

Chemistry



The Core concepts of Chemistry for Class VIII are as follows:

Class VIII

Matter

Atomic Structure

Language of Chemistry

Chemical Reactions

Carbon and its Compounds

Theme 1: Matter

In earlier classes, Matter was introduced and discussed as composed of atoms/molecules and that it is found in the forms of solids, liquids and gases. In this class the aim of the theme is to enable children to understand that these states are changed on the basis of inter particle state and inter particle collision. The Kinetic theory of matter will be explained to explain the change of state. They will understand that in a physical and chemical change, the total mass before and after the change remains the same which is known as the law of conservation of mass. Explanation of these theory and law would help us in understanding other behaviour of the matter.

Learning Outcomes:

Children will be able to:

- ✔ describe the main postulates of the kinetic theory of matter;
- ✔ explain the reason of change of one state of the matter to another and vice-versa on the basis of inter particle space and inter particle attraction and collision;
- ✔ define and explain the law of conservation of mass using an example.

Matter		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Main postulates of kinetic molecular theory of matter. ➤ Explanation of change of state of the matter on the basis of inter particle space and inter particle attraction and collision. ➤ Law of conservation of mass. (statement and explanation with examples). 	<ul style="list-style-type: none"> ➤ Describing and discussing the main postulates of kinetic theory of matter. ➤ Discussing inter particle space and inter particle attraction and collision. (Inter particle space and inter particle attraction varies from one matter to another. Hence the conditions of change of state of a matter are different from the other.) ➤ Stating the law of conservation of mass. Using videos to show that there is no change in total mass when a physical and chemical change takes place. (If the reaction involves combustion in presence of air, the mass of O₂/N₂ is also to be considered) Total mass of reactants including the mass of atmospheric gases if any, will be equal to the mass of the products formed. <ul style="list-style-type: none"> ☛ Taking the example of reaction of barium chloride with sodium sulphate. 	<ul style="list-style-type: none"> ➤ Pictures of collision of particles and exchange of energy. ➤ Chemicals and glass wares, barium chloride, sodium sulphate, weighing balance, test tubes, distilled water, filter paper, funnel and beaker.

Integration: Physics

Theme 2: Atomic Structure

This theme focuses on developing children's understanding about the atom as the building block of all types of matter. Therefore, in science, it becomes important to know about the atom and its structure.

In fact, everything on this earth is made up of atoms. It is the atom of an element that takes part in chemical reactions.

Learning Outcomes:

Children will be able to:

- ✔ describe that an atom consists of electrons, protons and neutrons;
- ✔ define atomic number and mass number;
- ✔ discuss valency of elements and radicals with respect to the number of hydrogen atoms combining with one atom of the element.

Atomic Structure		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none">➤ Fundamental subatomic particles present in an atom: electrons, protons, neutrons.➤ Nucleus and extra nuclear parts.➤ Atomic number and mass number.	<ul style="list-style-type: none">➤ Discussing historical perspective of discovery of electrons, protons and neutrons.➤ Identifying that a nucleus consists of protons and neutrons. Electrons are present in its extra nuclear part.➤ Describing that atomic number (Z) is the number of protons in an atom. It is also equal to the number of electrons in an atom.➤ Mass number: it is the sum of the number of protons and neutrons in an atom.	<ul style="list-style-type: none">➤ Books of science /Chemistry➤ Videos showing the structure of atom

Integration: Physics.

Theme 3: Language of Chemistry

In previous classes, discussions about the symbols of elements and the formulae of compounds help in expressing their long names as short-hand notations which forms the language of Chemistry. In this class children will develop the ability to derive the Formulae of compounds if symbols of elements/radicals forming the compound and their valencies are known. They will also be able to write chemical equations if the reactants and products and their symbols/ formulae are known to them.

Learning Outcomes:

Children will be able to:

- recall the symbols of different elements;
- derive the formulae of compounds on the basis of valencies of elements and radicals;
- write chemical equation of a reaction;
- balance chemical equations by applying the law of conservation of mass.

Language of Chemistry		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Symbols of elements. ➤ Formulae of compounds. ➤ Chemical equations (from word equations). ➤ Law of conservation of mass. ➤ Balancing simple equations ➤ Relate the law to the balancing of simple equations. ➤ Information gathered from a chemical equation. ➤ Limitations of a chemical equation: Catalyst, conditions for the reaction, state of the reactants and products, nature of the chemical reaction are not gathered from the equation. 	<ul style="list-style-type: none"> ➤ Revisiting earlier concepts. ➤ Building on children's previous learning. ➤ Conducting quiz to recapitulate the symbols of elements in the class by using valency cards. (symbols and valency of first twenty elements). ➤ Encouraging children to derive Formulae of compounds from valency and symbols/ formulae of elements/ radicals under the guidance of teacher. ➤ Writing word equations followed by writing the chemical equation. ➤ Explaining the law of conservation of mass and its importance in balancing a chemical equation. ➤ Giving practice in balancing simple equations. ➤ Specifying the state of the reactants and products as (s), (l) and (g) for solid, liquid and gas respectively by writing them after their symbols/ formulae. ➤ Using an equation to discuss with children the information provided and the limitations by/of a chemical equation. 	<ul style="list-style-type: none"> ➤ Valency cards PPT. ➤ Video depicting the important and simple chemical equations in which the state of reactants and products is also shown. ➤ Quiz.

