

Science 9
Unit 2: Chemical Reactions
Worksheet 15: Physical and Chemical Changes



Matter can undergo two types of changes:

1) Physical changes : change in which no new substance is produced; only a physical property is altered. It could include a change in: texture, shape, size, color, odor, volume, mass, and density

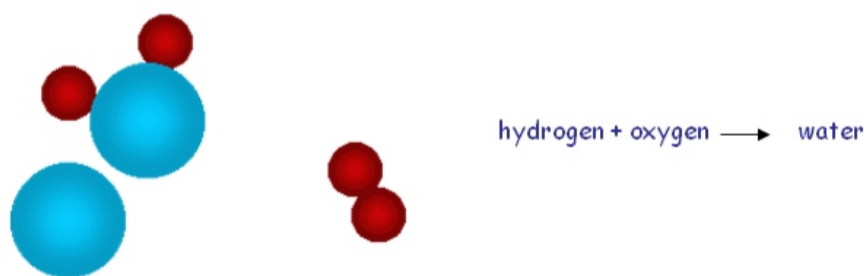
Examples of physical change:

- Liquid H₂O freezes to form ice
- Sawing wood into small pieces.
- Salt dissolving
- Breaking chalk

Evidence of Physical Change:

- changing shape (reforming a lump of clay)
- dissolving within another substance (salt in water)
- cutting
- changing states of matter
 - Solidification (freezing) [liquid => solid]
 - Vaporization (boiling)[liquid =>gas]
 - Condensation [gas => liquid]
 - Melting [solid => liquid]
 - Sublimation [solid => gas]

2) Chemical Changes a change which results in the formation of one or more new substances, with different compositions and properties from the original matter. These changes are usually irreversible



Reactant : Any substance that is used up in a chemical reaction. There may be more than one. Example: Hydrogen and oxygen

Product: the new substance that is formed in the chemical reaction Example: Water

Examples of physical change:

- Nails rusting
- Rotting apples
- cooking an egg
- burning wood
- Bread getting moldy
- Sour Milk

Evidence of a chemical change:

- Colour Change: the formation of a substance whose colour is quite different from the colour of the reactants
- Precipitate Formation: refers to the formation of solid that settles out of a solution.
- Gas Formation (Effervescent): the formation of a gas, gas bubbles etc. Effervescent
- Change in energy. the absorption or the release of heat and/or light, sound, electrical energy
- The process is difficult to reverse

Sometimes the wording can help you identify if it is a chemical or physical change.

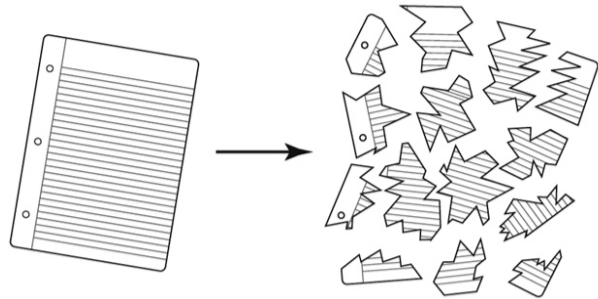
Physical Change Vocabulary	Chemical Change Vocabulary
grinding	burning
eroding	rotting
breaking	rusting
evaporating	
meting	
condensing	
drying	
freezing	

PART 1: MULTIPLE CHOICE

1. During physical changes, matter always retains its
 - (A) size.
 - (B) identity.
 - (C) state.
 - (D) texture.
2. Which of the following is an example of a physical change?
 - (A) a silver spoon tarnishing
 - (B) a cake baking in an oven
 - (C) a popsicle melting
 - (D) a car rusting
3. The melting of butter when it is left out in a warm room is an example of
 - (A) a physical change.
 - (B) a chemical change
 - (C) a physical property.
 - (D) a chemical property.

4. Jennifer tears a piece of notebook paper into smaller pieces, as shown below. Tearing paper into pieces is an example of what kind of change?

