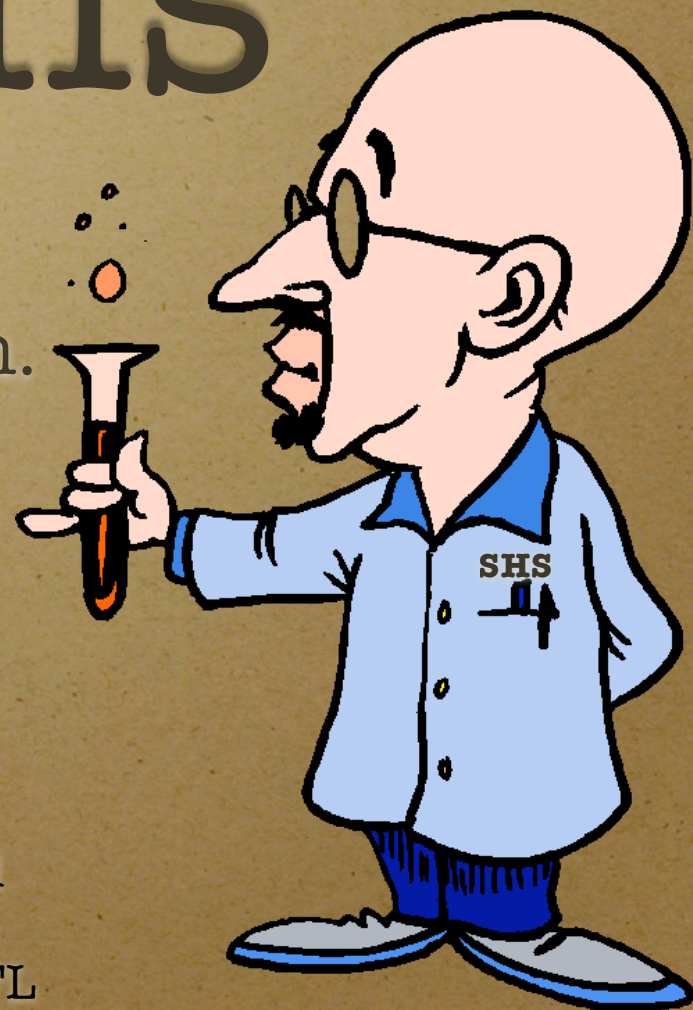


Chemical Equations

A Chemist's Shorthand way
of writing a Chemical Reaction.



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Honors Physical Science
Sarasota High, Sarasota, FL

Chemical Reaction

A process in which substances undergo physical and chemical changes that result in the formation of new substances with different physical and chemical properties.



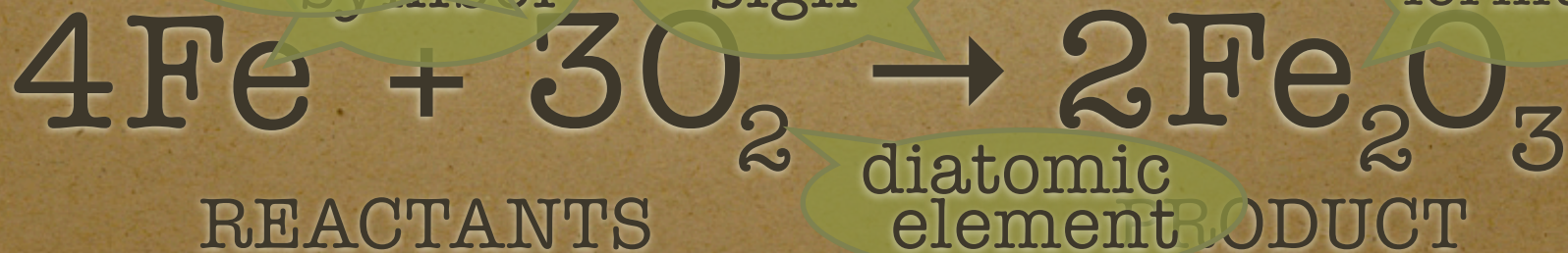
Fire is energy released in an exothermic reaction between substances in wood and oxygen in the air.

