Let's pave the way for learning and
Move Forward

STD – 9

Chemistry

State Council of Educational Research and Training (SCERT),
Kerala
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PREFACE

The evaluation of the answer scripts of the First Terminal Examination 2022 and the classroom experiences shared by the teachers concerned, have brought to light the fact that our children have suffered some serious learning gap due to the non-availability of proper learning experiences as a result of the unprecedented situation created by the Covid Pandemic from 2019 to 2022. An activity book has been designed to assist children internalize the concepts which they ought to have mastered in the previous classes and with the intention to facilitate further learning. Necessary explanations and activities are included in the booklet to help children bridge the gap. It is hoped that this package will facilitate the learners for self-study or for studying with the help of their teachers and I wish them success in their endeavors to move forward with confidence.

Director

SCERT, Kerala

UNIT 2

CHEMICAL BONDING

Symbols – Symbols are used for representing elements.

- The first capital letter of the English name is used as the symbol for some elements.

English Name of element	Symbol
Carbon	C
Oxygen	O
Hydrogen	H

- For some elements along with the first capital letter, the second or another prominent letter is used in the symbol as a small letter.

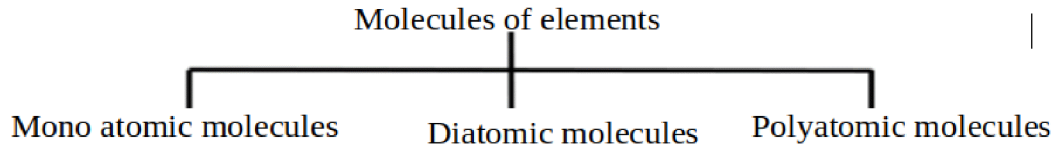
English Name of element	Symbol
Calcium	Ca
Chlorine	Cl
Chromium	Cr
Bromine	Br

- Symbols of some elements have been derived from their Latin name.

English Name of element	Latin Name of element	Symbol
Sodium	Natrium	Na
Potassium	Kalium	K
Copper	Cuprum	Cu
Iron	Ferrum	Fe

Elements:- Elements are pure substances which cannot be split into simpler components through chemical process.

Molecule of elements:- Molecules consisting of same type of atoms are called molecule of elements.



Mono atomic molecules:- Molecules with only one atom are called monoatomic molecules.
Eg :- Na, K , He

Diatomic molecules :- Molecules with two atoms each are called diatomic molecules.
Eg:- H_2 , O_2, N_2

Polyatomic molecules:- Molecules with more than two atoms are called polyatomic molecule
Eg :- S_8, O_3, P_4

Compounds:- Compounds are pure substances formed from two or more elements through chemical combination. Eg :- CO_2 , H_2O, H_2SO_4

Chemical formula:- A chemical formula is the representation of a molecule showing the actual number and type of atoms present in it.

1. Complete the table.

Element	Symbol
Phosphorous	
Boron	
Fluorine	
Magnesium	
Zinc	
Aluminium	

2. Find the relation and fill the table.

Element	Latin name	Symbol
Sodium	Natrium	
Iron	Ferrum	
Silver	Argentum	
Gold	Aurum	

3. Classify the following into Monoatomic molecule, Diatomic molecule and Polyatomic molecule.

Cu, He, I_2 , Cl_2 , Ar, Br_2 , O_3 , P_4 , S_8 , H_2

Monoatomic molecule	Diatomic molecule	Polyatomic molecule

4. Classify the following into 'Element molecule' and 'Compound molecule'.

H_2 , O_2 , SO_2 , NH_3 , H_3PO_4 , Cl_2 , Br_2 , HCl

Element molecule	Compound molecule

5. What do the following represent?.

2O	Two Oxygen atoms
H_2	
2H	
$2H_2$	
SO_2	
3HCl	

6. Determine the total number of atoms and total number of molecules in the following

(a) 3KCl (b) $2C_{12}H_{22}O_{11}$ (c) $4\ H_2SO_4$ (5) $5NH_3$

UNIT 3
REDOX REACTIONS AND RATE OF CHEMICAL REACTIONS

Chemical equations:- A chemical equation is the short scientific method of representing a chemical reaction using symbols and formulae

$$Zn + 2HCl \rightarrow ZnCl_2 + H_2$$

In the given reaction, Zinc (Zn) and Hydrochloric acid (HCl) are the reactants. Zinc chloride ($ZnCl_2$), and Hydrogen (H_2) are the products.
The substances taking part in a reaction are called the reactants. The substances formed as a result of reaction are called products.

