Unit : 03
Periodic Table and Chemical Bonding

Concept : Lavoisier's classification

1. The efforts to classify elements were first made by Lavoisier.

   (a) How did Lavoisier classify elements? (1)

   (b) What were the drawbacks of this classification? (1)

Score (2) Time (3 minute)

Concept : Metals - Different behaviour

2. Match the following

Metal	Reaction with water	Reaction with dilute acid
Sodium	No reaction	Reacts slowly producing hydrogen
Iron	Reacts vigorously	No reaction
Silver	No reaction with cold water	Reacts vigorously

Score (3) Time (3 minute)

Concept : atomic mass unit

3. Listen to a conversation among three students.

   Student 1 : The atomic mass of nitrogen is 14g

   Student 2 : An atom is too small. Then how can it have a mass like 14g

   Student 3 : The mass of nitrogen atom is 14 amu

   In continuation, Student 3 gave an explanation based on amu. What would have been the explanation?

Score (2) Time (2 minute)

Concept : Dobereiner's classification

4.

Element	Atomic mass
Li	7
Na	23
K	39

Given above is a triad identified by Dobereiner. Write any two relations among these elements. (2)

Score (2) Time (3 minute)

Concept : Newlands Law of Octaves

5.

H	Li	Be	B	C	N	O
F	Na	Mg	-	-	-	-

One of the early attempts in classifying elements is given above

(a) Who classified elements based on the law of octaves? (1)

(b) What was the basis of this classification? (1)

Score (2) Time (2 minute)

Concept : Mendeleev's Classification - Identifying special features

6. Mendeleev is honoured as the founder of the periodic table

(a) What was the basis of the classification put forward by Mendeleev? (1)

(b) What speciality did Mendeleev find out during classification of elements? (1)

(c) What names are assigned to the rows and columns of this periodic table? (1)

Score (3) Time (3 minute)

Concept : Mendeleev's periodic table - Merits and demerits

7. Although Mendeleev's periodic table had a number of merits, it had certain demerits also. Give one merit and one demerit.

Score (2) Time (4 minute)

Concept : Comparison of different classifications

8. Match the following

Scientist	Classification	Criterion
Lavoisier	Octaves	Atomic mass
Dobereiner	Periodic table	Metallic - non metallic character of elements
Newlands	Metals, Non metals	Three elements with similar behaviour
Mendeleev	Triads	Repetition of properties of the eighth element

Score (4) Time (4 minute)

Concept : Features of the Modern periodic table

9. The Modern periodic table was put forth by Moseley.

(a) On what basis are the elements arranged in the Modern periodic table? (1)

(b) What is the peculiarity in the number of valence electrons for the elements present in the same group? (1)

(c) What is the speciality regarding the properties of elements present in the same group? (1)

(d) What is the reason for this speciality? Explain based on the concept of valency. (1)

Score (4) Time (5 minute)

Concept : Element family and valency

10. Fill up the blanks

Group Number	Element family	Valence electrons	Valency
15	Nitrogen family	5	3
16	Oxygen family	.....(a).....	2
17	Halogens	7	.....(b).....
18	.....(c)	.....(d).....	0

Score (4) Time (3 minute)

Concept : Identifying properties of elements from electronic configuration

11. The atomic number of an element 'X' is 16 (Symbol not true). Find the following aspects related to this element.

Electronic configuration	.....
Period number	.....
Group number	.....
Valency	.....
Metal or non metal	.....
Charge of the ion	.....

