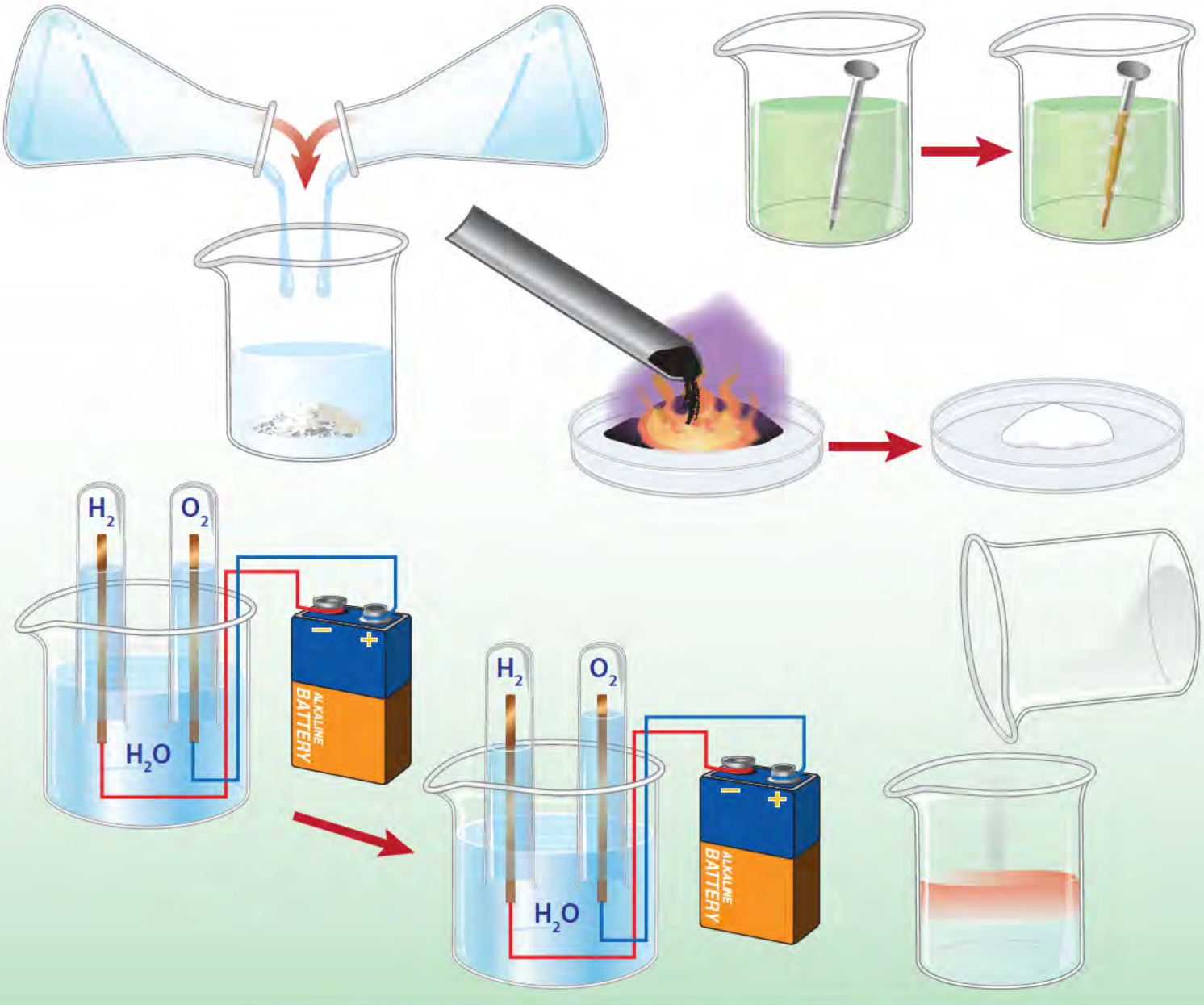
Chemical Reactions
Learning Guide



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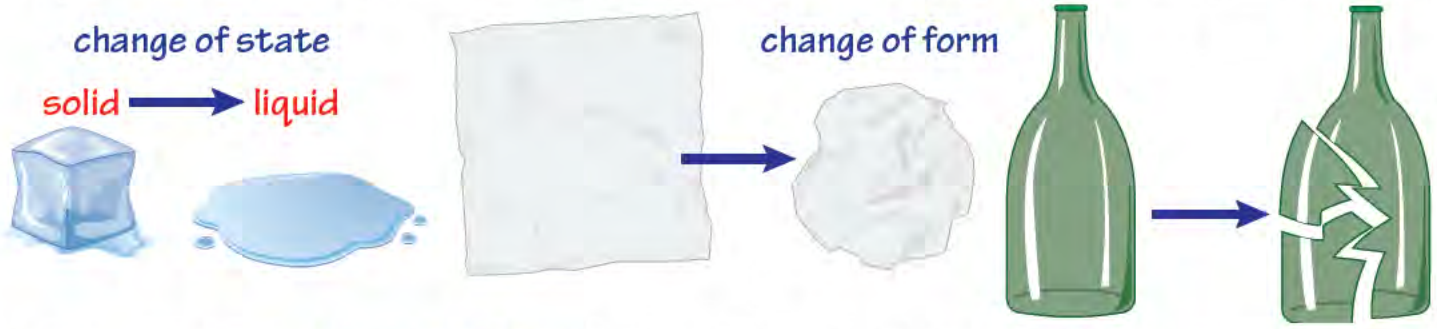
LESSON 1

CHEMICAL REACTIONS

Chemical & Physical Changes of Matter

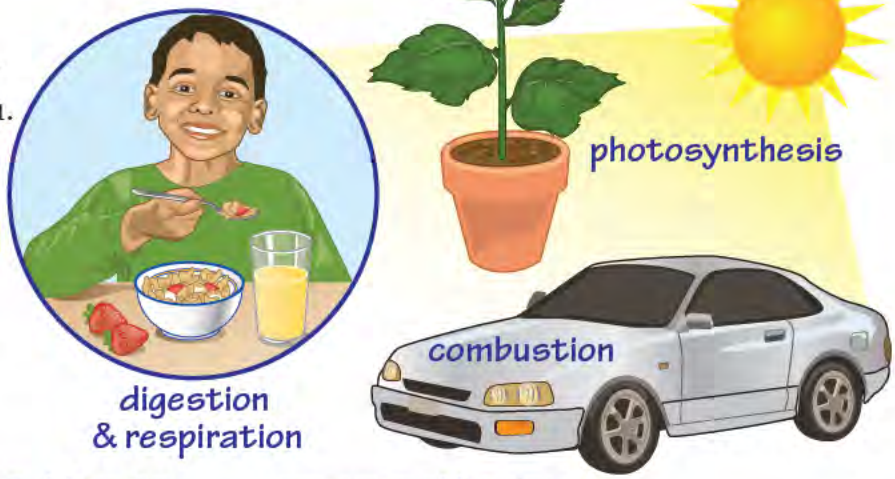
A **physical change** involves a **change of state or form** of a substance while its chemical properties remain the same. Examples of **physical changes** include **crumpling** a piece of paper, **melting** an ice cube, and **breaking** a glass bottle. Changes in **physical properties do not** produce new substances and are only concerned with **energy** and **states of matter**.



On the other hand, a **chemical change** takes place at the **molecular level** and occurs when one or more substances are changed into **new substances** with different properties. Examples of **chemical changes** include **burning** a piece of paper into ashes, **cooking** an egg, **rusting** of iron, and mixing an acid with a base to produce water and salt.

Chemical Reactions

Chemical reactions occur every day all around you, and even within you. **Chemical reactions** occur in plants during **photosynthesis** and in the engines of automobiles. A **chemical reaction** is a series of **chemical changes** in which one or more substances are **converted** to one or more different substances.



