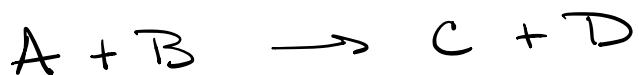


Balancing Chemical Equations



mass must be balanced on both sides

"Goes to form"



Reactants

Products

Reagents

Conditions

Temp

Time

heat or light or sound

Δ

λ

))))

Catalyst

State of Reagent

(aq) = aqueous

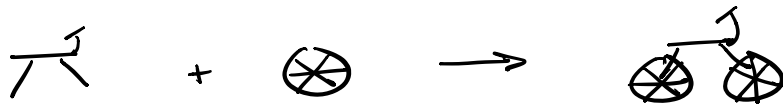
(s) = solid

(l) = liquid

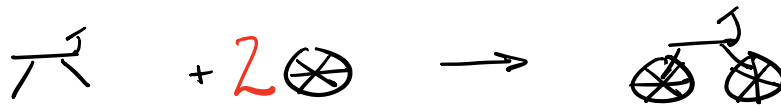
(g) = gas



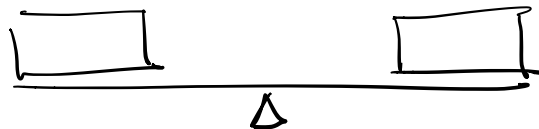
Coefficients are whole numbers used to mass balance the eq



Add Coefficients to balance the eq.



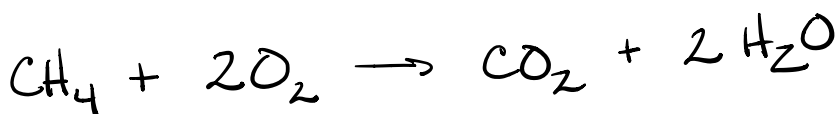
Frames	1	}	1	✓
Tires	2		2	✓



Combustion of Methane

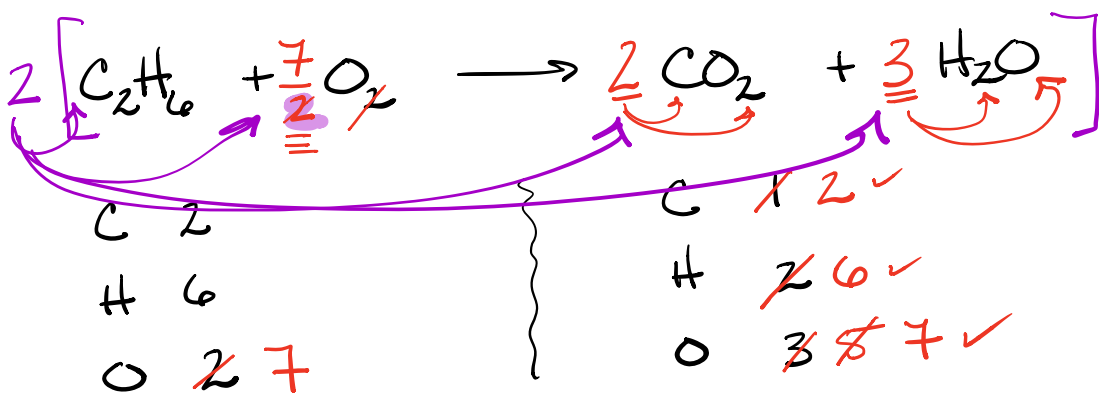


①	C	1		C	1	✓
	H	4		H	2 4	✓
②	O	2 4		O	3 4	✓



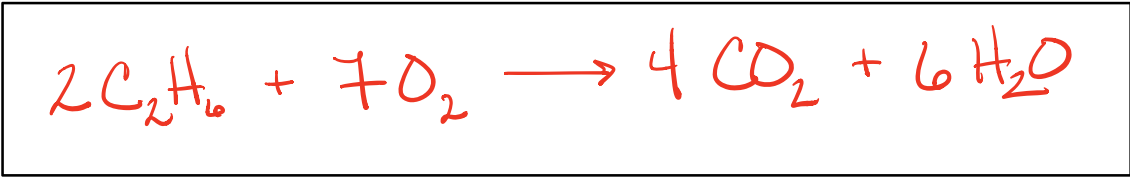
Steps

- ① Make an atom count for both reactants & products. Keep the list in the same order
- ② Start from left to right balancing any element that is out of balance and does not appear more than 3 times. (Anything that appears 3 or more times generally resolves itself)
- ③ You may only change coefficients
- ④ Save diatomics for last ($\text{O}_2, \text{N}_2, \text{H}_2, \text{Cl}_2, \dots$)
- *⑤ You may use a fractional coefficient to help balance diatomics, but you must clear the fraction at end