Score (3) Time (4 minute)

Concept : Electronic configuration and position of elements

12. Given below are three elements with their atomic numbers (Symbols not true)

A = 5 B = 18 C = 13

Write their electronic configurations and find out the following

(a) Which elements belong to the same period? (1)

(b) Which elements belong to the same group? (1)

(c) Which is a noble element? (1)

(d) To which group and period does the element 'C' belong? (1)

Score (4) Time (5 minute)

Concept : Electronic configuration and properties of elements

13. The electronic configurations of some elements are given below?

A - 2, 2

B - 2, 7

C - 2, 8, 2

(a) Which element has the biggest atom? (1)

(b) Which element has the smallest atom? (1)

(c) Which among these elements show metallic character (electro positive)? (1)

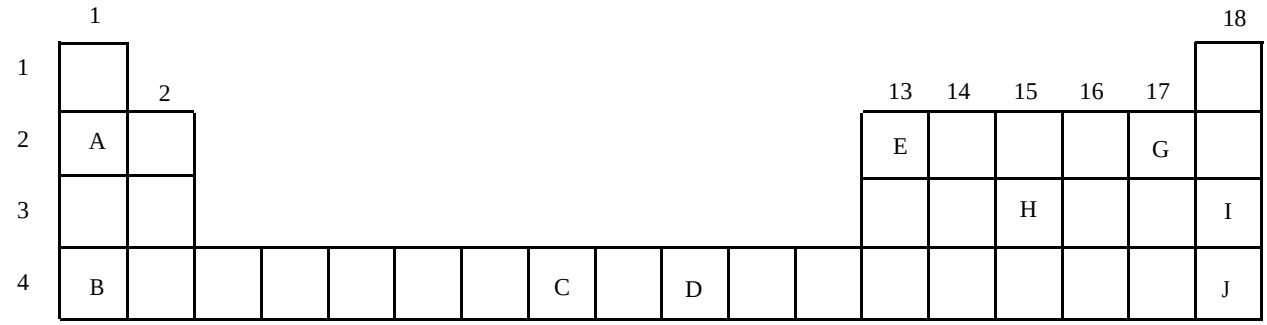
(d) Which element among these show non-metallic character (electro negative)? (1)

Score (4) Time (4 minute)

Concept : Position in the periodic table and properties

14. An incomplete model of the periodic table is given below.

Examine it and answer the questions given below.



(a) Which element has the biggest atom? (1)

(b) Which are the transition elements? (1)

(c) Which are the noble gases? (1)

(d) Which element has the highest electronegativity? (1)

Score (4) Time (4 minute)

Concept : Identifying the type of chemical bond based on electronic configuration

15. The atomic numbers of two elements are given below. (Symbols not true)

X = 17

Y = 11

(a) Write the electronic configuration of these two elements. (1)

(b) Which is electropositive? Which is electronegative? (1)

(c) How is a chemical bond formed between these two? Explain based on electron transfer / sharing. (2)

(d) What name is given to this type of bond? (1)

(e) Write the chemical formula of the compound formed between 'X' and 'Y' through this type of bonding. (1)

Score (6) Time (5 minute)

Concept : Identifying the type of chemical bond from electronic configuration

16. The valence shell electronic configuration of two elements is represented below.

(a)Which is electropositive? Which is electronegative? (1)

(b) Represent the chemical bond formation between them. (2)

(c) What is this type of bonding called? (1)

Score(4) Time (4 minute)

Concept : Gains ability in balancing chemical equations

17. Balance the unbalanced chemical equations from those given below.

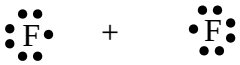
$Na + Cl_2 \rightarrow NaCl$

$Mg + F_2 \rightarrow MgF_2$

$Ca + O_2 \rightarrow CaO$ (2)

Score (2) Time (3 minute)

Concept : Covalent bonding

18. 

(a) You might have observed the valence shell electronic configuration of the two fluorine atoms. How many electrons are needed for each to attain stability? (1)

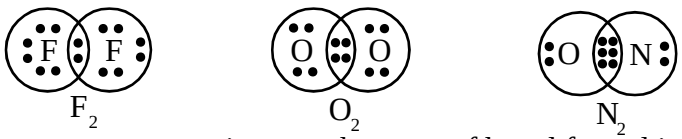
(b) How is octet attained when a fluorine molecule is formed? (1)

(c) Represent the distribution of electrons in a fluorine molecule. (2)

(d) What is this type of bonding called? (1)

Score (5) Time (5 minute)

Concept : Single bond, double bond, triple bond

19. 