Balanced chemical equations:-

When a chemical equation is written, the number of atoms of same kind, on the reactant side and product side should be equal. This type of chemical equations are called balanced chemical equation.

1. Identify the unbalanced chemical equation and balance them
   a) $H_2 + O_2 \rightarrow H_2O$
   b) $H_2 + Cl_2 \rightarrow 2HCl$
   c) $C + O_2 \rightarrow CO_2$
   d) $H_2O_2 \rightarrow H_2O + O_2$
   e) $N_2 + 3H_2 \rightarrow 2NH_3$
2. Analyse the chemical equation given below and answer the following questions.

$$N_2 + O_2 \rightarrow 2NO$$

   a) Which are the reactants ?
   b) Which is the product ?
   c) Which are the 'element molecules' ?

UNIT 5
ACIDS, BASES AD SALTS

♦ Acids are present in most of the food materials we use in our everyday life .

Eg:-

Food material	Acid present
Butter milk	Lactic acid
Vinegar	Acetic acid
Tamarind	Tartaric acid
Lemon	Citric acid
Apple	Malic acid

GENERAL CHARACTERISTICS OF ACIDS

- Turn blue litmus red.
- Have sour taste.
- Liberate hydrogen gas on reaction with highly reactive metals.
- React with carbonates to form carbon dioxide.

♦ In everyday life alkalies are used for various purposes.

GENERAL CHARACTERISTICS OF ALKALIES

- Turn red litmus blue.
- Have alkaline taste.
- Soapy to touch

♦ **Indicators:-** Indicators are substances that help us to distinguish between acids and alklies through colour change.

Eg :- Litmus paper (blue, red), phenolphthalein, Methyl orange.

♦ The table given below shows the colour of certain indicators in acids and alkalies

Indicator	Colour in acid	Colour in alkali
Blue litmus	red	blue
Red litmus	red	blue
Phenolphthalein	No colour	pink
Methyl orange	pale pink	pale yellow

♦ **Neutralisation:-** When definite amount of acid and alkali are mixed their acidic and alkaline natures are lost and salt and water are formed. This is called neutralisation.

Acid + Alkali → Salt + Water

♦ **P^H Value :-** P^H value is the scientific method to show the acidic / alkaline nature of substances.

P^H value 7 – Neutral solution
P^H less than 7 – Acidic nature
P^H greater than 7 – Alkaline nature

♦ It is better to determine the P^H value of soil before farming.

1. Analyse the experiments and observations given below and complete the table.

Experiment	Observation	Inference
Dip blue litmus paper in given solution	Blue litmus turns red	
Add 2 drops of methyl orange to lemon juice	Pale pink colour	
Add 2 drops of phenolphthalein to clear lime water	Pink colour	
Dip red litmus paper to given solution	Red litmus turns blue	

2. Classify the following statements corresponding to acids and alkalies and tabulate them.

- Have sour taste
- P^H value more than 7.
- React with carbonates to form carbon dioxide.
- P^H value less than 7.
- Liberate hydrogen gas on reaction with Zinc (Zn)
- P^H value is 7.
- Have alkaline taste.
- Soapy to touch.
- Turn red litmus blue.

Suitable for acids	Suitable for alkalies

3. Complete the table

Substance	Colour of litmus paper		Acid / Alkali	P^H value	
	Red litmus turn blue	Blue litmus turn red		More than 7	Less tha 7
Dil. Hydrochloric acid		✓	Acid		✓
Washing soda solution			Alkali		
Tamarind in water					
Lime water					
Vinegar					