Chemical Equation



A chemical equation is a shorthand way of writing a chemical reaction using chemical symbols, formulas and coefficients.

Rusting is a chemical reaction in which iron and oxygen combine to yield iron(III) oxide



The Law of Conservation of Mass

Matter cannot be created
or destroyed
in a chemical reaction.

Atoms are simply rearranged
to form new substances.

Atoms and ions on
the reactant side = Atoms and ions on
the product side

Coefficients

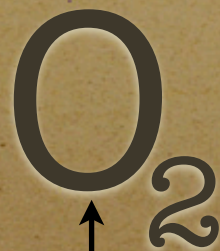
Coefficients are whole numbers placed in front of reactants and products. They are used to balance an equation to show matter is conserved.

Hydrogen + Oxygen Yields Water

4 hydrogen atoms



+



2 oxygen atoms



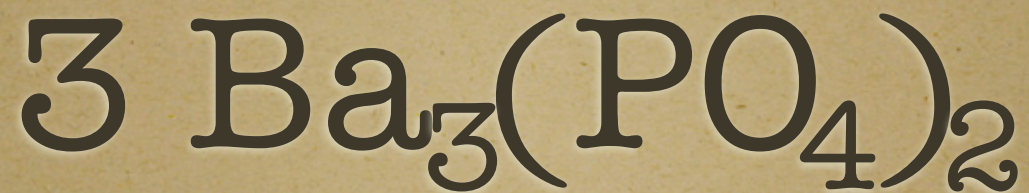
4 hydrogen atoms



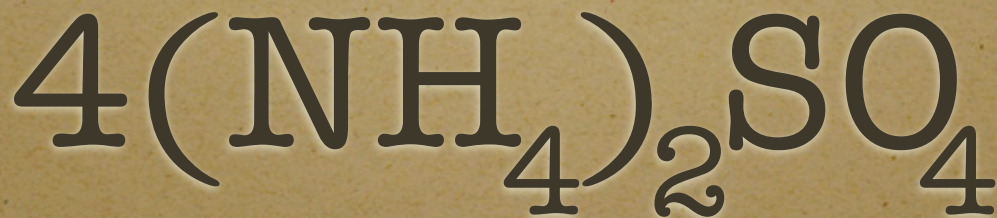
2 oxygen atoms

Counting Atoms

How many atoms/ions are present?



$$\text{Ba} = 9 \quad \text{P} = 6 \quad \text{O} = 24$$



$$\text{N} = 8 \quad \text{H} = 32 \quad \text{S} = 4 \quad \text{O} = 16$$

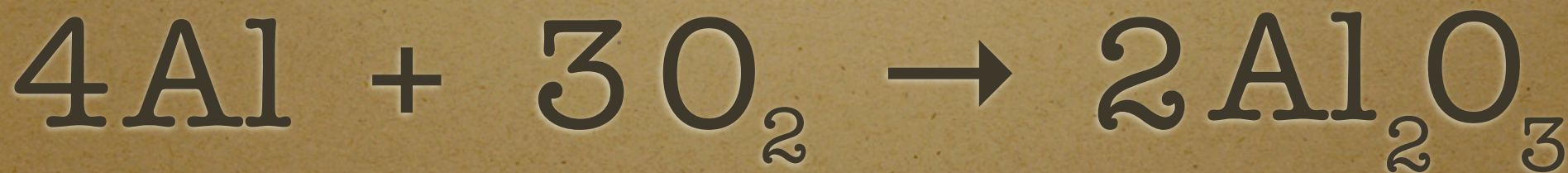
Steps in Writing an Equation

1. Write the chemical symbols and or formulas for the reactants and products.

2. Check for diatomic elements.

3. Balance the equation using coefficients.
Make sure atoms are equal on both sides.

aluminum + oxygen yields aluminum oxide



4 atoms of aluminum + 3 diatomic molecules of oxygen
yields 2 unit cells of aluminum oxide.

