

Chemistry



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

Class VI

Introduction to Chemistry

Elements, Compounds and Mixtures

Matter

Theme 1: Introduction to Chemistry

Chemistry finds applications in day-to-day life as well as in industries. Chemicals from simple to complex, are used in medicines, cosmetics, textile industry, agriculture, cleansing agents, etc. This theme will help children understand applications of Chemistry in their lives.

Learning Outcomes:

Children will be able to:

- discuss the importance of Chemistry in daily life and its role in different industries and life processes;
- list important applications of Chemistry in day to day life;
- list some industrial applications of Chemistry;
- discuss the bio-sketches of some great scientists and their works;
- appreciate the patience, perseverance, sacrifices and ethical conduct of scientists.

Introduction to Chemistry		
Key Concepts / Concerns	Pedagogy/ transactional strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Chemistry – meaning and importance. ➤ Development of Chemistry- A historical perspective. ➤ Notable chemists/ scientists and their contributions to Chemistry (at least 3 scientists). 	<ul style="list-style-type: none"> ➤ Discussing with children and explaining the meaning and importance of Chemistry in day to day life. ➤ Asking children to make a list of products used daily– pencil, rubber, paper, ink, shampoo, deodorants, perfumes, toothpaste, cosmetics. Discussing how Chemistry plays a role. ➤ Discussing the development of Chemistry from the historical perspective with facts -when alchemists attempted to convert cheap metals to gold using philosopher stone, find a chemical that would enable people live longer etc. However, they could not succeed in their efforts to find such miraculous techniques. But they were successful to some extent in developing processes to extract metals and prepare alloys which proved of great use. Refer to the iron pillar near Qutab Minar. ➤ Asking children to share photographs of great chemists such as Mendeleev, Lavoisier, Dalton and discussing their works in class. 	<ul style="list-style-type: none"> ➤ Children’s own experiences. ➤ Products used in daily life since the morning. ➤ Virtual tour of chemical industry/video. ➤ Photographs of scientists. ➤ Videos/PPTs.

Introduction to Chemistry

Key Concepts / Concerns	Pedagogy/ transactional strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Food and Chemistry. ➤ Cosmetics and Chemistry. ➤ Clothing and Chemistry. ➤ Chemicals as Medicines. ➤ Chemicals in Industries. 	<ul style="list-style-type: none"> ➤ Providing common examples of food preservatives, food processing. Common food products like salt, sugar, tea, milk, jams etc. ➤ Discussing some common examples like the constituents of talcum powder (names only). ➤ Discussing the journey from cotton to synthetic fabric such as terylene. ➤ Giving examples of simple chemicals such as aspirin, paracetamol in medicines. ➤ Giving examples of: cleansing agents (soaps and detergents), stain removals, etc. 	

Integration: Languages, Biology, Geography

Theme 2: Elements, Compounds and Mixtures

All materials / objects found around are either in solid, liquid or gaseous form and occupy space and have mass. In science, the term matter is used for all these materials. Chemically matter can be classified as element, compound and mixture. In nature, matter occurs mostly in the form of mixture. Importantly, substances are required in their pure form that is done by the separation of the components of a mixture by different techniques. The use of any particular separation technique depends upon the properties of the components of the mixture.

Learning Outcomes:

Children will be able to:

- define elements as made up of identical atoms;
- classify elements as metals and non-metals on the basis of their properties;
- define compound and mixture and discuss the points of difference between the two;
- use symbols of elements and molecular formulae of the compounds to represent their names as short hand notations;
- observe the separation of different components of samples of some mixtures;
- discuss the reasons for opting for a particular technique for separation of components of the mixture.

Elements, Compounds and Mixtures

Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ▷ Element (a substance made up of identical atoms). ☛ Use of symbols as short hand notations of writing names of elements. ☛ Origin of symbols of elements. ☛ Names and symbols of first 20 elements. ☛ Molecules of elements contain atoms of the same element (O₂, N₂, H₂). ▷ Compound (two or more than two elements combine in fixed definite proportions to form a compound. Original properties of the constituent elements are lost 	<ul style="list-style-type: none"> ▷ Showing pictures of iron powder, sulphur powder and zinc granules. ▷ Taking examples of certain elements e.g. iron and discussing with children that it is made up of only one type of atoms i.e. iron atoms. Likewise, discussing other examples of elements also. ▷ Introducing symbols and emphasising that every element has a symbol. Showing the periodic table and drawing children's attention towards the symbols of elements. ▷ Explaining the basis on which symbols of the elements have been given, qualitative meaning of symbols which represent the name and one/two atom(s) of an element. Giving examples also. ▷ Using the molecular model kit to show the models of some atoms and molecules (O₂, N₂, H₂). ▷ Discussing that the molecules of compounds are made up of atoms of different elements in a fixed proportion. Examples of H₂O, CO₂, NO₂, CaO, ZnCl₂. 	<ul style="list-style-type: none"> ▷ Different samples of some metal and non-metals. ▷ Literature related to language of Chemistry. ▷ Periodic table of elements with names and symbols of elements. ▷ Molecular model kit If molecular kit is not available, balls and sticks models can be used. Models of some compounds using the kit. *using dough and straws or matchsticks.

