



Chemistry

Class-9

Chapter-7

Chemical reactions

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Lecture sheet with worksheet-1

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Unit-1:Physical changes

Different types of changes are going on around us. These changes occur due to heat, pressure and contact with other substances. There are two types of changes: physical changes and chemical changes.

A chemical substance is composed of one or more elements. All chemical substances have a certain percent of composition of its elements.

Sometimes, changes occur only in physical states of substances leaving their chemical composition unchanged. For example, if we place a piece of ice in open air, it will convert into liquid by absorbing heat from the surroundings and if we heat the liquid up to 100°C , water vapor will produce.



The chemical formula of ice, liquid water and water vapor is H_2O . That means in all the three phases two hydrogen atoms and one oxygen atom are present. The percent composition of H and O in all the three states of water are the same. This is a perfect example of physical change.

Physical change is a usually reversible change in the physical properties of a substance.

A physical change involves a change in physical properties. Examples of physical properties include melting, transition to a gas, change of strength, change of durability, changes to crystal form, textural change, shape, size, color, volume and density.

Often, physical changes can be undone, if energy is input.

No new chemical substances or species forms in a physical change. Changing the state of a pure substance between solid, liquid, and gas phases of matter are all physical changes since the identity of the matter does not change.

Examples of Physical Changes

- Crumpling a sheet of aluminum foil
- Melting an ice cube
- Casting silver in a mold
- Breaking a glass bottle
- Boiling or freezing water
- Evaporating alcohol
- Shredding paper
- Sublimation of dry ice into carbon dioxide vapor

Exercise-1:

1. What is meant by physical changes?
2. Sublimation of dry ice into carbon dioxide vapor is a physical change. Explain.

Unit-2:Chemical changes

Sometimes, when a substance changes due to heat, pressure and contact with other substances, new substances are produced with new chemical formula through changes in the percent composition of the existing elements in substances. This change is called chemical change. A chemical change results from a chemical reaction.

Chemical changes cannot be undone easily, The only way to reverse a chemical change is to do another chemical reaction.

The new substance can form from the elements of the previous substance by the dissociation or the addition of any element.

A new compound (product) results from a chemical change as the atoms rearrange themselves to form new chemical bonds through the breaking the existing bonds between atoms in reactants.

Examples of chemical Changes

- Burning wood
- Souring milk
- Mixing acid and base
- Digesting food
- Cooking an egg
- Heating sugar to form caramel
- Baking a cake
- Rusting of iron

Burning of wax is an example of both physical and chemical change,because it includes melting of wax(physical change) and burning that produces Carbon dioxide and water vapor(producing new products,thus chemical change)

How to tell whether it's a physical or chemical change?

- Look for an indication that a chemical change occurred. Chemical reactions release or absorb heat or other energy or may produce a gas, odor, color or sound. If you don't see any of these indications, a physical change likely occurred. Be aware a physical change may produce a dramatic change in the appearance of a substance. This doesn't mean a chemical reaction occurred.
- In some cases, it may be hard to tell whether a chemical or physical change occurred. For example, when you dissolve sugar in water, a physical change occurs. The form of the sugar changes, but it remains the same chemically (sucrose molecules). However, when

you dissolve the salt in water the salt dissociates into its ions (from NaCl into Na⁺ and Cl⁻) so a chemical change occurs. In both cases, a white solid dissolve into a clear liquid and in both cases, you can recover the starting material by removing the water, yet the processes are not the same.

Exercise-2:

1. What is meant by chemical change?
2. Burning cooking gas is a chemical change. Explain.
3. What is both a physical and chemical change?
4. How to tell whether it's a physical or chemical change?

Unit-3:Irreversible and reversible reactions

Watch the lecture video-1 on chapter-7 and read the text book properly for these topics and answer the following questions.

Exercise-3:

1. What is irreversible reaction and reversible reaction? Give examples.
2. What is meant by forward and backward reaction?
3. The reversible reactions never go to completion if performed in a closed container. Explain.
4. How can we convert a reversible reaction into irreversible reaction?
5. Explain esterification is a reversible reaction.