as the electrolyte (electrolytic bath) When an electric current is passed through the solution, the pure metal from the anode passes into the solution in the form of the metals ions. A equivalent amount of metal ions from the solution is deposited as pure metal on the cathode. Thus, as the electrolysis proceeds the size of anode keeps on decreasing while that of the cathode keeps on growing. The soluble impurities go into the solution, whereas the insoluble impurities settle down below the anode as anode mud.

Q13. Describe the Froth flotation process for the concentration of Sulphide ore.
or
How are sulphide ore Concentrated?

Ans:- Sulphide ores are concentrated by Froth Flotation process.Sulphides are more readily wetted by oil than by water, while those of gangue are preferentially wetted by water. The crushed and powdered ore is wetted with oil and agitated in a tank of soapy water. Air is bubbled through the mixture, bubbles stick to oil coated particles, and they float on the surface as froth. The gangue being wetted by water settles down to bottom of the tank. The froth on the top of the tank is allowed to flow off, and the concentrated ore is recovered.

- draw diagram (see text book) -

Q14. How is mercury extracted from its ore.?

Ans:- Cinnabar (HgS) is an ore of mercury. When it is heated in air, it is first converted into mercuric oxide(HgO).Mercury oxide is then reduced to mercury on further heating.

$2HgS(s) + 3O_2(g) \xrightarrow{heat} 2HgO(s) + 2SO_2(g)$
$2HgO(s) \xrightarrow{heat} 2\,Hg(l) + 2SO_2(g)$

Q15. Why is sodium kept immersed in kerosene oil?

Ans:- Sodium metal is reactive and reacts with oxygen of the atmosphere and water catching fire vigorously. So, it is kept immersed in kerosene oil.

Q16. Suggest a suitable method for carrying out each of the following transformation.
$ZnCO_3 \longrightarrow ZnO \longrightarrow$ impure Zn $\longrightarrow$ Pure Zn

Ans:-

$ZnCO_3 \xrightarrow{Roasting} ZnO \xrightarrow{Electrolytic\ reduction}$ impure Zn $\xrightarrow{Refining}$ Pure Zn

Q17. Give two reason for using froth floatation method in the concentration of sulphide ore?

Ans:- The two reasons are:- 1. Sulphide ores are preferentially wetted by oil
2. Oil froth bring up the sulphide ore particle and float on the surface.

Q18. Describe the process used for welding cracked part of heavy machines. Give the chemical reaction involved.

Ans:- When iron (III) oxide (Fe_2O_3) is heated with aluminium powder, the heat evolved is so high that iron obtained melts.

$Fe_2O_3(s) + Al(s) \xrightarrow{heat} 2Fe(l) + Al_2O_3(s)$

The reaction is , therefore used for welding the broken parts of iron machinery, join railway track or cracked machine parts.

Q19. Write the composition of bronze ?

Ans:- Copper(75-90)% and tin(10-25)%.

Q20. A piece of metals when immersed in aqueous copper sulphate solution discharged the blue colour solution. predict the position of the metals reactive to copper in the activity series of metal?

Ans:- The metals is well above copper in the activity series of metals .

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Q22. Why is Hg reduced by heating?

Ans:- Because, it has low reactivity rate.

Q23. Name an acid which do not liberate hydrogen gas when treated with a metal.

Ans:- Nitric acid.

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Q25. What are the steps of metallurgy?

Ans:- 1) Concentration or enrichment of the ore.
2) Extraction of the metal from the concentrated ore.
3) Refining or purification of the impure metal.

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Q28. What is an alumino thermic process?

Ans:- The reduction of a metal by using aluminium liberating a large amount of heat is called alumino thermic process. It is used to join cracked machine parts, to join the railway track.

Q29. Distinguish between Roasting and Calcination.

Ans:- a) Roasting is the process of heating an ore in excess supply of air. But calcination is the process of heating an ore in limited air.
b) Roasting is used to reduced the sulphide ore particles but calcination is used to reduced carbonate ore.

Q30. Explain leaching with examples.
Or. Explain the chemical separation of Bauxite ore by bayer's method.
Or Explain the purification of bauxite ore by chemical method.

Ans:- Bauxite (Al_2O_3) an aluminium ore is concentrated by leaching with hot sodium hydroxide solution. The aluminium oxide dissolves in the excess base forming soluble sodium meta-aluminate.

$$Al_2O_3 + 2NaOH \longrightarrow 2NaAlO_2 + H_2O$$

sodium meta-aluminate.

