

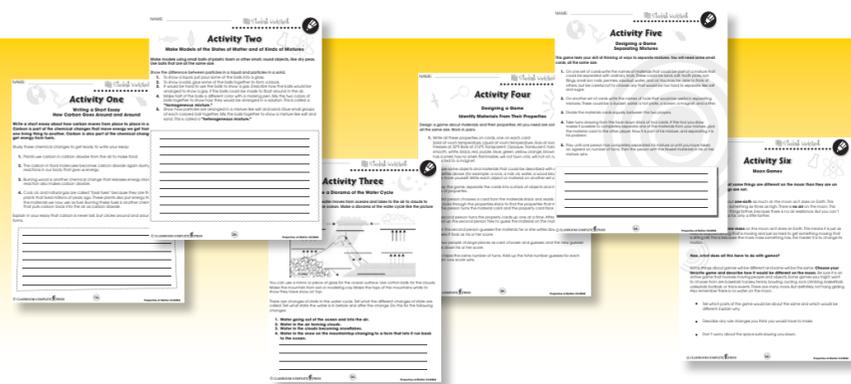


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FREE! 6 Bonus Activities!

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- Go to our website:
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- Click on item CC4504 – Properties of Matter
- Enter pass code CC4504D





Physical Changes of Matter

1. Circle **T** if the statement is TRUE or **F** if it is FALSE.

- T F** a) During a physical change a new kind of matter is formed.
- T F** b) After a material has a physical change it is made of different kinds of particles.
- T F** c) Melting is a physical change.
- T F** d) Adding heat to a material can cause a physical change.
- T F** e) When a liquid freezes, its particles get harder.

2. Circle the changes that are physical changes.

Melting butter

Breaking a pretzel

Digesting food

Boiling water

A nail rusting

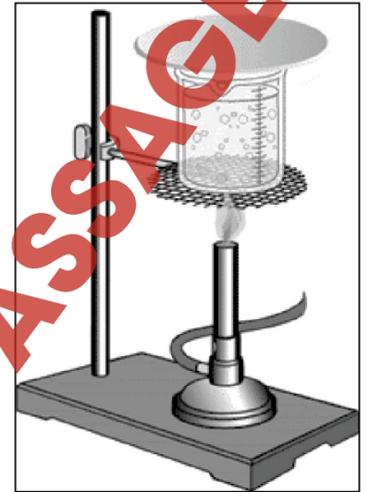
Burning a match

Clothes drying on a line



Physical Changes of Matter

Things can change in two ways: **physical changes** and **chemical changes**. A physical change makes something look different, but it is still the same material made of the same kinds of particles. A chemical change causes a whole new material to form. The new material is different because the particles are different. We will soon learn more about chemical changes. First we will look at physical changes.



We have studied how materials can change from solid to liquid to gas and back again. These are all physical changes because no new material is formed. Ice, liquid water, and steam are all made of water particles. Suppose an ice cube is melted and then the melted water is all boiled away. Now all the water is water vapor. We could condense the water vapor back to liquid water and then freeze that water. The ice we get will be just the same as the ice we started with.

Adding heat causes materials to melt and boil. Adding or removing heat can cause other physical changes, too. Remember that heat makes particles move faster. Heat also makes particles move farther apart. When particles move farther apart the material takes up more space. A material that takes up more space has a bigger volume. You can see this happen to a balloon. If you take a balloon out of the refrigerator and place it in warm sunlight, it will get larger. When volume gets larger, density gets smaller because the particles are not as close together.

Is the density of steam MORE or LESS than the density of water? Explain your answer using the word "particles".



Physical Changes of Matter

1. Put a check mark (✓) next to the answer that is most correct.

a) What happens when particles of a material move farther apart?

- A A new material is formed.
- B The particles become larger.
- C The material becomes more dense.
- D The volume of the material becomes greater.

b) A physical change can do all of these things, *except*

- A form a new material.
- B make something smaller.
- C change a liquid into a gas.
- D change the color of something.

c) What happens to particles of a material when heat is added?

- A The particles move faster.
- B The particles are destroyed.
- C The particles become softer.
- D The particles move closer together.

