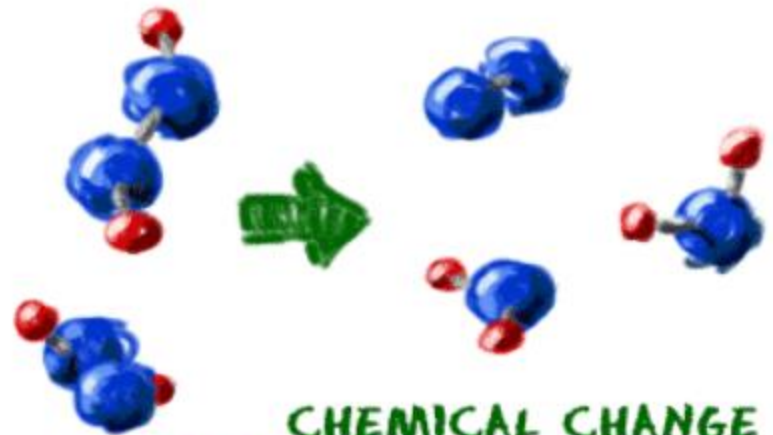


# Physical and Chemical Changes



PHYSICAL CHANGE  
OF WATER INTO ICE



CHEMICAL CHANGE  
OF HYDROGEN PEROXIDE  
INTO WATER

# I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can distinguish between a physical and chemical change.
- I can provide examples of both physical and chemical changes.

# Physical Changes

Physical changes occur whenever the appearance of the substance changes but the identity of the substance remains the same.



When matter changes states, it is just a physical change.

# Physical Changes

Cutting, tearing, painting, and breaking things are all just physical changes.



# Physical Changes

Dissolving is also just a physical change as the two substances retain their chemical composition, they are just mixed together.



# Chemical Changes

A chemical change occurs when one or more substances react to form one or more new substances.



When logs are burned, in the presence of oxygen, the carbon combines with the oxygen to form carbon dioxide,  $\text{CO}_2$ , and ash.

Burning is a chemical change.

# Chemical Reactions

In order for a chemical change to take place a chemical reaction must occur.



# Chemical Reactions

Substances that react together, during a chemical reaction, are called reactants.



## Reactants

Sulfur (match)

Potassium Chlorate (match)

Red Phosphorus (box)



# Chemical Reactions

New substances that are produced during a chemical reaction, are called products.

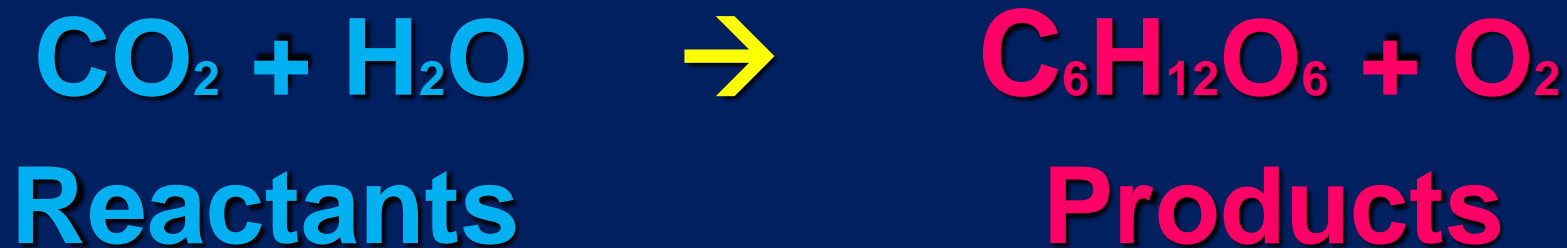


## Products

**White Phosphorus**  
**Potassium Chloride**  
**Oxygen**

# Chemical Equations

Chemical reactions are expressed as chemical equations.



Arrows indicate the direction in which the reaction takes place.

# Detecting Chemical Changes

When a substance undergoes a change in odor, it can signal a chemical change has taken place.