The solution is filtered to remove insoluble gangue particles. The filtrate when diluted with water and agitated gives precipitate of aluminium hydroxide.

$$2NaAlO_2 + H_2O \longrightarrow Al(OH)_3\downarrow + NaOH$$

The precipitate is dried and then heated strongly to get pure aluminium oxide (alumina)

$$Al(OH)_3 \xrightarrow{heat} Al_2O_3 + 3H_2O$$

Q31. Name a metal which does not react with dilute acids.

Ans:- Copper(Cu) , Silver (Ag) and Gold (Au)

Q32. What are Amphoteric oxide ? Give examples..

Ans:- Metal oxides with react with both acid as well as base to produce salt and water are called amphoteric oxides.

eg.:- Al_2O_3 is an amphoteric oxide.

$Al_2O_3 + 6HCl \longrightarrow 2AlCl_3 + 3H_2O$

$Al_2O_3 + 2NaOH \longrightarrow 2NaAlO_2 + H_2O$

Q33. Name on oxide ore of iron ?

Ans:- Haematite (Fe_2O_3) and Magnatite (Fe_3O_4)

Q34. What is concentration of ore ?

Ans:- The process in which the gangue is removed from the ore is called concentration of ore.

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Q36. "All ores are minerals while all minerals are not ores". Justify?

Ans:- Minerals from which metal can be extracted economically are called ores. so, all ores are mineral while all minerals are not ores as all mineral cannot be used to extract metals economically.

Q37. A sample of metals 'X' was found to contain a small amount of silver and gold as impurity. Describe a method for purifying such a sample.

Ans:- When X is more reactive than gold and silver. To refined metal X, electrolytic refining can be used. In these method the sample of pure metal X is made cathode. A solution of the soluble salt of the metal X is taken as electrolyte.

After passing electric current though the electrolyte for some time, pure metal X is collected at the cathode and gold is collected just below as the anode mud.

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Q39. Describe a method for the concentration of the ore when either the ore or the impurities is magnetic in nature.

Ans:- Electromagnetic separation is used for the concentration of the ore when either the ore or the impurities (gangue) is magnetic in nature.The arrangement consists of two rollers over which a leather belt moves. One of the rollers is a electromagnet. The powdered ore is dropped over the belt on the side of non-magnetic roller, the magnetic particles are attracted by the magnetic roller and fall into a heap on the inner side . The non-magnetic particle simply falls down from the edge of the magnetic roller.

Q40. How will you obtained pure copper from impure copper?

Ans:- The impure copper can be purified by electrolytic refining. The impure rod of copper is made anode and a thin sheet of copper as cathode. The electrolyte is copper sulphate solution. When electric is passed through the electrolyte, impure copper from the anode goes into the solution forming copper ions. Copper ions from the solution deposits on the cathode as impure copper and the impurities either go into the solution or fall down below the anode. **(see diagram on text book)**

Q41. What is smelting? Give Example.

Ans:- The process by which the metal oxides in the fused state are reduced by carbon to the free metal involving melting is also called smelting.

Eg. $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$

$ZnO + CO \longrightarrow Zn + CO_2$

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Q43. Describe the methods of reduction used for (i) metals of low activity

Ans: (i) A metal ,low in reactivity series can be reduced by heating the ore alone.

Eg: Cinnabar (HgS) an ore of Mercury can be converted toMercuric oxide (HgO) by heating .

$3HgS(s) + 3O_2(g) \longrightarrow 3HgO(s(+ 3SO_2(g)$

Mercuric oxide (HgO) can be reduced to Mercury by heating alone.

$2HgO(s) \longrightarrow 2Hg(l) + O_2(g)$

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Q44. What is the difference between the terms roasting and calcination? Show the difference using different ores of Zinc. How is Zinc metal obtained from the roasted or calcined ore? 1+2+2=5

Ans:- Calcination is the process of heating strongly the carbonate ore in limited air whereas roasting is the process of heatingthe sulphide ore strongly in presence of excess air.

