Name KEY

Identify the following as a chemical (C) or physical property (P):

P 1. blue color
P 2. density
C 3. flammability (burns)
P 4. solubility (dissolves)
C 5. reacts with acid
C 6. supports combustion
P 7. sour taste
P 8. melting point
C 9. reacts with water
P 10. hardness
P 11. boiling point
P 12. luster
P 13. odor
C 14. reacts with air

Identify the following as physical *(P)* or chemical *(C)* changes.

P 1. NaCl (Table Salt) dissolves in water.
C 2. Ag (Silver) tarnishes.
P 3. An apple is cut.
P 4. Heat changes H_2O to steam.
C 5. Baking soda reacts to vinger.
C 6. Fe (Iron) rusts.
P 7. Alcohol evaporates .
P 8. Ice melts.
C 9. Milk sours.
P 10. Sugar dissolves in water.
C 11. Wood rots.
C 12. Pancakes cook.
C 13. Grass grows.
P 14. A tire is inflated.
C 15. Food is digested.
P 16. Paper towel absorbs water.

Physical and Chemical Changes

Can you recognize the chemical and physical changes that happen all around us? If you change the way something looks, but haven't made a new substance, a **physical change** (P) has occurred. If the substance has been changes into another substance, a **chemical change** (C) has occurred.

1.	P	An ice cube is placed in the sun. Later there is a puddle of water. Later still the puddle is gone.
2.	C	Two chemical are mixed together and a gas is produce.
3.	C	A bicycle changes color as it rusts.
4.	P	A solid is crushed to a powder.
5.	C	Two substances are mixed and light is produced.
6.	C	A piece of ice melts and reacts with sodium.
7.	P	Mixing salt and pepper.
8.	P	Chocolate syrup is dissolved in milk.
9.	C	A marshmallow is toasted over a campfire.

Read each scenario. Decide whether a physical or chemical change has occurred and give evidence for your decision. The first one has been done for you to use as an example.

	Scenario	Physical or Chemical Change?	Evidence....
1.	Umm! A student removes a loaf of bread hot from the oven. The student cuts a slice off the loaf and spreads butter on it.	Physical	No change in substances. No unexpected color change, temperature change or gas given off.
2.	Your friend decides to toast a piece of bread, but leaves it in the toaster too long. The bread is black and the kitchen if full of smoke.	chemical	toast is burned + is smoking
3.	You forgot to dry the bread knife when you washed it and reddish brown spots appeared on it.	chemical	knife is rusting
4.	You blow dry your wet hair.	physical	heat from blow dryer changes liquid H_2O to gas
5.	In baking biscuits and other quick breads, the baking powder reacts to release carbon dioxide bubbles. The carbon dioxide bubbles cause the dough to rise.	chemical	baking powder reacts to produce CO_2 gas
6.	You take out your best silver spoons and notice that they are very dull and have some black spots.	chemical	silver is tarnished
7.	A straight piece of wire is coiled to form a spring.	physical	wire changes shape no change in chemical composition
8.	Food color is dropped into water to give it color.	physical	- food color dissolves - no change in chemical composition
9.	Chewing food to break it down into smaller particles represents a ~~chemical~~ physical change, but the changing of starch into sugars by enzymes in the digestive system represents a chemical change.	physical	- food changes shape - physical - food broken down - chemical
10.	In a fireworks show, the fireworks explode giving off heat and light.	chemical	heat + light produced

Part C: True (T) or False (F)

1.	F	Changing the size and shapes of pieces of wood would be a chemical change.
2.	F	In a physical change, the makeup of matter is changed.
3.	T	Evaporation occurs when liquid water changes into a gas.
4.	T	Evaporation is a physical change.
5.	F	Burning wood is a physical change.
6.	F	Combining hydrogen and oxygen to make water is a physical change.
7.	T	Breaking up concrete is a physical change.
8.	F	Sand being washed out to sea from the beach is a chemical change.
9.	F	When ice cream melts, a chemical change occurs.
10.	F	Acid rain damaging a marble statue is a physical change.

Name_____

Density Practice Problem Worksheet

Make sure you show the formula, your work + the correct unit of measurement for the answer.

1) A block of aluminum occupies a volume of 15.0 mL and weighs 40.5 g. What is its density?

$$D = \frac{M}{V} = \frac{40.5\text{ g}}{15.0\text{ mL}} = 2.7\text{ g/mL}$$

2) Mercury metal is poured into a graduated cylinder that holds exactly 22.5 mL. The mercury used to fill the cylinder weighs 306.0 g. From this information, calculate the density of mercury.

$$D = \frac{M}{V} = \frac{306.0\text{ g}}{22.5\text{ mL}} = 13.6\text{ g/mL}$$

3) What is the weight of the ethyl alcohol that exactly fills a 200.0 mL container? The density of ethyl alcohol is 0.789 g/mL.

$$M = DV$$
$$= 0.789\text{ g/mL} \times 200.0\text{ mL}$$
$$= 157.8\text{ g}$$

4) A rectangular block of copper metal weighs 1896 g. The dimensions of the block are 8.4 cm by 5.5 cm by 4.6 cm. From this data, what is the density of copper?

$$V = 8.4\text{ cm} \times 5.5\text{ cm} \times 4.6\text{ cm} = 212.52\text{ cm}^3$$

$$D = \frac{M}{V} = \frac{1896\text{ g}}{212.52\text{ cm}^3} = 8.92\text{ g/cm}^3$$

5) A flask that weighs 345.8 g is filled with 225 mL of carbon tetrachloride. The weight of the flask and carbon tetrachloride is found to be 703.55 g. From this information, calculate the density of carbon tetrachloride.

$m = 703.55\text{g} - 345.8\text{g} = 357.75\text{g}$

$D = \frac{M}{V} = \frac{357.75\text{g}}{225\text{mL}} = 1.59\ \text{g/mL}$

6) Calculate the density of sulfuric acid if 35.4 mL of the acid weighs 65.14 g.

$D = \frac{m}{V} = \frac{65.14\text{g}}{35.4\text{mL}} = 1.84\ \text{g/mL}$

7) Find the mass of 250.0 mL of benzene. The density of benzene is 0.8765 g/mL.

$M = DV$

$= 0.8765\ \text{g/mL} \times 250.0\ \text{mL}$

$= 219.13\text{g}$

8) A block of lead has dimensions of 4.50 cm by 5.20 cm by 6.00 cm. The block weighs 1587 g. From this information, calculate the density of lead.

$V = 4.50\text{cm} \times 5.20\text{cm} \times 6.00\text{cm} = 140.4\ \text{cm}^3$

$D = \frac{M}{V} = \frac{1587\text{g}}{140.4\text{cm}^3} = 11.30\ \text{g/cm}^3$

9) 28.5 g of iron shot is added to a graduated cylinder containing 45.50 mL of water. The water level rises to the 49.10 mL mark, from this information, calculate the density of iron.

$D = \frac{m}{V}$ $m = 28.5$

$V = 49.1 - 45.5$

$= 3.6$

$D = \frac{28.5}{3.6} = 7.916\ \text{g/cm}^3$

10) What volume of silver metal will weigh exactly 2500.0 g. The density of silver is 10.5 g/cm3.

$V = \frac{M}{D} = \frac{2500.0\text{g}}{10.5\ \text{g/cm}^3} = 238\ \text{cm}^3$