(a) What is the common name given to the type of bond found in the above molecules? (1)

(b) What difference in bonding is observed in the above molecules? (2)

(c) What name is given to each bond? (1)

Score (4) Time (4 minute)

Concept : Ionic compounds and covalent compounds

20. Complete the table

Compound	**Solubility**	**Electrical conductivity**	**Melting and boiling points**
Ionic compound	Soluble in water	.....(b).....	.....(c).....
Covalent compound	.....(a).....	Non conductor of electricity	.....(d).....

Score (4) Time (4 minute)

Unit - 11
Non metals found in Nature

Concept : Differentiates various forms of oxygen

1.

O, O_2, O_3

Various forms of oxygen are given above.

(a) Which among these forms is not found in nature? (1)

(b) Which is the component that is known as a life supporter and contributes 21% of the atmosphere? (1)

(c) Which form is seen as a separate layer in the topmost portion of the atmosphere called 'stratosphere'? (1)

Score (3) Time (3 minute)

Concept : Green plants and oxygen

2. Though atmospheric oxygen is used for respiration by crores of plants and animals each second, its concentration remains unchanged. Why? (2)

Score (2) Time (3 minute)

Concept : Laboratory preparation of oxygen and identifying its peculiar properties

3. A little potassium permanganate taken in a test tube is heated and a burning splint is shown at the mouth of the test tube

(a) What is observed? (1)

(b) What is the reason for this? (1)

(c) Complete the chemical equation for the reaction (1)

$2KMnO_4 \rightarrow K_2MnO_4 + \text{.....} + \text{.....}$

Score (3) Time (4 minute)

Concept : Acquire information regarding different oxides

4. Write the product obtained in each case given below.

(a) Magnesium burns to produce a white powder. (1)

(b) A pop sound is heard when a flame is brought to the mouth of a test tube containing hydrogen. (1)

(c) The shining appearance of a brand new aluminium vessel turns grey after a few days. (1)

(d) Rust is seen on the surface of an iron rod. (1)

Score (4) Time (4 minute)

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5 **Concept :** To understand that Nitrogen is an essential element for plants

Given below are certain opinions that arose in a seminar 'Agriculture and Chemistry'. Give reasons for each.

(a) Cultivating leguminous plants as inter crop is good for other plants and trees. (1)

(b) Green leaves and fish waste are good manure for plants. (1)

(c) Sufficient amounts of chemical fertilizers should be given to plants along with bio fertilizers. (1)

Score (3) Time (5 minutes)

Concept : To understand that Nitrogen reaches the soil as its oxide during lightning

6. It is said that lightning is a blessing for plants. What could be the reason?(2)

Score (2) Time (5 minutes)

Concept : Understanding the preparation and properties of ammonia

7. You are supplied with ammonium chloride, lime and a watch glass.

(a) Write the method of preparation of ammonia. (1)

(b) Give any two properties of the gas formed. (2)

Score (3) Time (3 minutes)

Concept : Identifying the characteristic properties of hydrogen

8. A gas was formed when zinc reacted with dilute hydrochloric acid.

(a) A pop sound was heard when a burning match stick was introduced at the mouth of the test tube. What is the reason for this? (1)

(b) When a balloon was filled with the gas formed and released, it moved upwards. What could be the reason for this? (1)

Score (2) Time (4 minutes)

Concept : To compare the properties of hydrogen, oxygen and carbon dioxide

9. Match the following. (3)

Gas	**Reaction with a flame**	**Presence**
Hydrogen	Supports burning	21% of air
Carbon dioxide	Burns	99% of the universe
Oxygen	Puts off a flame	0.033% of air

Score (3) Time (3 minutes)

Concept : Identifying the merits and demerits of hydrogen as a fuel

10. "Hydrogen : The future fuel". This was a title that appeared in a science magazine.