The carbonate ore of Zinc called calamine (ZnCO3) is heated to obtain zinc oxide (calcination)

$ZnCO_3(s) \xrightarrow{heat} ZnO(s) + CO_2(g)$

The sulphide ore of zinc is heated in presence of excess air to obtain zinc oxide.(Roasting)

$ZnS(s) \xrightarrow{heat} ZnO(s) + SO_2(g)$

The roasted or calcined ore, ZnO is mixed with suitable quantity of coke (carbon), carbon monoxide or another element which has greater affinity for oxygen.

$ZnO(s) + C(s) \xrightarrow{heat} Zn(s) + CO(g)$

Carbon monoxide formed in the reaction acts as reducing agent producing metallic zinc.

$ZnO(s) + CO(g) \xrightarrow{heat} Zn(s) + CO_2(g)$

Q45. What is the difference between an ore and a mineral? Discuss the electrolytic refining of copper. 3

Ans: Minerals & Ores:

The natural materials in which the metals or their compounds are found in earth are called minerals. While the ores are the minerals from which metals can be extracted profitably.

Electrolytic refining of copper

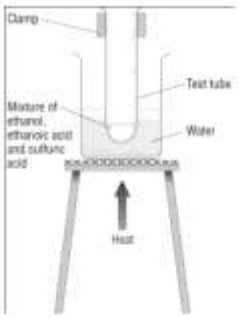
The impure metal in the form of thick blocks is made anode and a thin sheet of pure metal is made the cathode and a solution of the salt of the metal is taken as the electrolyte.

When electric current is passed, copper from the anode passes into the solution forming Copper ions (Cu^{2+}) .Copper ions (Cu^{2+}) ions from the solution is deposited as pure metal on the cathode.

The Soluble impurities go into solution, whereas the insoluble impurities settle down below the anode as the anode mud.

Chapter - 6
Carbon and its compound

★ ***Q1. Draw a neat and labelled diagram of the fitted apparatus used in the conversion of acetic acid into ethyl acetate.***



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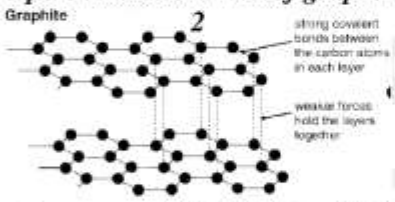
Q4. Draw a proportionate structure of graphite showing the bond together.



Q5. An elementary grey solid 'X' is found to be a good conductor of electricity. But it possess a dull surface, is brittle and is not ductile .Is 'X' a metal or a non-metal?

Ans: It is a non metal.

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★ ***Q7. What is the functional group in Alcohols? What happens when ethanol is treated with ethanoic acid in the presence of Sulphuric acid? Write the reaction.***

Ans: Functional group of alcohol is the hydroxyl (-OH) group. When ethanol is treated with ethanoic acid in the presence of sulphuric acid, a sweet smelling substance, ethyl acetate or ethyl ethanoate ester is formed

$$CH_3COOH + CH_3CH_2OH \longrightarrow CH_3COOC_2H_5 + H_2O$$

Q8. Give the name of the compound formed by the reaction of propene with bromine water.

Ans: 1,2- dibromopropane

★ ***Q9 . Define functional groups of organic compounds. What are the components of a complete name of an organic compound? Write the name of the compound***

$$CH_3\text{-}\underset{\displaystyle Cl}{\underset{|}{CH}}\text{-}CHO$$

Ans: The heteroatoms and the group attached to the hydrocarbon part forming a stable molecule irrespective

of the nature and the length of the carbon chain are called Functional Group.

Secondary + Primary + Word root + Primary + Secondary
Prefix Prefix Suffix Suffix

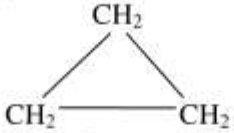
The name of the compound is 2-chloropropanal

Q10. Write the structure and IUPAC name of the possible isomers having molecular formula C_3H_6.. Which of the isomers will undergo bromination reaction with bromine water? Write the reaction involved.

Ans: Isomers of C_3H_6:

(i) CH_3-CH=CH_2 IUPAC name: Propene

(ii)



IUPAC name: Cyclopropane.

Propene being unsaturated hydrocarbon will undergo Bromination reaction with Bromine water. The orange-red colour of Bromine water will be discharged in the reaction.

CH_3-CH=CH_2 + Br_2(water) → CH_3-$CH(Br)$-$CH_2(Br)$

1,2-dibromopropane

Q11.Why is Diamond bad conductor of electricity?