#1 reason why students get an equation wrong: diatomic elements

H

N

O

F

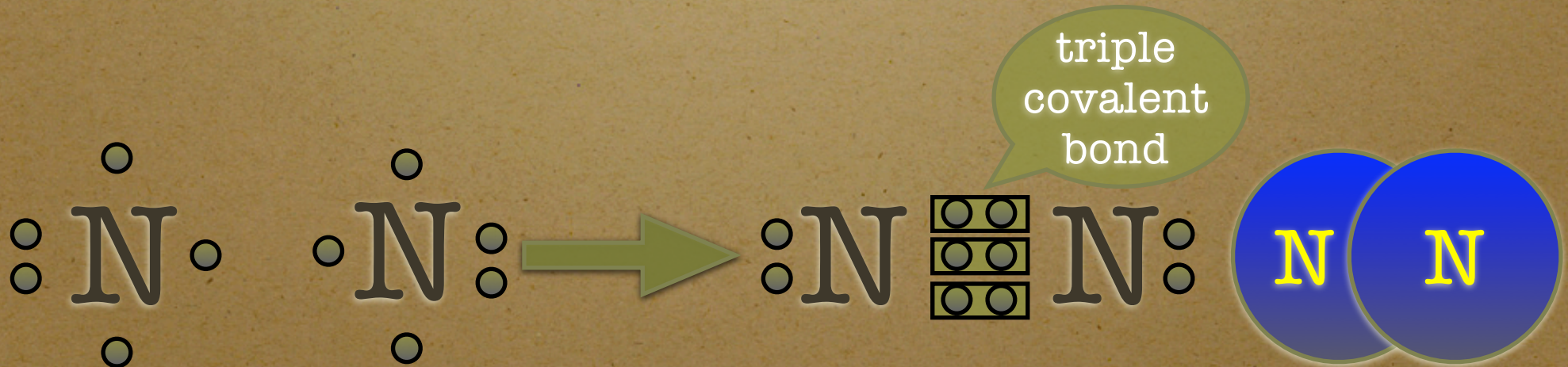
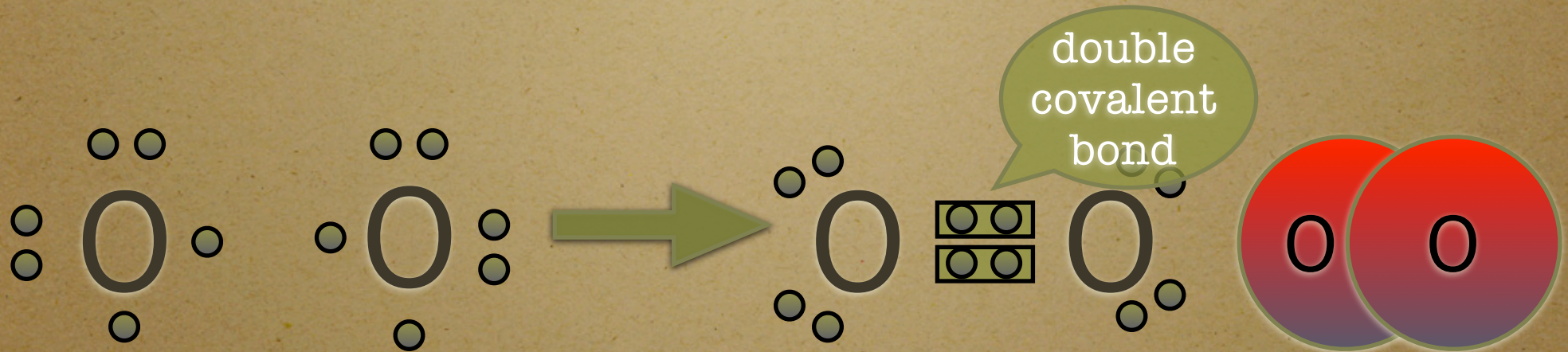
Cl