- (A) a change in mass
- (B) a physical change
- (C) a chemical change
- (D) a change in energy



5. What evidence shows that ice had a physical change when left out in a room?
- (A) it reacted with oxygen in the air
 - (B) it changes to a liquid.
 - (C) it is hard and white
 - (D) it is cold to the touch
6. John decided to cool his can of soda by placing it in the freezer. However, he forgets about it. The next day he discovers the soda can ripped open and the soda frozen all over the freezer. John decided that a physical change had taken place. What evidence supports his conclusion?
- (A) the can was ripped open
 - (B) the soda was cold
 - (C) No new substance was formed
 - (D) chemical changes must have two new substances.
7. Which process is an example of a physical change?
- (A) Water turns to steam when boiled over a Bunsen burner.
 - (B) Carbon combines with oxygen to form carbon dioxide gas.
 - (C) Water breaks down into hydrogen and oxygen gases over time.
 - (D) Limestone breaks down into lime and carbon dioxide when heated.
8. Which process is an example of a physical change?
- (A) burning
 - (B) rusting
 - (C) flattening
 - (D) decomposing
9. Chemical changes result in new substances, but physical changes do not. Which process is an example of a chemical change?
- (A) baking a cake
 - (B) chopping a tree
 - (C) heating a cup of tea
 - (D) drying clothes in the dryer
10. Which of these foods have been through a chemical change?
- (A) carrots cut up in a salad
 - (B) vinegar and oil mixed together
 - (C) juice and oid mixed together
 - (D) sugar and cream boiled together to form a sauce

11. Although the Statue of Liberty is made of copper (originally an orange-brown color), it is green because the copper has interacted with substances in the air to form new substances with different properties. This is an example of a
- (A) physical change.
 - (B) chemical change.
 - (C) physical property.
 - (D) chemical property.
12. Which observation is a sign of a chemical change?
- (A) Heat and light is given off from a fire..
 - (B) A melting block of ice leaves a large puddle.
 - (C) A cloud changes shape when blown by wind.
 - (D) A plaster statue breaks when it falls onto the floor.
13. When you add bleach to the water while you are washing your clothes, you are encouraging
- (A) conductivity.
 - (B) a chemical change.
 - (C) ductility.
 - (D) a physical change.
14. Two substances that undergo a chemical change together are _____ with one another.
- (A) ductile
 - (B) reactive
 - (C) conductive
 - (D) soluble
15. Which one of these would cause a chemical change?
- (A) tearing a piece of paper
 - (B) leaving your bike in the rain and it begins to rust
 - (C) cutting an apple
 - (D) freezing water
16. Which of the following demonstrates a physical change?
- (A) fire burning
 - (B) rotting apple
 - (C) chopping wood
 - (D) leaves changing color in the fall
17. You accidentally break your pencil in half. This is an example of
- (A) a physical change.
 - (B) a chemical change.
 - (C) density.
 - (D) volume.
18. Which of the following is a product of a chemical change?
- (A) ice
 - (B) rust
 - (C) sawdust
 - (D) salt water

19. In order to change form a liquid to a gas, water must be
- (A) heated
 - (B) cooled
 - (C) frozen
 - (D) condensed
20. When a change of colour takes place, __
- (A) It's chemical change if new substance is formed
 - (B) That is always a physical change
 - (C) That is always a chemical change
 - (D) It is both a chemical and physical change
21. One clue of a chemical change is the formation of a precipitate. A precipitate is formed when
- (A) Two liquids react and a gas is produced
 - (B) A solid dissolves in a liquid
 - (C) One liquid dissolves in another
 - (D) Two liquids react and a solid is formed
22. Which observation is a sign of a chemical change?
- (A) Food colouring added to water
 - (B) Putting a new colourful case on your cellphone
 - (C) Bubbles formed from vinegar and baking soda being mixed together
 - (D) Blowing soap bubbles

PART B: WRITTEN RESPONSE

1. (a) Name two kinds of changes that can affect matter. [3]

(b) Which kind of change involves the formation or breaking of bonds between atoms?

(c) Which kind of change involves only changes to the appearance of a substance?

2. (a) Give one specific example of a change that produces new substances with new properties. [2]

(b) Give one specific example of a change that affects a substance without producing a new substance.

3. Explain why liquid water changing into steam is a physical and not a chemical change. [2]

4. A lot of chemistry happens in the kitchen, including, sometimes, the making of chili. A simple chili involves frying onions, garlic, and ground beef together and then adding chili spices, tomatoes, and kidney beans. Keeping this in mind, decide whether each step below is primarily a chemical change, a physical change, or a mixture of both. [6]

- (a) thawing the ground beef _____
- (b) slicing onions, crushing garlic _____
- (c) your eyes watering when the onion is chopped (causes stinging) _____
- (d) frying onion slices, garlic, and ground beef in vegetable oil _____
- (e) stirring chili spices, tomatoes, and kidney beans into the fried portions _____
- (f) burning your tongue when tasting the chili _____

5. Identify each of the following as a chemical or physical change: [7]

- (a) melting _____
- (b) combustion _____
- (c) evaporation _____
- (d) freezing _____
- (e) corrosion _____
- (f) dissolving _____
- (g) fruit ripening _____

6. Describe what happens to elements and compounds during a chemical change. [3]