Ans: In diamond each carbon atom lies at the centre of a regular tetrahedron and is covalently bonded with four carbon atoms located at its four corners. All the bonding electrons of the carbon atoms are thus used leaving no free electrons. This makes diamond extremely poor conductor of electricity.

Q12. What makes diamond the hardest substance known?

Ans: Diamond is very hard. The hardness of diamond is due to the structure of its carbon atoms. In diamond each carbon atom is bonded to four other carbon atoms which forms giant, three dimensional structure. Due to its giant structure diamond cannot easily heated up. Because giant covalent compound has many atom joined together by covalent bonds. To break all these bonds lot heat energy is required .The melting point of diamond is nearly 3600^0C.

Q13. What is a homologous series? Explain with an example.

Ans: A homologous series is a series of carbon compounds that have different numbers of carbon atoms but contain the same functional group.

For example, methane, ethane, propane, butane, etc. are all part of the alkane homologous series. The general formula of this series is C_nH_{2n+2}.

Methane CH_4
Ethane CH_3CH_3
Propane $CH_3CH_2CH_3$
Butane $CH_3CH_2CH_2CH_3$

It can be noticed that there is a difference of -CH_2 unit between each successive compound.

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Q16. What is esterification reaction?

Ans: When a carboxylic acid is treated with an alcohol and an acid catalyst, an ester is formed .This reaction is called esterification reaction.

$$CH_3COOH + CH_3CH_2OH \xrightarrow{H^+} CH_3COOC_2H_5 + H_2O$$

Acetic Acid Ethanol Ethyl Acetate

Ethyl acetate(ester) is a sweet-smelling liquid. It is used in making perfumes and as flavouring agents.

Q17. What will happen when Ethanoic acid reacts with (i) Sodium metal (ii) Sodium hydrogen carbonate

Ans: (i) Ethanoic acid reacts with Sodium metal to form Sodium acetate and H_2 gas.

$$2CH_3COOH + 2Na \longrightarrow 2CH_3COONa + H_2$$

(ii) Ethanoic acid reacts with Sodium hydrogen carbonate to form Sodium acetate, H_2O and CO_2.

$$CH_3COOH + NaHCO_3 \longrightarrow 2CH_3COONa + H_2O + CO_2$$

Q18. What are the properties of Ethanoic acid?

Ans: (i) Ethanoic acid (Acetic acid) is a colourless liquid with a sharp vinegar odour and sour taste.

(ii)Its freezing point is 16.6°C and boiling point is 118°C.

(iii) Its vapours are suffocating and cause damage to lungs.

(iv) It is miscible with water, ether and ethanol.

Q19. Why is acetic acid called as glacial acetic acid?

Ans: Below its melting point acetic acid is converted into ice like solid hence it is called as glacial acetic acid.

Q20. What is vinegar? Write its uses.

Ans: Vinegar is a liquid used for food that contains acetic acid (4 -7 %). Its primarily made from spoiled alcoholic beverages. Usually it is made from wine that a bacteria called *Mycoderma aceti* is added to turn the alcohol sour. Those are usually called wine vinegar.

It is widely used as a preservative of pickles and as table food.

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Q31. Why is graphite a good conductor of electricity?

Ans: Each carbon in graphite is covalently bonded to only three neighbouring carbon atoms froming layers of hexagonal networks,separated by a comparatively larger distance. Because of this distance between two successive layers, the possibility of a covalent bond being formed between carbons atoms lying in opposite layers is ruled out. The forth electron thus remains almost free. That is why, graphite is a good conductor of electricity.

Q32. Why is Graphite used as lubricant?

Ans: Graphite has one carbon atom covalently bonded to three other carbon atoms, forming a giant hexagonal molecular structure with layers held by weak Vander Waals' forces. As the Vander Waals' forces between the layers are weak, the layers can easily slide over each other when pressured and is soft. Thus, it can be used as a lubricant.

Q33. What is allotopism?

Ans: Allotropism is the phenomenon of existence of an element in two or more physically different forms but with similar chemical properties and those forms are called allotropes.

Q34.What is Catenation?

Ans: Carbon has the unique property to form bonds with other carbons atoms to form long chains. This property of carbon is called catenation.

Q35. Give reason for the formation of strong bonds by carbon.

Ans: The reason for the formation of strong bonds by carbon is its small size. This enables the nucleus to hold on to the shared electron pairs strongly.

Q36. What are Alkanes?