Br

I

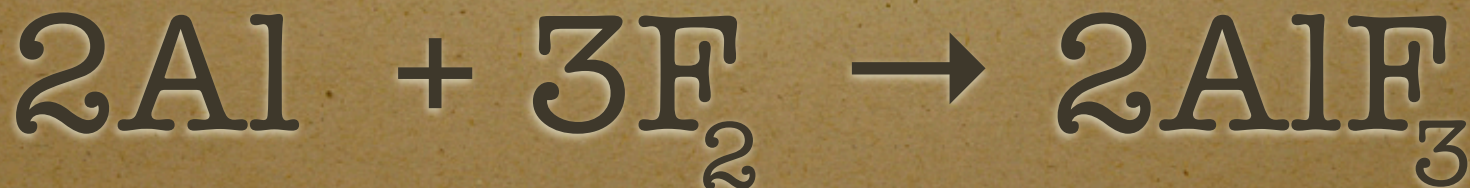
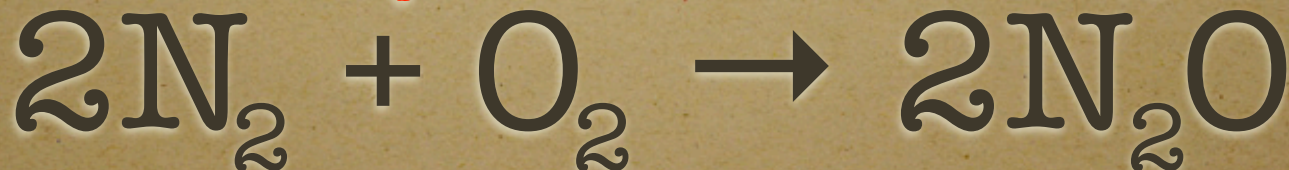
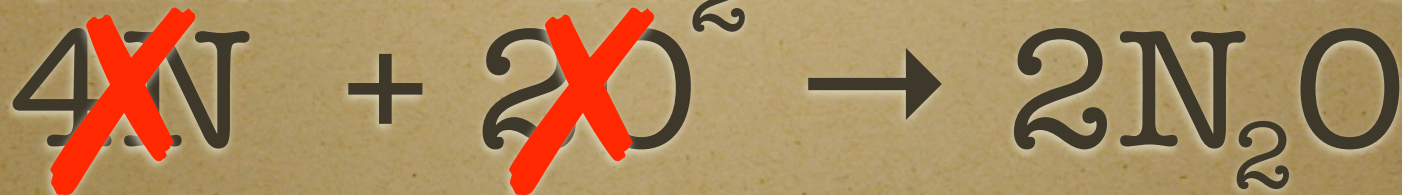
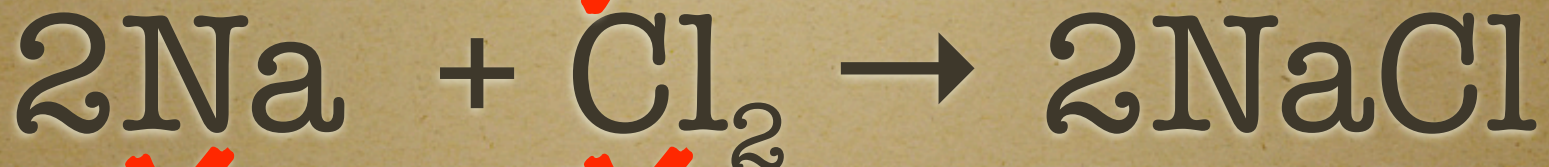
When found as elements (not in compounds), always use a subscript 2 to show these that these elements are always found in pairs.

Diatomc molecules



Diatomic Elements in Equations.