(a) Write the chemical equation for the reaction taking place when hydrogen is used as a fuel. (1)

(b) Write two merits of hydrogen as a fuel. (1)

(c) Write one practical difficulty in using hydrogen as a fuel. (1)

Score (3) Time (5 minute)

Concept : Identifying the behaviour of chlorine on the basis of its electronic configuration

11. The atomic number of chlorine is 17.

(a) Write the electronic configuration of chlorine. (1)

(b) What is the valency of chlorine? (1)

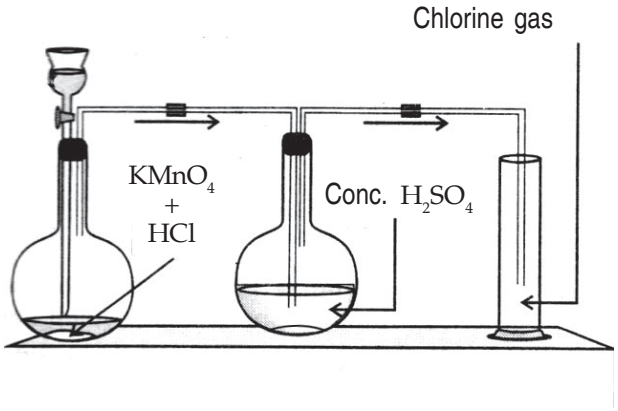
(c) Is the chemical reactivity of chlorine high or low? (1)

(d) Chlorine is found in nature only in the combined form. Why? (1)

Score (4) Time (5 minute)

Concept : Laboratory preparation of chlorine and identifying physical properties

12. The laboratory preparation of chlorine is diagrammatically represented below



(a) Which are the reactants? (1)

(b) Write the names of any two apparatus used in the arrangement. (1)

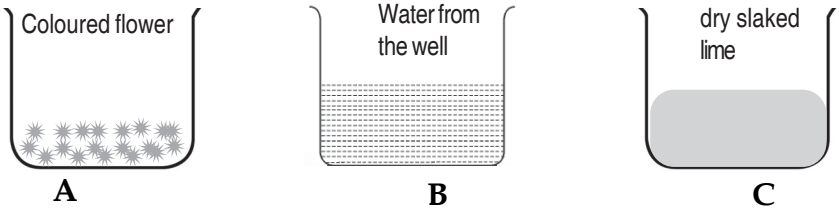
(c) Why is chlorine passed through conc. sulphuric acid? (1)

(d) Chlorine is collected keeping the gas jar in upright position. What nature of chlorine is revealed by this? (1)

Score (4) Time (5 minute)

Concept : Identifying the characteristics of chlorine

13.



(a) What happens when chlorine is passed through A? What is this reaction called? (2)

(b) What is the advantage in passing chlorine through B? (1)

(c) What is the name of the substance obtained when chlorine is passed through C? (1)

Score (4) Time (3 minute)

Concept : Identifying the merits and demerits of chlorine compounds

14. "Chlorine and its compounds are always a problem to mankind". Give two arguments each to oppose and support this statement. (2)

Score (2) Time (4 minute)

Concept: Identifying facts related to the depletion of ozone layer

O_3,	C1,	CFC,	O_2

15. The substances given in the box relate to an environmental problem faced by us. Prepare a brief note based on this problem. (2)

Score (2) Time (5 minute)

Concept : Identifying the uses of chlorine, oxygen, nitrogen and hydrogen

16. Given below are certain uses of chlorine, oxygen, nitrogen and hydrogen. Relate each to the corresponding element.

(a) Manufacture of pesticides
(b) Protein synthesis in plants
(c) Oxidiser for rocket fuels
(d) Purification of drinking water
(e) Fuel in fuel-cell
(f) Medical utility (3)

Score (3) Time (3 minute)

Concept : To understand that oxygen is essential for burning

17. A burning candle kept on a table is covered with a glass tumbler.

(a) What would be observed? (1)

(b) What is the reason for this? (1)

Score (2) Time (2 minute)

Concept : Identifying the way in which different metals react with oxygen to form oxides

18. You are supplied with an iron nail, an aluminium nail and a gold ornament.

(a) Colour of which among these gets faded with time? (1)

(b) Which gas present in the atmosphere is responsible for colour fading? (1)

