Name: _____

Period: _____

Physical vs. Chemical Changes and "The Code"

Chemical Reactions

Chemical Reactions – when chemical combine together (or just react to each other) and make new chemicals. When chemical changes occur, chemical reactions take place. Chemicals are changes and rearranged when chemical bonds are broken and new ones are formed.

Physical vs. Chemical Changes

Physical change – a substance changes appearance, but it is still that substance.

When ice melts it changes appearance, but it is still water.

Types of physical changes: *melting; boiling; breaking; cutting; ripping; dissolving.*

Chemical change – a substance actually changes to something else.

When hydrogen burns in oxygen it produces water.

$$2H_2 + O_2 \rightarrow 2H_2O$$

Question: afterward is it still the same substance?

- Yes — Physical Change
- No — Chemical Change

Evidence (Data) that a chemical change took place:

Bubbles – evidence that a new gas is formed (but soda pop fizzling is a physical change, though. Why?).

Turns cloudy – evidence that a new solid is forming.

Temperature changes – evidence that chemical bonds are breaking or forming.

Color changes – evidence that a new substance is forming.

Change in smell or taste– evidence a new substance formed. (SEE WARNING!)

VERY IMPORTANT!

Your tongue and nose are VERY sensitive and accurate chemical detectors, **BUT BE VERY CAREFUL:** some chemicals can be harmful or even fatal.

Learning to recognize chemical changes is the most important thing you can learn in chemistry—it could save your life! People die every year from mixing ammonia and chlorine bleach (common cleaners) which cause a chemical change and make chlorine gas—a poison. If you notice a chemical change occurring, be safe, get out! You may have made something dangerous.

	Physical or chemical change?	Evidence to support your conclusion
Salt dissolved in water	_____	_____
Wood burning	_____	_____
Sugar dissolved in water	_____	_____
Water boiling	_____	_____
Baking soda and vinegar	_____	_____

Name: _____

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Digestion—Physical or Chemical Change?

Digestion is a multi-step process involving : the teeth; the tongue and mouth; the stomach; the small and large intestines.

		Physical or chemical change?	Evidence to support your conclusion
Chewing	using the teeth to break food into smaller pieces	_____	_____
Saliva	pre-digestion through enzymes in saliva; also for softening for swallowing.	_____	_____
Stomach	acids in the stomach do most of the breaking down of food, which produces ***heat*** and nutrients for the body. The heat produced is part of how we keep warm.	_____	_____
Intestines	additional chemicals continue to break down food into useable nutrients.	_____	_____
Digestion	the entire process of chewing and digestion through the body.	_____	_____

Reading the Chemical Reaction "Code"

Reactants are on the left: – the chemicals that are "reacting".

Products are on the right side—the chemicals that are "produced".

Reactants **Products**

$$2H_2 + O_2 \rightarrow 2H_2O$$

A *coefficient* shows the number of molecules $2H_2$ means 2 hydrogen molecules for a total of 4 hydrogen atoms.

A *subscript* shows how many atoms (or ions) in a formula: in H_2O, the "2" says 2 atoms of hydrogen; in $Be(NO_3)_2$ the "2" means that there are 2 nitrate ions and a total of 1 Be, 2 N, and 6 O total.

The *arrow* says "produces" or "yields" (or "turn into"). It always points from reactants to products.

$Li_2O + MgCl_2 \rightarrow 2LiCl + MgO$	$2K_3N + 3CaCrO_4 \rightarrow Ca_3N_2 + 3K_2CrO_4$
Name the second reactant: _____	Give the *formula* for the second reactant: _____
Name the first product: _____	How many potassium atoms on the reactant side: _____
How many Lithiums on the product side? _____	How many oxygen atoms on the product side? _____
$2AlCl_3 + 3Na_2CO_3 \rightarrow Al_2(CO_3)_3 + 6NaCl$	$Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$
Name the first reactant: _____	*Name* the first reactant: _____
How many sodium atoms on the reactant side? _____	How many total atoms on the reactant side: _____
How many Oxygen atoms on the product side? _____	How many total atoms on the product side: _____