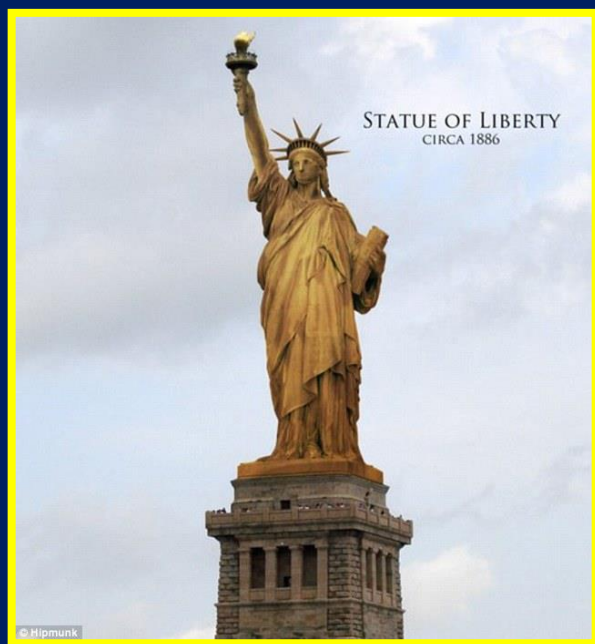
You can always tell if milk has turned sour by the distinct odor of sour milk.

You can also tell when rubber is being burned, by its distinct odor.



# Detecting Chemical Changes

Another indication that a chemical change is a change in color.



When copper is exposed to moist air, new copper compounds are produced that form a greenish patina over the copper.

# Detecting Chemical Changes

Explosions are also indicators of a chemical change.



In this case, energy is released as light or heat and a sound is produced.

# Detecting Chemical Changes

The production of a gas, often seen as bubbles, is another indication that a chemical change has taken place.



# Detecting Chemical Change

A formation of a precipitate, or a solid, when two liquids are combined, is also an indication of a chemical change.



# Chemical Change Examples

Cooking actually causes chemical changes to occur.

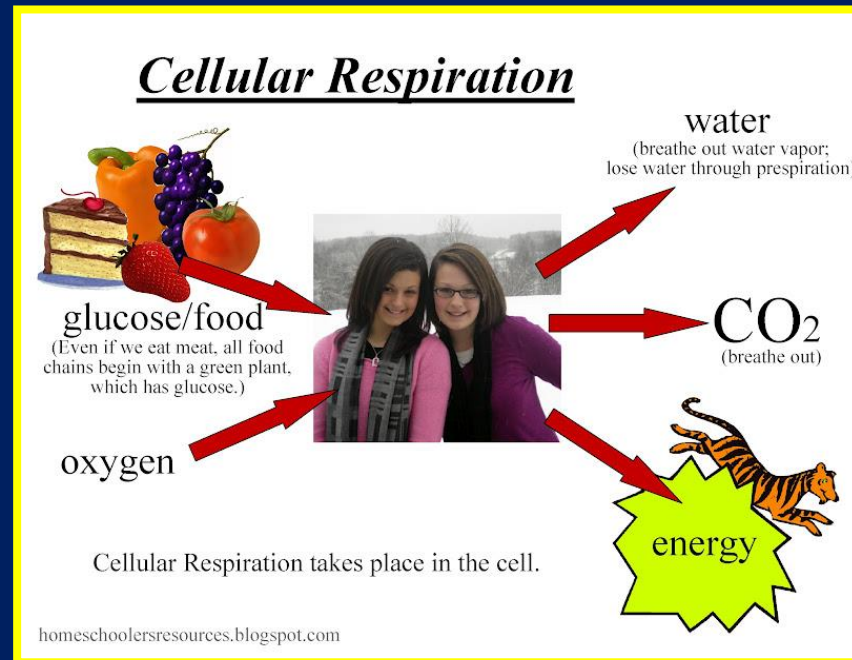


When we cook or bake, we are combining reactants together to produce a new product.



# Chemical Change Examples

Digestion and decomposition are both chemical changes whereby substances are broken down and new substances are produced.



# Chemical Change Examples

Rusting is also a chemical change. Iron, Fe, rusts when it reacts with oxygen,  $O_2$ , to produce iron oxide,  $Fe_2O_3$ .



# Chemical Change Examples

When substances react to changes in light exposure, a chemical change takes place.



Photographers use chemicals to stop the light sensitive paper from reacting to light.

# The End