(c) What are the substances formed on the surface of the faded metals? (1)

Score (3) Time (3 minutes)

Concept : Acquiring the skill to balance chemical equations

19. Balance the unbalanced chemical equations from those given below.

$H_2 + O_2 \rightarrow H_2O$

$S + O_2 \rightarrow SO_2$

$A1 + O_2 \rightarrow A1_2O_3$ (2)

Score (2) Time (5 minute)

Concept : To understand the preparation and uses of ammonia

20. When a student rubbed ammonium chloride with slaked lime, a pungent smell was produced.

(a) Which gas was responsible for this smell? (1)

(b) What is the use of this gas in agriculture? (1)

(c) How is this gas produced industrially? (1)

Score (3) Time (4 minute)

Unit - 12
The world of carbon

Concept : Various isotopes of carbon

1. Carbon – 12 , Carbon – 13 and Carbon – 14 are the various isotopes of carbon.
   (a) Which isotope is used to determine the age of fossils? (1)
   (b) Which is the isotope whose mass is used as a standard for the determination of atomic masses? (1)

Score (2) Time (2 minutes)

Concept : Various forms of carbon

2. Lamp black, wood charcoal and coal are some of the different forms of carbon
   (a) Write the names of two other forms of carbon. (1)
   (b) Write one difference between the two forms that you have written. (2)

Score (3) Time (3 minutes)

Concept : Conductivity of graphite

3. A boy is removing dirt from an electric plug using a pencil sharpened at both ends.
   (a) What danger can happen during this incident? (1)
   (b) What is the reason for this? (1)

Score (2) Time (3 minutes)

Concept : Characteristics of carbon dioxide

4. When HCl was added to a substance, brisk effervescence of a colourless gas was produced. When this gas was passed through clear lime water, it turned milky.
   (a) Which could be the substance that was taken? (1)
   (b) Which was the gas produced? (1)
   (c) Why did lime water turn milky? (2)

Score (4) Time (5 minutes)

Concept : Characteristics of carbon dioxide

5. I am a gas.

   I can extinguish a flame

   If my level increases in the atmosphere, it will lead to environmental problems. Who am I?

Score (1) Time (2 minutes)

Concept : Characteristics of carbon dioxide

6. When HCl was added to a substance taken in a test tube, brisk effervescence of a gas was produced. When this gas was brought near a flame, it was extinguished. A blue litmus paper turned red when dipped into a solution obtained by passing this gas through water.

   (a) Which was the gas produced? (1)

   (b) Give an idea regarding the substance taken in the test tube. (1)

   (c) What nature of solution obtained by passing the gas through water is revealed by litmus test? (1)

   (d) Write the chemical change that took place when this gas was passed through water? (2)

Score (5) Time (6 minutes)

Concept : Preparation of soda water

7. A sour taste was felt while drinking soda water.

   (a) How is soda water prepared? (1)

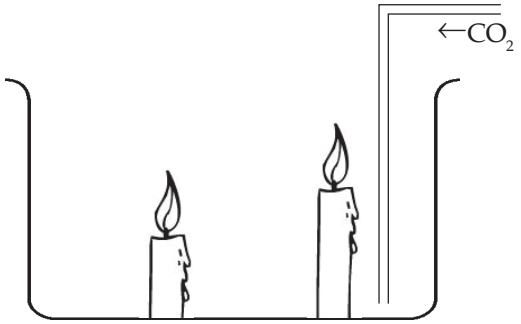
   (b) Write the chemical equation for this? (1)

   (c) What is the reason for the sour taste of soda water? (1)

Score (3) Time (4 minutes)

Concept : Density of CO_2

8.