Ans: Alkanes are hydrocarbons that contain only single bonds between carbon atoms. They are the simplest class of hydrocarbons. Its formula is C_nH_{2n+2}

Q37. What are Alkenes?

Ans: Alkenes are hydrocarbons that contain double bonds between carbon atoms. Its formula is C_nH_{2n}

Q38. What are Alkynes?

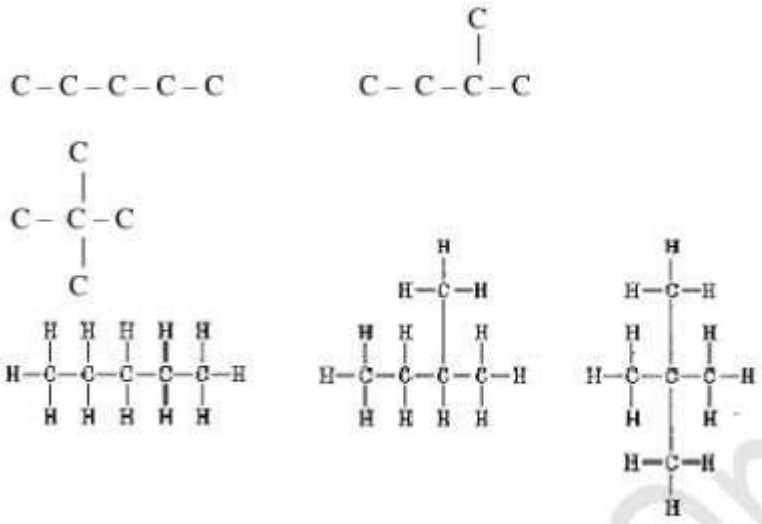
Ans¨ Alkenes are hydrocarbons that contain triple bonds between carbon atoms. Its formula is C_nH_{2n-2}

Q39.What is homologous series?

Ans: A homologous series is a series of organic compound which belong to the same family (i.e. posses same functional group) and show similar chemical properties. The members of this series are called homologue and differ from each other by the number of CH_2 units in the main carbon chain.

Q40.Write the possible structural isomers of Pentane (C_5H_{10})

Ans: The possible carbon skeleton of Pentane (C_5H_{10})are



n- pentane **isopentane** **neopentane**

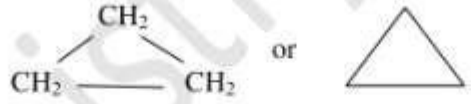
Q41.What are structural isomers?

Ans: Those Hydrocarbons which have the same molecular formula but have different structures are called Structural isomers.

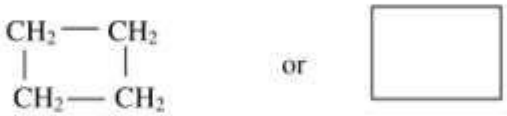
Q42. What are cycloalkanes?

Ans: Those hydrocarbons Which have carbon atoms in the form of ring are called cycloalkanes. They have the general formula C_nH_{2n}.

Eg: C_3H_6



Cyclopropane C_3H_6



Cyclobutane C_4H_8

Q43.What are Position Isomers? Give examples.

Ans: Those hydrocarbons having the same carbon chain but differ in the position of Double bond are called position isomers.eg: Butene (C^4H^8) have two position isomers

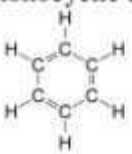
$\overset{1}{CH_2}=\overset{2}{CH_2}-\overset{3}{CH_2}-\overset{4}{CH_2}$ But – 1- ene (1 - Butene)

$\overset{1}{CH_3}-\overset{2}{CH}=\overset{3}{CH}-\overset{4}{CH_3}$ But – 2- ene (2 - Butene)

Q44.What are Arenes?

Ans: Arenes may be defined as monocyclic and polycyclic aromatic hydrocarbon with general formula C_nH_{2n-6}

eg: Benzene (C_6H_6)



Q45.What is petroleum? How is its formed?

Ans: Petroleum is a dark colour viscous liquid found deep in the earth's crust. Chemically it is mixture of various types of hydrocarbons along with some oxygen, sulphur and nitrogen containing compounds.

Due to some upheavals like earthquakes, volcanic eruption etd, the prehistoric forests and sea animals get buried under the earth's crust. Due to prolonged action of high pressure and high temperature in the interior of the earth for ages, the organic matter decomposed into petroleum.