$$\frac{x \cdot 2}{2} = \frac{7}{2}$$

$$x = \frac{7}{2}$$



C 4

H 12

O 14

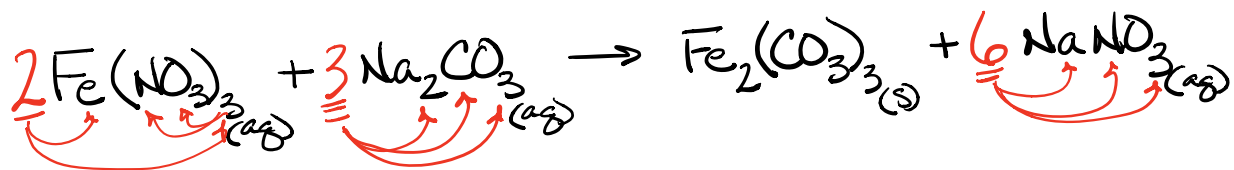
C 4 ✓

H 12 ✓

O 14 ✓

- * If you find it is taking more than 4 steps
- stop & recount atoms \Rightarrow Look for errors
 - Make Sure problem has been Copied Correctly
 - for elements in more than 1 place - recount

Double Displacement Problem



Fe ~~1~~ 2

N ~~3~~ 6

O ~~12~~ ~~21~~ 27

Na ~~2~~ 6

C ~~1~~ 3

9 + 2 × 3 × 3

9 + 18 = 27

Fe 2 ✓

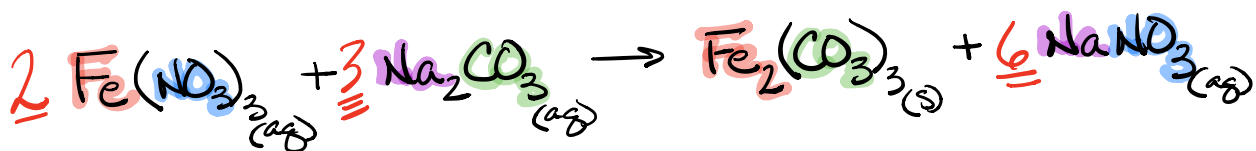
N 1 6 ✓

O 12 27 ✓

Na 1 6 ✓

C 3 ✓

Alternative for Balancing Double Displacement



Fe³⁺ 1 2

NO₃⁻ 3 6

Na⁺ 2 6

CO₃²⁻ 1 3

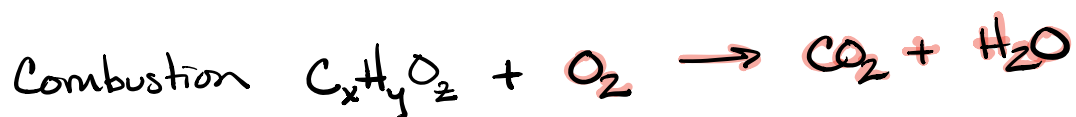
Fe³⁺ 2

NO₃⁻ 1 6

Na⁺ 1 6

CO₃²⁻ 3

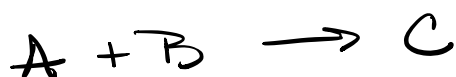
Reaction Types



Double Displacement
(Precipitation or
Double Replacement)



