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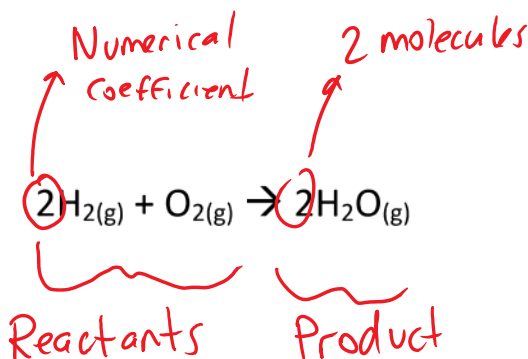
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**Chemical Reactions:**

**Lesson 1 – Chemical Equations**

Chemical Equation: an equation that shows important details of a chemical reaction

Ex.



State Subscripts	
(s)	Solid
(l)	Liquid
(g)	Gas
(aq)	Aqueous (has been dissolved in water)

Note: 2 H<sub>2</sub>O  
means 4 hydrogen atoms  
2 oxygen atoms

Types of Equations:

Sentence Equation

hydrogen gas reacts with oxygen gas to form water

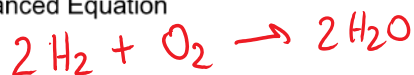
Word Equation

Hydrogen gas + Oxygen gas → water

Skeleton Equation



Balanced Equation



**Atom:** single element  
Ex. O or K  
**Molecule:** group of atoms  
Ex. H<sub>2</sub>O or Br<sub>2</sub>

Law of Conservation of Mass:

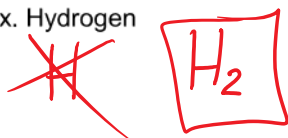
- In a chemical reaction atoms are neither created or destroyed, only chemical bonds change.
- The # of each type of atom is the same on both the reactants side and the product side.

Polyatomic- If there are brackets apply the subscript to each element in the brackets.  
Ex.  $\text{Ca}_3(\text{PO}_4)_2$   
3 Ca, 2 P, 8 O



Diatomic Elements: Elements that on their own always pair up with themselves ("magic 7" or upside down hockey stick)

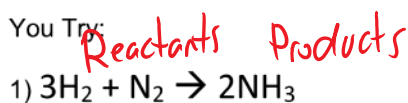
Ex. Hydrogen



Hydrogen  
Oxygen  
Fluorine  
Bromine  
Iodine  
Nitrogen  
Chlorine

"hockey stick"  
always gasses

You Try:



a) List the name of the reactants.

hydrogen gas, Nitrogen gas

b) Give the formula for the product.



c) How many molecules of hydrogen ( $\text{H}_2$ ) will combine exactly with one molecule of nitrogen ( $\text{N}_2$ )?

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~~d) How many molecules of nitrogen are required to produce 18 molecules of ammonia ( $\text{NH}_3$ )?~~

2) List the total number of each type of atoms in the following reactants.

a)  $2\text{H}_2\text{O} + 2\text{NaF}$

H - 4    Na - 2  
O - 2    F - 2

b)  $\text{Pb}(\text{NO}_3)_2 + 2\text{NaI}$

Pb - 1    Na - 2  
N - 2    I - 2  
O - 6

c)  $3\text{Br}_2 + 2\text{FeI}_3$

d)  $2\text{K}_3\text{PO}_4 + 3(\text{NH}_4)_2\text{SO}_4$

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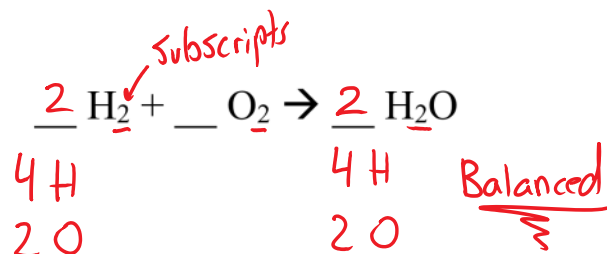
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## Chemical Reactions:

### Lesson 2 – Balancing Chemical Equations

Balanced Chemical Equations: The # of atoms is the same  
one both sides of the equation

Ex.

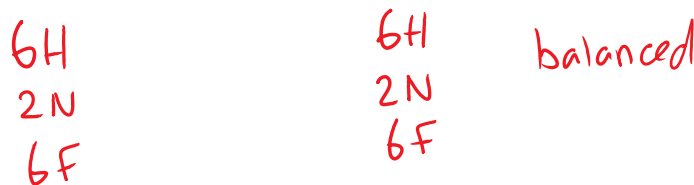
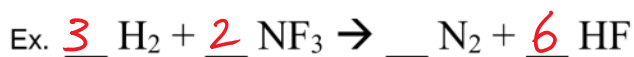


Use the coefficients  
to balance the equation.  
Do NOT change the  
subscript!

**Hint 1:** Find an element that is unbalanced.

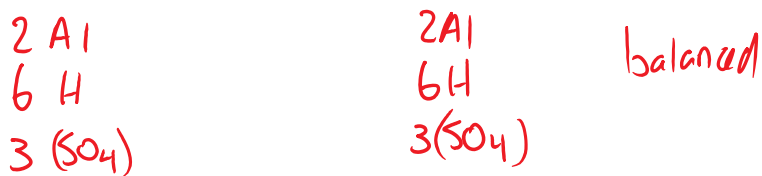
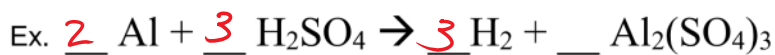
**Hint 2:** Place a coefficient on each side to balance that element.

**Hint 3:** Place one coefficient at a time, then recalculate.

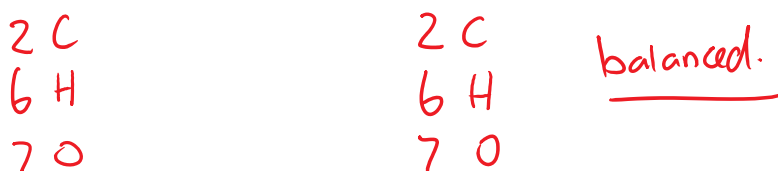
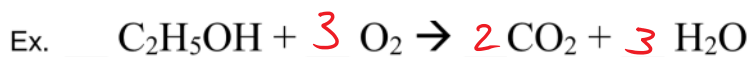


**Hint 4:** When faced with many unbalanced elements start with one that is in compounds on both sides (not by itself).

**Hint 5:** When faced with coefficients that would have to be fractions, multiply the existing coefficients by two.

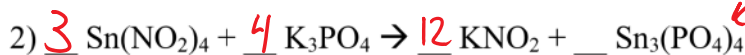


**Hint 6:** If a polyatomic ion appears on both sides, treat it as a single unit. You don't need to but it does simplify stuff.



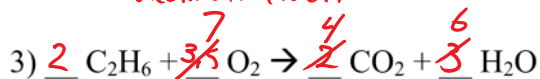
**Hint 7:** For combustion equations start with carbon, then hydrogen, finally oxygen.

You Try: Balance the following skeleton equations.



- Very very difficult  
 start balancing Sn  
 - treat poly atomic as 1 unit

Hint 5: double coefficients if decimal/fraction is involved



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textbook pg 131-133  
for help