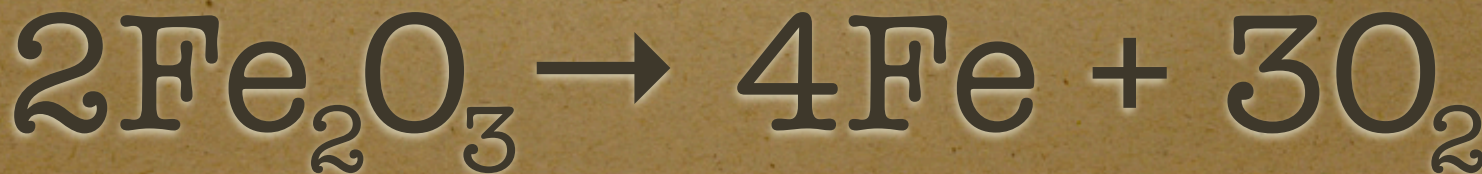
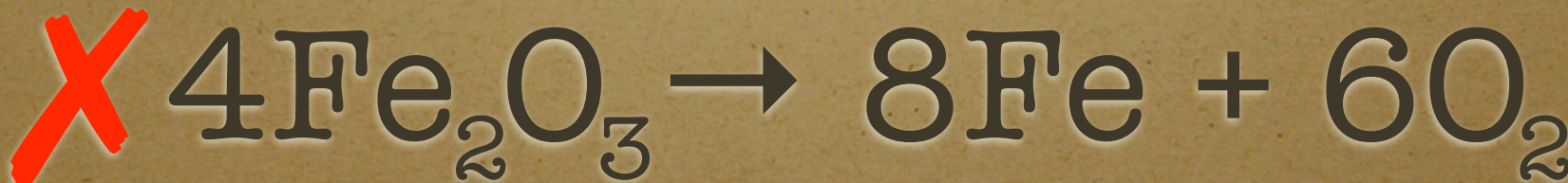
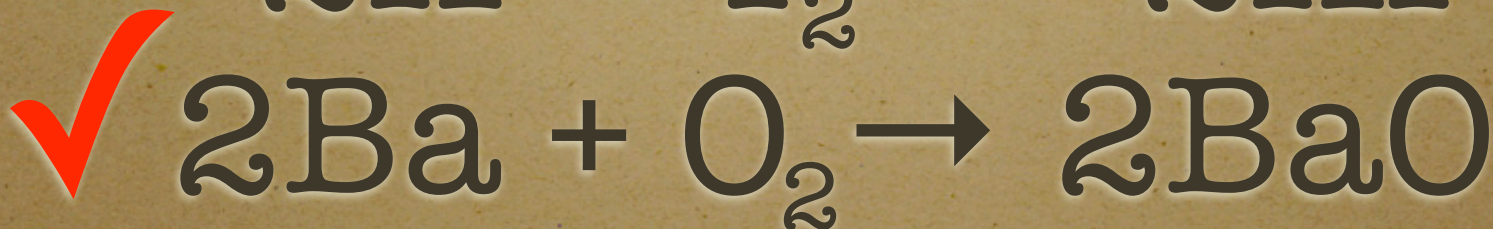
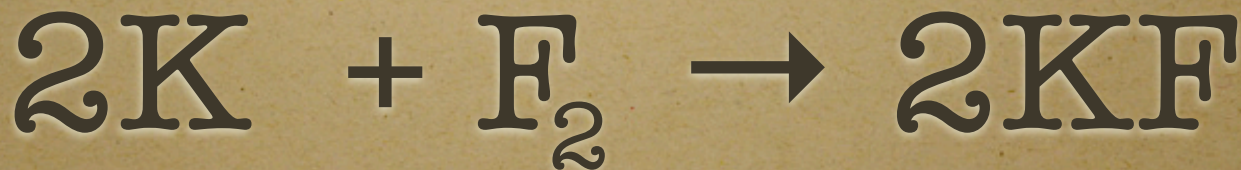
What is wrong with these equations?



Reducing Coefficients

You must simplify coefficients when there is a coefficient in front of EVERY reactant & product and they are ALL divisible by the same number.

Can these coefficients be reduced?



Equations Review

A chemical equation is a shorthand way of writing a chemical reaction using chemical symbols and formulas.

Coefficients are used in front of reactants and products to balance the equation to show that matter is conserved.