Elements, Compounds and Mixtures

Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<p>and a substance with new properties is formed).</p> <ul style="list-style-type: none"> ☛ Molecules of compounds contain atoms of different elements. (H₂O, CO₂, NO₂, CaO, ZnCl₂). <p>➤ Mixture (components of more than one substance combine in any proportion, original properties of the components are retained).</p> <p>➤ Difference between mixtures and compounds (on the basis of proportion of combination of components and their properties).</p> <p>➤ Separation techniques of mixtures into their components:</p> <ul style="list-style-type: none"> ☛ Sieving ☛ Sedimentation ☛ Decantation ☛ Filtration ☛ Evaporation ☛ Magnetic Separation. 	<p>etc.</p> <p>➤ Taking examples of some mixtures such as solution of sugar, honey, milk and pointing out that the concentration of the components of the mixture can be different.</p> <p>➤ Differentiating between mixtures and compounds by taking examples to emphasise that in compounds, elements are combined in fixed proportion and properties of the compounds are quite different from those of the elements formed. Example of $C+O_2 \rightarrow CO_2$</p> <p>➤ Discussing details of the activity of the formation of FeS by heating Fe and S.</p> <p>➤ Providing opportunities to children to observe simple activities:</p> <ul style="list-style-type: none"> ☛ Filtration – (sand and water) ☛ Sedimentation (link to purification of water) ☛ Decantation (Tea brewing) ☛ Sublimation (Iodine crystals/ ammonium chloride), Naphthalene balls, Camphor. ☛ Evaporation (Salt water) ☛ Sieving (Rice powder/soil structure) ☛ Magnetic separation (Iron and sulphur) <p>➤ Discussing reasons for preferring a particular technique over another.</p>	<p>All the following experiments can be shown through virtual laboratory or videos.</p> <p>➤ Some samples of mixtures and compounds.</p> <p>➤ Iron powder, sulphur and iron sulphide to show different properties of iron sulphide. Iron gets attracted towards magnet, sulphur is yellow in colour and floats over water. But iron sulphide has altogether different properties.</p> <p>➤ Separation: filter paper, sieve, bar magnet, iodine, ammonium chloride, salt, tea leaves.</p>

Integration: Geography

Skills: Critical thinking, observation, systematic procedural development.

Theme 3: Matter

This theme focuses on enabling children to understand that matter around exists in different physical forms. i.e. solids, liquids and gases. One form can be converted into another. Matter expands on heating and on cooling, it contracts. Besides the physical changes, matter can also undergo chemical changes on heating.

Learning Outcomes:

Children will be able to:

- discuss the properties of solids, liquids and gases;
- classify the matter into solid, liquid and gas;
- discuss the inter-conversion of one state of matter into another;
- explain the effect of heat on matter showing change of state, expansion and chemical change.

Matter		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<p>States of Matter</p> <ul style="list-style-type: none"> ➤ Classification of matter into solid, liquid and gas on the basis of properties (shape, volume). Factors responsible for the existence of matter in different states. ➤ Arrangement of atoms/ molecules in solids, liquids and gases: - intermolecular space, cohesive forces). ➤ There is space between the particles of matter. 	<ul style="list-style-type: none"> ➤ Showing pictures of some solids, liquids and gases and asking children to group them on the basis of their properties. Listing the properties on the basis of which children have done classification. From children's responses, concluding that volume and shape of the samples are the basic properties for their classification. ➤ Discussing these properties with reference to solids, liquids and gases in detail. (Egg in a bottle – Egg can be kicked out by blowing air inside the bottle) ➤ Sharing videos of inter conversion of solid (ice), liquid (water) and gas (vapour): children should arrive at the conclusion that solids have definite volume and shape, liquids have definite volume but no definite shape while gases have neither definite volume nor definite shape; use of a knife to cut a solid and a liquid (Apple, Milk). ➤ Discussing and explaining reasons for the difference in properties of the three states of matter is intermolecular forces, cohesive forces and Brownian movement among particles constituting matter. ➤ Smaller particles occupy spaces between the bigger particles. 	<ul style="list-style-type: none"> ➤ Different samples of solid, liquid, gases. ➤ Solid – wood, common salt, pen, pencil. ➤ Liquid – water, milk. ➤ Gas – balloons. ➤ Home activity for students- freezing of water and sublimation of camphor.

Matter		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<p>➤ Effect of heat on matter (expansion, change of state and chemical change)</p>	<p>➤ Carrying out activities such as: -</p> <ul style="list-style-type: none"> ☛ Adding sugar to pebbles taken in a plastic container. ☛ Adding sand to glass balls. Sugar and sand go into the space between the pebbles and glass balls respectively. (Intermolecular spaces are occupied). <p>➤ Sharing videos of expansion of matter on heating, evaporation and condensation, freezing and sublimation.</p> <p>➤ Change of state- changing of ice to water to steam and reverse can be shown/ recalled.</p> <p>➤ Chemical change – Burning of candle.</p>	

Integration: Physics, Languages

Life skills: Cooperation and working together, creative thinking, decision making, conclusion drawing.