2. Fill in each blank with a word from the list. Four words will be left over.

gas	solid	liquid	motion	heat
volume	density	freezing	particle	spacing

Water and ice are made of the same kind of _____ a _____ s.

Particles in a _____ b _____ are much farther apart than the particles in a liquid.

When volume gets larger, _____ c _____ gets smaller.

Adding _____ d _____ to a material makes its particles move faster.

The state a material is in depends on the _____ e _____ and _____ f _____ of the particles of the material.



Physical Changes of Matter

3. How is a physical change different from a chemical change?

4. How does removing heat from a material change the motion of its particles?

Extensions & Applications

5. Physical Changes Caused By Heat

a) This experiment shows that matter does not change during a physical change.

Weigh a cup of water. Put the water in a refrigerator freezer until it is frozen. Remove the frozen water and weigh it again. Let it melt and weigh it one more time.

A. Are the particles of melted water any different than they were before the experiment?

B. Are the weights the same?

C. If the weights are different, use the words "evaporation" and "condensation" to explain the differences.

b) Find an empty plastic soda or water bottle. Put the cap on loosely and run hot water over the bottle for a few minutes. Quickly screw the cap tight and put the bottle in the refrigerator freezer.

Wait 30 minutes and look at the bottle.

A. What happened to the volume of air in the bottle?

B. What happened to the mass of air in the bottle?

C. What happened to the density of the air in the bottle?

D. How did the motion and spacing of the air particles in the bottle change?



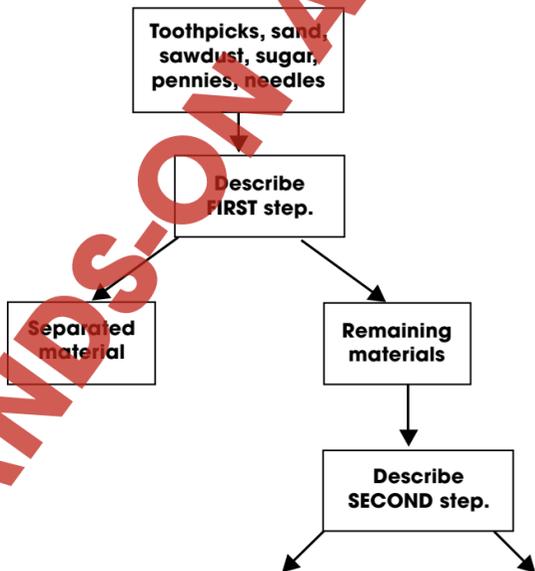
Separating a Mixture

One property we have not talked about is **MAGNETIC** property. This property can help separate some mixtures. Magnets attract and hold onto anything made of iron. Therefore, they can be used to separate things made of iron from other things. In this activity you will make a plan to separate a mixture of **SIX** things using tools from a list.

This mixture is really messy. In a bucket, all mixed together, are wooden toothpicks, sand, sawdust, sugar, copper pennies, and steel sewing needles. (Steel is mostly iron.)

These six materials can be **separated** using the bucket, water, a screen, a hot plate, a metal pot, and a magnet.

Tell how you would separate the materials. Describe each step. It is possible to separate them with just **five** steps. You may write the steps in a **list** or show them in a **flow chart**. The beginning of a flow chart is shown below.



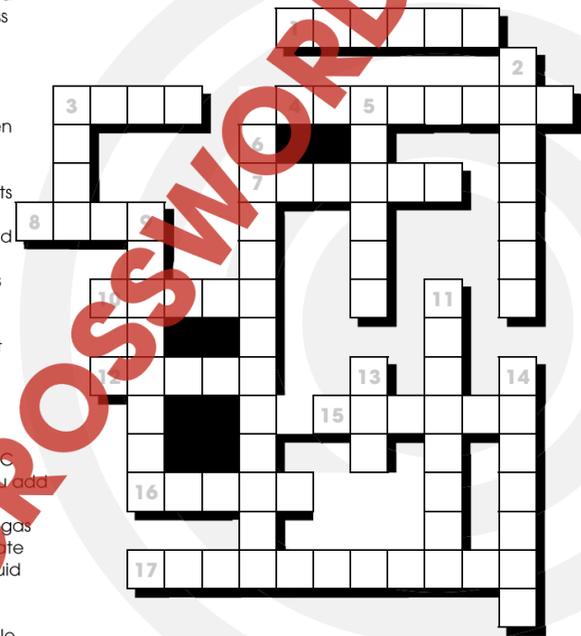
Crossword Puzzle!