★***Q46. What are functional groups?***

Ans: Those heteroatoms and the group attached to the hydrocarbon part forming a stable molecule characterize the specific properties of the compound irrespective of the nature and the length of the carbon chain are called functional groups.

Eg:

Name	Prefix	Suffix	Functional Group	Example
Alkane	-	-ane		$CH_3CH_2CH_3$ (propane)
Alkene	-	-ene	>C=C<	$CH_3CH=CH_2$ (propene)
Alkyne	-	-yne	C≡CH	$CH_3C\equiv CH$ (propyne)
Haloalkane	Halo		F, Cl, Br, or I	CH_3Br (methyl bromide)
Alcohol	Hydroxy	-ol	-OH	CH_3CH_2OH (ethanol)

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★***Q50. Identify the functional groups present in the following organic compound:***

(i) $CH_3COOC_2H_5$ (ii) C_2H_5COOH

Ans: (i) $CH_3COOC_2H_5$ - Functional group is - COO-

(ii) C_2H_5COOH - Functional group is - COOH

Materials of common use

by: Omesh Konsam

Q1. How is plaster of Paris obtained from gypsum? How is it set to hard mass?

Ans: Plaster of paris is prepared by heating Gypsum at 120°C-130°C

$$2CaSO_4.2H_2O \xrightarrow[120^\circ C\text{-}130^\circ C]{\text{heated}} (CaSO_4)_2.H_2O + 3H_2O$$

The setting of Plaster of paris is due to the reformation of gypsum with the absorption of water.

Q2.How does bleaching powder act as a disinfectant?

Ans:Chlorine liberated from bleaching powder kills germs by oxidation

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Q4. How is bleaching powder prepared? What chemical is responsible for the bleaching and disinfectant activity of bleaching powder?

Ans: Bleaching powder is prepared by passing Cl_2 gas over dry slaked lime at 35°C – 45°C.

$$Ca(OH)_2 + Cl_2 \longrightarrow Ca(OCl)Cl + H_2O$$

Cl_2 liberated by the decomposition of bleaching powder is responsible for the bleaching and disinfectant activity.

Q5.Mention a place in Manipur where brine well is available.

Ans:Ningel/ Chandrakhong/ Waikhong.

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Q7. What happens when an excess of carbon dioxide gas is passed through a saturated solution of sodium chloride containing dissolved ammonia gas? Give the balanced chemical equation.

Ans: Sodium hydrogen carbonate or sodium bicarbonate is formed.

$$NaCl + H_2O + CO_2 + NH_3 \longrightarrow NaHCO_3 + NH_4Cl$$

Q8.Washing Soda , a white crystalline solid on heating becomes amorphous in nature. What is the type of reaction involved in the change?

Ans: Decomposition Reaction.

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Q10. How is freezing mixture made?

Ans: Freezing mixture is made by mixing ice and common salt.

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Q12. What is Salt cake?

Ans: Sodium Sulphate(Na_2SO_4) obtained by reacting NaCl wit concentrated H_2SO_4 is called Salt Cake.

Q13.Write the uses of NaOH?

Ans: NaOH is used for making Soap, detergent, paper and artificial fibre.

Q14. Name the compound used to remove ink-stains and for bleaching clothes? How is it obtained?

Ans: The name of the compound is Sodium hypochlorite.

It is obtained by reacting sodium hydroxide and Chlorine.

$2NaOH + Cl_2 \longrightarrow NaCl + NaOCl + H_2O$

Q15. What will happen when Bleaching powder is exposed to air?

Ans: Carbon dioxide and moisture of the atmosphere decompose bleaching powder liberating Chlorine.

$Ca(OCl)Cl + CO_2 \longrightarrow CaCO_3 + Cl_2$

$Ca(OCl)Cl + H_2O \longrightarrow Ca(OH)_2 + Cl_2$

Q16.Why does Bleaching powder act as a bleaching agent?

Ans: It is because when bleaching powder is decomposed, the free chlorine is responsible for oxidizing and bleaching property act as a bleaching agent.

Q17. Write the uses of Sodium hydrogen Carbonate or Sodium bicarbonate.

Ans: (i) Sodium hydrogen Carbonate is used in medicine to reduce acidity in the stomach.

(ii) It is used as baking powder.

(iii) It is used in soda-acid fire extinguishers.