Integration: Mathematics, Physics

Theme 4: Chemical Reactions

This theme will enable children to understand that several oxides, carbonates and hydrates on heating are converted to other compounds. Oxides of metals and non-metals have basic and acidic character respectively. They will also realize and appreciate that there are different types of reactions such as combinations, decomposition, displacement, double displacement, exothermic and endothermic reactions.

Learning Outcomes:

Children will be able to:

- describe different types of chemical reactions with examples;
- identify the type of chemical reaction;
- identify different oxides as basic, acidic, amphoteric and neutral;
- explain the effect of heat on oxides of some metals.

Chemical Reactions		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ▷ Types of reactions: <ul style="list-style-type: none"> ☛ Combination ☛ Decomposition ☛ Displacement ☛ Double displacement. ▷ Reactivity series: <ul style="list-style-type: none"> ☛ In reactivity series metals are arranged in order of their reactivity. ☛ The metal that displaces the metal ion from the solution is more reactive. ▷ Predict the reactivity of metals. 	<ul style="list-style-type: none"> ▷ Explaining that chemical reactions involve breaking of existing bonds and formation of new bonds with absorption or release of energy normally in the form of heat or light. Explaining with examples using chemical equations. ▷ Giving examples of reactions from daily life - burning of fuel. ▷ Sharing videos of burning of a magnesium ribbon. ▷ Explaining the different types of reactions with examples. <ul style="list-style-type: none"> ☛ Synthesis $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$ $\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$ $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ ☛ Decomposition Decomposition of CaCO_3, PbO. ☛ Displacement Displacement of Cu from CuSO_4 by Zn. ☛ Double displacement Both the ions are displaced - $\text{NaCl} + \text{AgNO}_3$ ▷ Asking children to arrange metals - Cu, Ag, Al, Mg, Fe in decreasing order of their reactivity by consulting the table of reactivity series. ▷ Sharing experiments (videos) for different metals with metal salt solution. 	<ul style="list-style-type: none"> ▷ Magnesium wire, match box. ▷ Limestone, tongs, test tube, burner. ▷ CuO, ZnO, Al_2O_3, litmus paper. ▷ Virtual laboratory and Videos/ PPTs. <p style="margin-top: 20px;">All activities and experiments can be shared through virtual laboratory.</p>

Chemical Reactions

Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<p>➤ Endothermic and exothermic processes/ reactions.</p> <p>➤ Neutralization reaction.</p> <p>➤ Decomposition reactions to form Oxides.</p> <p>➤ Classification of oxides:</p> <ul style="list-style-type: none"> ☛ Acidic ☛ Basic ☛ Amphoteric ☛ Neutral. <p>Metal oxides are basic; non-metal oxides are acidic in nature.</p> <p>Acidic oxides react with base and basic oxides react with acids. some oxides such as ZnO, PbO react both with acids and bases. These are amphoteric oxides.</p>	<p>➤ Sharing videos of</p> <ul style="list-style-type: none"> ☛ neutralization of an acid with a base as an exothermic reaction. ☛ dissolution of NH_4Cl in water is an endothermic process. <p>➤ Heating metal carbonates, nitrates, sulphates yield oxides and carbon dioxides.</p> <p>Oxides are also formed by heating element in presence of air.</p> <ul style="list-style-type: none"> ☛ Activity-1 Heating limestone strongly over the flame - CaO is formed ☛ Activity-2: Heating Lead carbonate strongly - PbO is formed. <p>➤ Dissolving the oxide in water and testing the acidic, basic and neutral oxide with litmus paper.</p>	

Life skills: Critical thinking, observation, interpretation, analysis

Theme 5 : Carbon and its Compounds

In this theme children will learn the importance of carbon and some of its compounds. It is a constituent of all plants and animals. In fact, a large number of compounds are made up of carbon. It is a very versatile element.

Products such as paper, wooden furniture, soaps, food items are made up of carbon as one of their elements and used extensively in daily life activities. The fuel that is used in cars and trucks is also made of carbon.

Learning Outcomes:

Children will be able to:

- explain the term allotropy;
- describe different Allotropes of Carbon;
- state the properties of Graphite and Diamond.

Carbon and its Compounds		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Allotropes of Carbon - definition and explanation. ➤ Crystalline and amorphous nature of allotropes of carbon. ➤ Uses of diamond, graphite, coke, coal, soot. ➤ Physical properties of Carbon dioxide. ➤ Chemical properties of Carbon Dioxide. ➤ Acidic nature. ➤ Reaction with lime water. ➤ Properties and uses of Carbon monoxide. ➤ Emphasis on use as reducing agent in the extraction of iron. ➤ Emphasize the harmful properties of Carbon monoxide when inhaled - -- Asphyxia. 	<ul style="list-style-type: none"> ➤ Defining allotropes and explaining it with different examples, -diamond, graphite, coal, etc. ➤ Emphasising on different physical properties but same chemical properties of allotropes. ➤ Explaining that the properties such as electric and thermal conductivity of the two allotropes are different. ➤ Emphasising that the difference in physical properties is due to their different structures. Showing the models of structures and discussing the differences. ➤ Making models using dough / other molecular models. ➤ Discussing the classification of crystalline and amorphous nature of carbon. ➤ Defining Allotropes on the basis of their Crystalline and amorphous nature. ➤ Making a list of the uses of diamond, graphite, coke, coal, soot from the literature and internet. 	<ul style="list-style-type: none"> ➤ Models of structures of Diamond and Graphite. ➤ Sample of Graphite as an electrode. PPT ➤ Videos or Virtual laboratory.

Integration: Geography, Biology