Across

1. How much space something takes up
3. How much matter is in something
4. A material dissolved in a liquid
7. Something light cannot pass through
8. A particle that cannot be divided with everyday tools
10. A new material formed when something combines with oxygen
12. What iron does when it reacts with oxygen
15. Something that has mass and takes up space
16. The state of matter that has a fixed shape and a fixed volume
17. Some light passes through it and some does not

Down

2. What water is doing at 212°C
3. What a solid does when you add heat
5. A material that is not in the gas state and not in the solid state
6. The change from gas to liquid
9. Pure materials scrambled together form
11. Either an atom or a molecule
13. Oxygen is one of these
14. It keeps you from floating off into space



Word List

opaque, rusts, solid, gas, volume, condensation, translucent, gravity, solution, liquid, atom, particle, oxide, melt, mixtures, mass, boiling, matter



Comprehension Quiz

Part A

Circle **T** if the statement is **TRUE** or **F** if it is **FALSE**.

- T F 1) Mass is a property of matter
- T F 2) Atoms and particles are two kinds of molecules.
- T F 3) When water boils, it changes into a new material.
- T F 4) You would have less weight on the moon than you do on Earth.
- T F 5) Smashing a pumpkin is a chemical change.
- T F 6) When salt dissolves in water, it forms a mixture.
- T F 7) Chemical changes cause atoms to fasten together a different way.

Part B

Put a check mark next to the answer that is most correct.

- 1) When water changes from a gas to a liquid it is called
 - A boiling
 - B condensation
 - C evaporation
 - D freezing
- 2) Which is a property of glass?
 - A It is soluble
 - B it is opaque
 - C it is flammable
 - D it is transparent
- 3) Which tool could be used to separate sugar from water?
 - A a screen
 - B a refrigerator
 - C a kitchen stove
 - D a bucket of water

Mass and Weight On the Earth and the Moon





Physical Properties of Matter

3. What does the word **opaque** mean?

4. Explain what the density of an object tells us about the particles the object is made of.

Extensions & Applications

5. Measure or describe as many **PROPERTIES** as you can for an egg and for a glass of water.

Part A

For the egg, describe the properties color, texture, hardness, and shape. Also tell whether the egg is transparent, translucent or opaque. Tell whether the water is transparent, translucent or opaque.

Part B

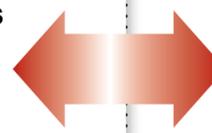
For the next part, you will need a thermometer, a measuring cup, a kitchen stove or hot plate, and a scale or balance. If you cannot get these tools, describe how you would use them.

Measure the **temperature** of the water. Measure the **boiling point** of the water or tell how you would measure it.

Use the measuring cup to measure the volume of the water. Use the measuring cup *and* the water to measure the volume of the egg.

Use the balance to measure the mass of the egg. How would you measure the mass of the water?

What is the density of the water? What is the density of the egg?



5.

Answers will vary

22

3.

Light does not pass through it.

4.

Density tells how closely the particles are packed together.

1.

a) **F**

b) **F**

c) **T**

d) **T**

e) **F**

2.

Melting butter

Breaking a pretzel

Boiling water

Clothes drying on a line

23

The density of steam is less because the particles are farther apart.

24

1.

a) **D**

b) **A**

c) **A**

2.

a) Particle

b) gas

c) density

d) heat

e) motion/spacing

f) spacing/motion

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3.

Accept one of: A new material is formed during a chemical change but not during a physical change. (OR) Atoms are connected in different ways after a chemical change but not after a physical change.

4.

Removing heat slows the particles down.

5.

A. No

B. Answers will vary

C. Water may have condensed on the cup, increasing the weight; or water may have evaporated, decreasing the weight.

A. It became smaller/decreased

B. It stayed the same

C. It increased

D. The particles slowed down and moved closer together

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EASY MARKING ANSWER KEY