

PHYSICAL AND CHEMICAL CHANGE

22 APRIL 2014



Lesson Description

In this lesson we:

- Discuss differences between physical and chemical changes.
- Identify physical and chemical changes from descriptions.
- Prove the law of conservation of mass from an equation.

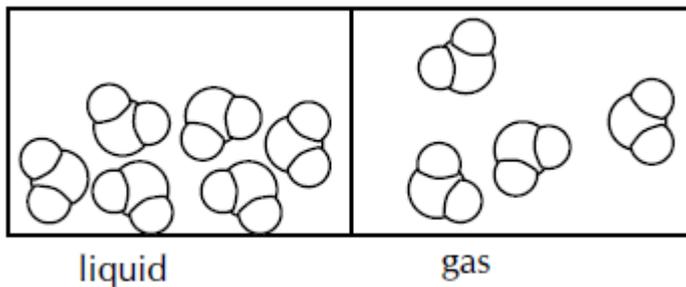


Summary

Physical Change

A physical change can be seen or felt, but that doesn't involve the break-up of the particles in the reaction. During a physical change, the form of matter may change, but not its identity.

E.g. phase changes of water H_2O



Chemical Change

When a chemical reaction takes place new substances are formed – with different properties.

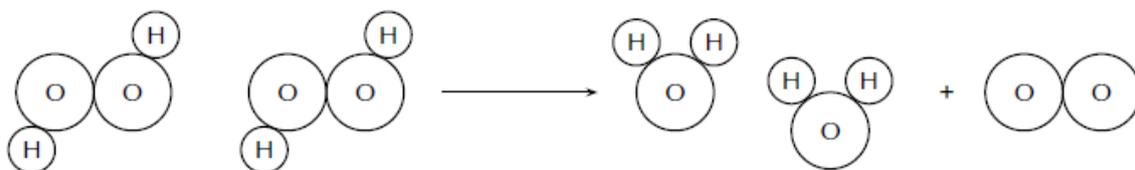
PHet simulation: Chemical reactions

- <http://phet.colorado.edu/en/simulation/reactants-products-and-leftovers>

Examples of chemical change:

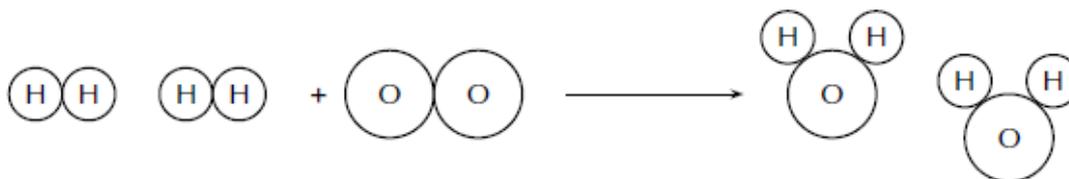
- Decomposition (breaking down) of hydrogen peroxide
- Synthesis (forming) of water.

Decomposition



Picture taken from: www.everythingscience.co.za

Synthesis



Picture taken from: www.everythingscience.co.za

	Physical Change	Chemical Change
Arrangement of particles	Compounds may spread apart or come closer together - but the bonds in between the atoms will not break.	New compounds are formed.
Conservation of mass	Total mass, the number of atoms and the number of molecules will always stay the same.	Mass is conserved during a chemical change, but the number of molecules may change.
Energy changes	Energy changes are normally small.	The energy changes are much larger. Energy needed to break bonds and then energy is released when the new product is formed
Reversibility	Physical changes in matter are usually easier to reverse than chemical changes. i.e. Filtration, Distillation, Temperature changes	More difficult to reverse than physical changes.



Test Yourself

Question 1

Identify the following as physical or chemical changes occurring:

- sugar dissolving in water to form sugar water
- fireworks exploding
- photosynthesis
- decomposition of dead leaves into compost
- separating sand and gravel

Question 2

Ammonia is formed from the synthesis of nitrogen gas and hydrogen gas.

- Identify this a physical or a chemical change.
- Provide a reason for your answer.
- Write an equation for this process if it is a chemical change.

Question 3

Wood burns on a fire causing a pot of water on the fire to boil.

Identify a physical and a chemical change in this description.

**Improve your Skills****Question 1**

A child has been playing in the kitchen and mixes table salt, pepper corns and water together.

To try and separate these substances a number of processes could be done:

- Suggest a way to separate the peppercorns from the salt water.
- Suggest a way to separate the salt from the water
- Identify each process as undergoing physical or a chemical change.

Question 2

Given the following equation: $(\text{NH}_4)_2\text{CO}_3 \rightarrow 2\text{NH}_3 + \text{CO}_2 + \text{H}_2\text{O}$

- Identify this as a physical or a chemical change.
- Identify this reaction as a synthesis or a decomposition reaction.
- Show that the law of conservation of mass applies.

**Links**

- www.everythingscience.co.za