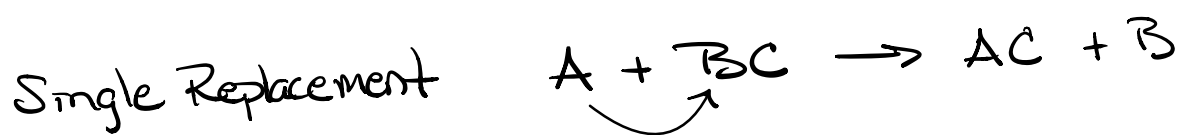
Combination



Decomposition

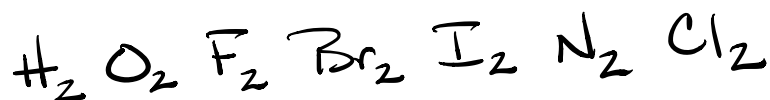


Single Replacement



Diatomic Elements

HOFBrINCl or BrINClHOF



PT Location

H

N O F
Cl
Br
I

Activity 12 - Balancing Chemical Equations

Name _____

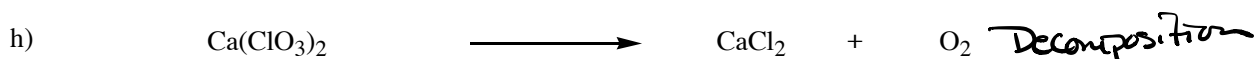
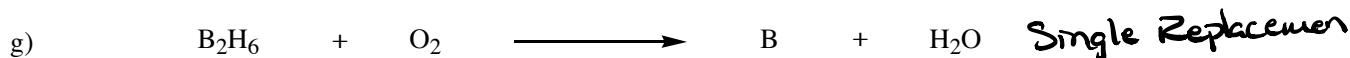
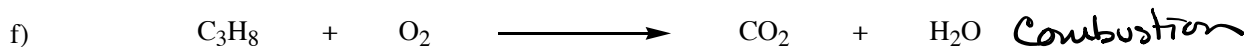
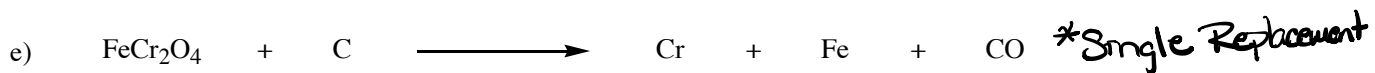
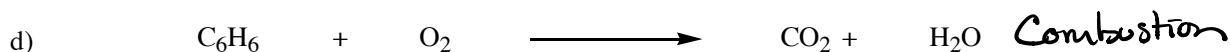
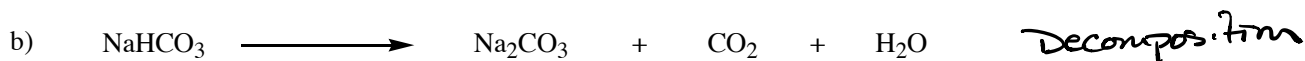
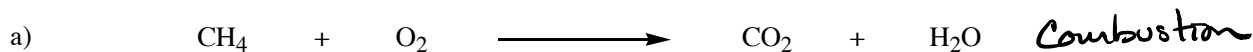
Section _____ Date _____

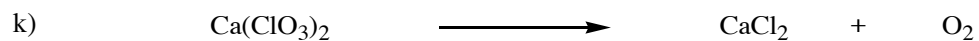
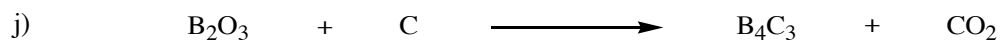
Tips for Writing Chemical Equations:

- Make certain all formulas are correct.
- Once all formulas are written correctly one may **not change the subscripts**, only the coefficients in order to balance the equation. Always choose the lowest whole number coefficients.
- The symbols (s), (l), and (g) indicate the phase of each reactant or product: solid, liquid and gas, respectively.
- Some elements exist in nature as diatomic molecules. The element names correspond to the diatomic formula because this is the elemental structure. These elements include hydrogen, nitrogen, oxygen, fluorine, chlorine, bromine and iodine. The correct formula for the elemental name is diatomic not monatomic. A mnemonic device that may help you remember these elements is the name Hofbrincl $H_2 O_2 F_2 Br_2 I_2 N_2 Cl_2$.

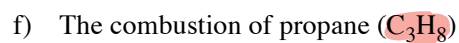
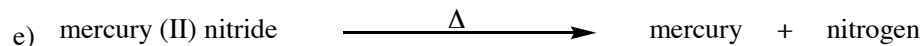
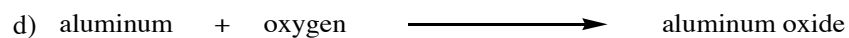
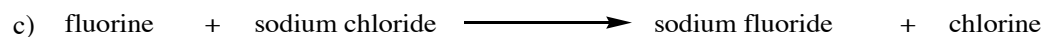
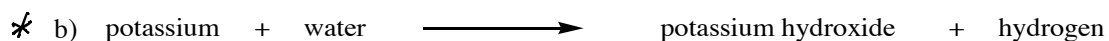
Questions and Problems

1. Balance the following chemical equations:





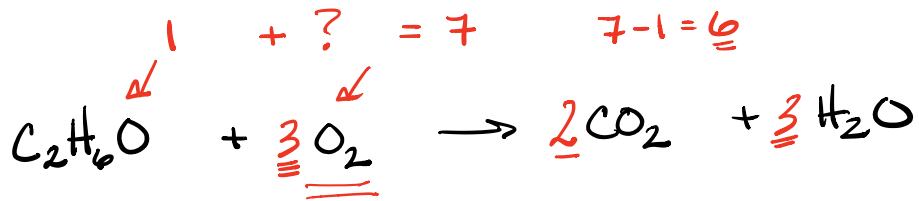
2. Write balanced chemical equations for each of the following reactions:





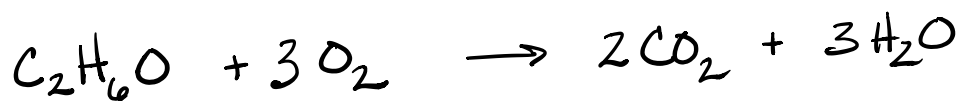
Na	1 2
H	1 2
C	1 2
O	3 6

Na	2	✓
H	2	✓
C	2	✓
O	6	✓



C	2
H	6
O	3 7

C	1 2	✓
H	2 6	✓
O	3 8 7	✓



Potassium + water \rightarrow Potassium hydroxide + hydrogen



HOFBRINCA

- ① Build the equation from names.
 - Careful w/ Ionic Compounds to balance for Charge
 - Careful of diatomics

② Balance Eq