   (a) What will happen to the candles? (1)

   (b) To which candle does this happen first? (1)

   (c) What is the reason for this? (1)

Score (3) Time (4 minutes)

Concept : Preparation of CO_2, Properties

9. Observe the picture of a portable type fire extinguisher.

   (a) Which chemicals are used in this? (1)

   (b) Write any two characteristics that are responsible for the use of CO_2 in fire extinguishing. (2)

Score (3) Time (3 minutes)

Concept : Uses of CO_2

10. CO_2 is used for the preparation of carbonated drinks. Write 3 other uses of carbon dioxide. (3)

Score (3) Time (3 minutes)

Concept : Preparation of CO, Characteristics

11. (a) CO_2 is formed when carbon burns in air. Then how is carbon monoxide (CO) formed? (1)

(b) CO is a poisonous gas. How does it react with blood? How does it lead to death? (2)

(c) Give any two uses of carbon monoxide. (1)

Score (4) Time (4 minutes)

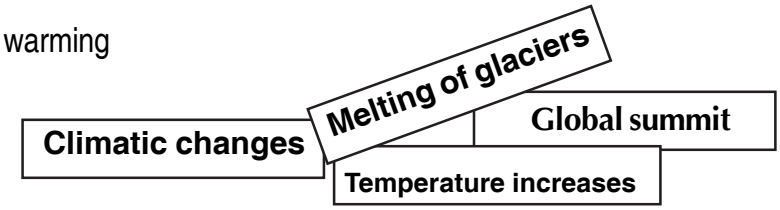
Concept : Characteristics of CO

12. It is dangerous to leave a vehicle started inside a closed garage for a long time. Why? (2)

Score (2) Time (2 minutes)

Concept : Global warming

13.



(a) An environmental problem of utmost importance is mentioned in the box above. What is this problem? (1)

(b) Which phenomenon is responsible for this? (1)

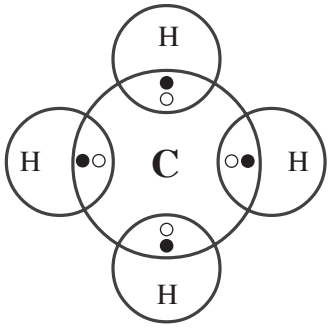
(c) Why does this happen? (1)

(d) Suggest any method to resist this problem. (1)

Score (4) Time (5 minutes)

Concept : Hydrocarbons

14.



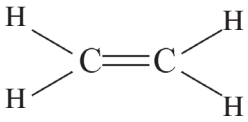
(a) The compound given above is a hudrocarbon. Why is it called a hydrocarbon (1)

(b) What is the valency of carbon? (1)

(c) What type of bonding is present in this? (1)

Score (3) Time (4 minutes)

Concept : Unsaturated hydrocarbons

15. 

(a) What is the peculiarity of the bond between the carbon atoms? (1)

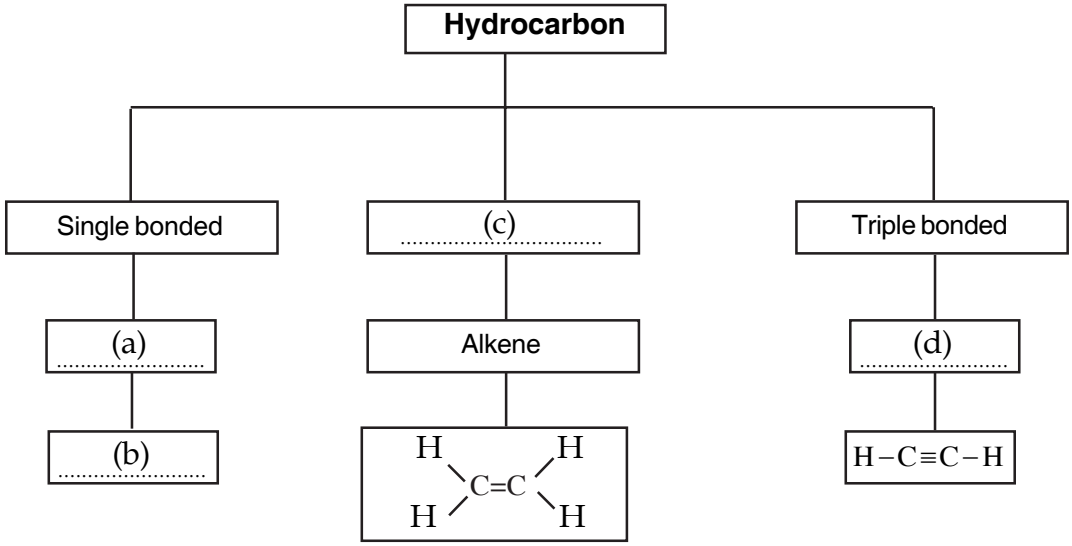
(b) What is the common name given to these hydrocarbons? (1)