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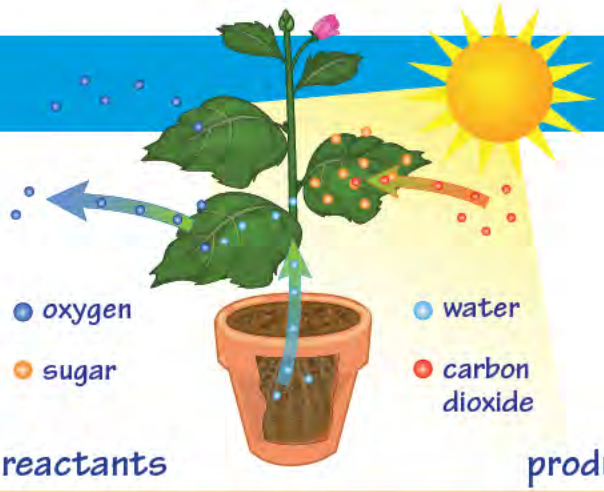
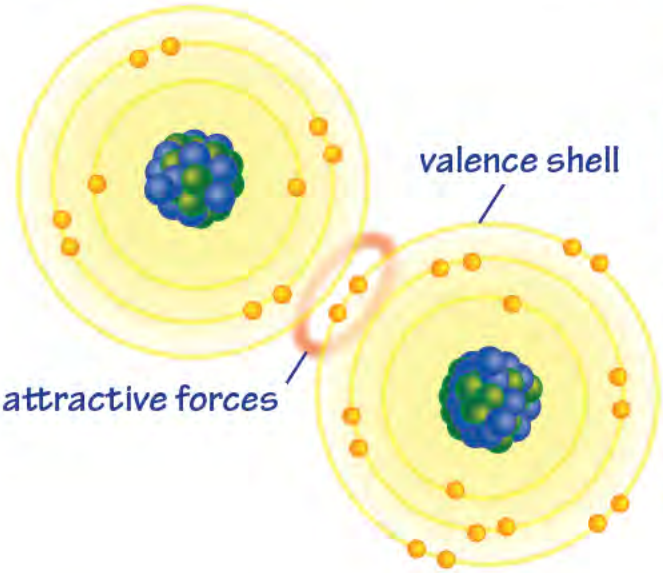
Substances are either chemical elements or compounds. An original substance that is involved in a **chemical reaction** is called a **reactant**, while the substance(s) produced is called a **product**.



reactants products

$6\,CO_2$ + $6\,H_2O$ —(light energy, chlorophyll)→ $C_6H_{12}O_6$ + $6\,O_2$

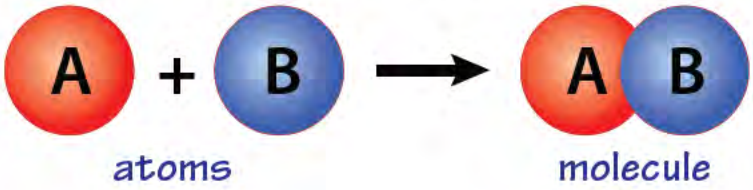
carbon dioxide · water · glucose · oxygen

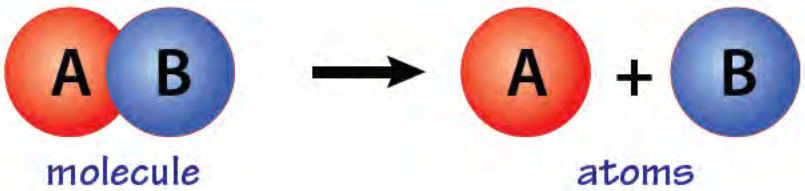


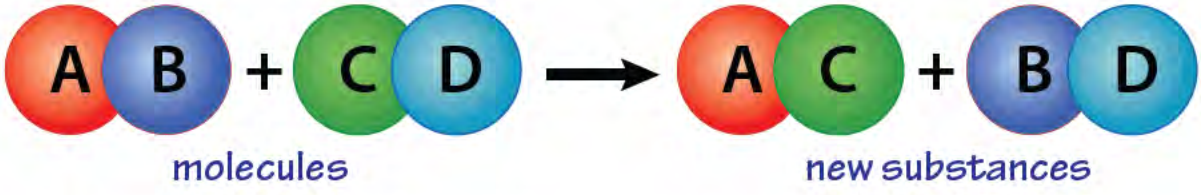
The **electron configuration** of atoms plays an important role in how elements interact with each other and form **chemical bonds**. The ease with which an atom will form **chemical bonds** determines its ability to undergo **chemical reactions**.

Evidence of Chemical Reactions

During a **chemical reaction**, atoms can **combine** to form molecules, molecules can **break apart** to form atoms, or molecules can **react** with other molecules to form **new substances**.







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