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Q19, How is NaOH obtained from NaCl?

Ans: On passing electricity through brine in specially designed electrolytic cell, Sodium Chloride is decomposed to produce sodium hydroxide, hydrogen and Chlorine.

$2NaOH + 2H_2O \longrightarrow 2NaOH + Cl_2 + H_2O$

Q20. What is Water of Crystallisation? How does the Blue colour of copper sulphate disappear When it is heated ?

Ans: The definite number of molecules of water chemically attatched to each formula Unit of Salt in its crystalline form is called water of crystallization.

The Blue colour of Copper Sulphate is due to presence of water of crystallization i.e $CuSO_4.5H_2O$. It is also called Blue Vitriol. The Blue colour of copper sulphate disappear When it is heated because the water molecules disappear and becomes colourless.

Q21. How is Baking Soda prepared?

Ans: When an excess of CO_2 is bubbled through a nearly saturated solution of Common salt containing Ammonia gas, then Sparingly soluble Sodium Hydrogen carbonate (Baking Soad) and Ammonium chloride are formed.

$NaCl + H_2O + CO_2 + NH_3 \longrightarrow NaHCO_3 + NH_4Cl$

Q22. How is pure Sodium Chloride prepared?

Ans: Pure Sodium Chloride is prepared by passing Hydrochloric acid gas into a saturated solution of impure salt. The pure is precipitated and obtained on filtration. It is then dried.

Q23.Write the uses of Chlorine gas.

Ans: Chlorine gas is used for sterilizing water (Water treatment), in swimming pools; manufacture of PVC (Poly vinylchloride)Plastics, Pesticides and CFC (Chlorofluoro carbon)

Q24. Why is the use of CFC as refrigerant not encouraged?

Ans: The use of CFC as refrigerant is not encouraged as it causes depletion of Ozone layer.

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Q27. How does baking powder differ from baking soda?

Ans: Baking soda is a single compound which has sodium hydrogen carbonate which is alkaline (basic) in nature .

Baking powder is a mixture of sodium hydrogen carbonate and a mild edible(eatable) acid such as tartaric acid. When baking powder mixes with water, then the sodium hydrogen carbonate reacts with tartaric acid to evolve carbon dioxide gas which gets trapped in the wet dough and bubbles out slowly making the cake to rise and hence 'soft and spongy'. The equation which takes place can be shown as:

$$NaHCO_3 + H^+ \longrightarrow Na \text{ . tartarate} + CO_2 + H_2O$$

Q28. What is available chlorine?

Ans: Available chlorine is the amount of chlorine set free by the sample of bleaching powder when decomposed. This free chlorine is responsible for the oxidizing and bleaching properties of bleaching powder.

Q29. Write the uses of Sodium hypochlorite solution.

Ans: It is used to remove ink stains and for bleaching clothes etc.

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Q33. Write the uses of Plaster of paris.

Ans: (i) It is used for making casts in moulds.
(ii) It is used as a plaster for supporting fractured bones in the right position.
(iii) it is used for wall plaster.

Q34. Write the uses of Washing Soda.

Ans: (i) It is used as cleansing agent for domestic purposes and that is why it is called washing soda.
(ii) It is used in the manufacture of glass, soap, paper and borax.
(iii) It is used for making hard water soft.

Q35. Write the uses of bleaching powder.

Ans: (i) It is used as a disinfectant.
(ii) It is used for sterilizing water to make water free from disease causing germs and bacteria.
(iii) It is used as an oxidizing agent in chemical industries.

Q36. Explain the Nicholas Leblanc process for the preparation of Washing Soda.

Ans: A French chemist Nicholas Leblanc prepared washing soda directly from sodium chloride in the following steps:

(i) Sodium chloride is treated with concentrated sulphuric acid to form sodium sulphate which is called salt cake.

$$2\,\underline{NaCl} + \underline{H_2SO_4} \rightarrow \underline{Na_2SO_4} + 2\,\underline{HCl}$$

(ii) the salt cake is grounded and mixed with its own weight of limestone and half its weight of Coal and strongly heated to 800- 1000°C. The slat cake is reduced by coke to sodium sulphide, which then reacts with calcium carbonate to form Sodium carbonate

$$Na_2SO_4 + 2\,C \rightarrow Na_2S + 2\,CO_2$$
$$Na_2S + CaCO_3 \rightarrow Na_2CO_3 + CaS$$