(c) Draw the structure of another hydrocarbon that belongs to this family. (2)

Score (4) Time (4 minutes)

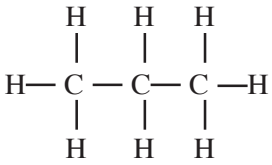
Concept : Classification of hydrocarbons

16. What are (a), (b), (c) and (d) ?



Score (2) Time (4 minutes)

Concept : Open chain compounds and ring compounds

17. 

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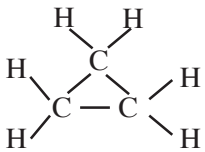


II

(a) What is the difference in the structures of these compounds? (1)

(b) Write the family to which these compounds belong based on its structure? (2)

Score (3) Time (3 minutes)

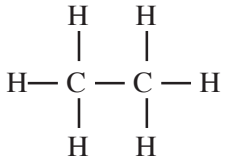
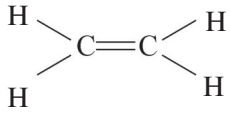
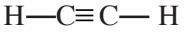
Concept : Unique nature of carbon

18. More than a crore of carbon compounds are known today. This abdundance is due to the unique nature of carbon. Give three properties which make carbon unique.

Score (3) Time (5 minutes)

Concept : Classification of hydrocarbons

19. Match the following

Structure	Name	Type of bond	Family
	Ethyne	Triple bond	Alkane
	Ethane	Double bond	Alkyne
	Ethene	Single bond	Alkene

Score (3) Time (4 minutes)

Concept : Catenation

20. C - C - C - C - C - C

The carbon atoms in a carbon compound are seen as drawn above. (Hydrogen atoms are omitted)

(a) What name is given to this unique nature? (1)

(b) Define this. (1)

Score (2) Time (3 minutes)

Unit - 13
Acids and Alkalis

Concept : Acid – Alkali : Physical Properties

1. Classify the following statements into those suitable for acids / alkalis

   (a) Turn pink when phenolphthalein is added

   (b) Turn blue litmus red

   (c) Possess sour taste

   (d) Possess soapy nature

Score (2) Time (3 minute)

Concept : Preparation and identification of carbon dioxide

2. You are supplied with egg shell, clear lime water, dilute HCl, test tubes and a match box.

   (a) Describe the procedure of the experiment in which carbonates react with dilute acids to produce carbon dioxide. (2)

   (b) Suggest a method to prove that the gas formed is carbon dioxide. (1)

Score (3) Time (4 minute)

Concept : Preparation and identification of hydrogen

3. You are supplied with zinc granules, dilute HCl, dilute H_2SO_4, test tubes and a match box.

   (a) Describe the method in which dilute HCl reacts with zinc granules to produce hydrogen. (1)

   (b) How can one identify that the gas produced is hydrogen? (1)

   (c) Hydrogen is also produced by the reaction of dilute H_2SO_4 with zinc granules. What inference can be drawn from this? (1)

Score (4) Time (5 minute)

Concept : Ionisation of acids and alkalis

4. (a) Which ions are produced when the following dissolve in water?

   HCl → ----- + ----- (1)

   NaOH → ----- + ----- (1)

   (b) Who put forward this theory? (1)

   (c) State the theory. (1)

Score (4) Time (4 minute)

Concept : Properties of alkalis

5. "Alkalis are compounds having properties different from those of acids."

Given below are certain characteristics of acids. Write the characteristics of alkalis to prove the above statement.

(b) Acids turn blue litmus red. (1)

(c) Acids dissolve in water to produce H^+ ions? (1)

Score (2) Time (3 minute)

Concept : Acid, Alkali, Salt – Identification

6.

HCl	KOH	$Ca(OH)_2$	H_2SO_4	$ZnCl_2$

Given above are the chemical formulae of certain substances

(a) Which among these are alkalis? (1)

(b) On what basis are they treated as alkalis? (1)

(c) Which among these are neither acids nor alkalis? (1)

(d) Justify your answer. (2)

Score (5) Time (5 minute)

Concept : Acid, Alkali, Neutralisation, Salt

7. When a little phenolphthalein was added to a solution A, it turned pink. When B was added in drops to it and stirred, its color disappeared. This solution now contains the substance C dissolved in it.

(a) What is the nature of A (Acid / Alkali)? (1)

(b) What is the nature of B (Acid / Alkali)? (1)

(c) What is the reaction between A and B called? (1)

(d) To which class does the product C, obtained in this reaction belong to? (1)

Score (4) Time (5 minute)

Concept : Strength of acids

8. Lemon juice and hydrochloric acid are acids.

(a) Which is the stronger acid? (1)

(b) You are supplied with marble pieces and test tubes. Plan an experiment to prove that your inference is correct. (1)

(c) What would be your observation? (2)

Score (4) Time (5 minute)

Concept : Acidity, Antacids

9. A person, showing symptoms of acidity approached a doctor. The medicine prescribed by the doctor contained aluminium hydroxide, magnesium hydroxide etc.

(a) Which chemical in the stomach is responsible for acidity? (1)

(b) Acidity was controlled upon taking the medicine. Explain the chemical reaction that took place here. (2)

(c) What is the common name of this type of medicines? (1)

Score (4) Time (5 minute)

Concept : Handling acidic substances in daily life

10. Given below are certain things that happen in a kitchen. Reveal the problem involved in each case with suitable reasons.

(a) Storing butter milk and tamarind in metal vessels. (2)

(b) Spilling of lime juice and vinegar on a marble floor (2)

Score (4) Time (4 minute)

Concept : pH of soil and its nature

11. A farmer tested the soil in his farm land when its yield came down. The following report was obtained.

- The pH of the sol is 6.1
- The decrease in the yield is due to this nature of the soil

a) What is the present nature of the soil? (1)

b) What type of substance should be used to change this character? (1)

c) Which substance is commonly used for this? (1)

Score (3) Time (4 minute)

Concept : Neutralisation

12. HCl, KCl, NaCl, KOH, NaOH

Observe the chemical formulae given above.

a) Choose an acid and alkali to perform a neutralisation reaction in the class. (1)

b) Write the salt produced as a result of this chemical reaction from those given above? (1)

c) Write the balanced chemical equation of this reaction. (1)

Score (3) Time (4 minute)

Concept : pH value and nature

13. The pH values and nature of certain substances are given below. Fill up the blanks.

Solution	P^H Value	Nature
A	7.5	(a) .....
B	(b)	Neutral
C	3.2	(c) .....
D	14	(d) .....

Score (2) Time (3 minute)

Concept : Cation, Anion and Chemical formula

14. Given below are the cations, anions and their number in certain salts. Fill up the blanks.

(a)

Salt	Cation	Number	Anion	Number
KCl (Potassium chloride)	.....	1	Cl^-	.....
Na_2SO_4 (Sodium sulphate)	Na +	.....	.....	1

(2)

(b) You have now completed the table given above. Based on the information from this table, write the chemical formula of the compound formed between potassium ion and sulphate ion. (1)

Score (3) Time (5 minute)

Concept : Plant growth and Elements

15.

$(NH_4)_3PO_4$	KCl	$NaNO_3$

Given above are certain salts used as fertilizers.

(a) Which elements needed in large quantities from the soil will be obtained by the use of these fertilizers? (Any 2) (1)

(b) There are certain elements that are needed only in small quantities. Write the name of two such elements. (1)

(c) What is the relation between the use of chemical fertilizers and irrigation? (2)

Score (4) Time (5 minute)
