

# N-22

# Balancing Chemical Equations



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## Balancing Chemical Equations

**Target: I can balance chemical equations to ensure conservation of mass.**



Link to YouTube Presentation:  
<https://youtu.be/1QUGb7hspUM>

# Reminder: Signs of a Chemical Rxn

Change in Properties			
<b>Color Change</b>		<b>Formation of a Gas</b>	
<b>Odor Change</b>		<b>Formation of a Precipitate</b>	
Change in Energy			
<b>Absorbing/ Releasing Heat</b>		<b>Releasing Light</b>	

# Law of Conservation of Mass

In normal chemical reactions *(not nuclear rxns),*

- Total mass of reactants is equal to total mass of products
- Nothing can magically appear
- Nothing can magically disappear

*Science not Magic!*

# Ways to Write Equations

## Word Equations

Written with the names of the compounds

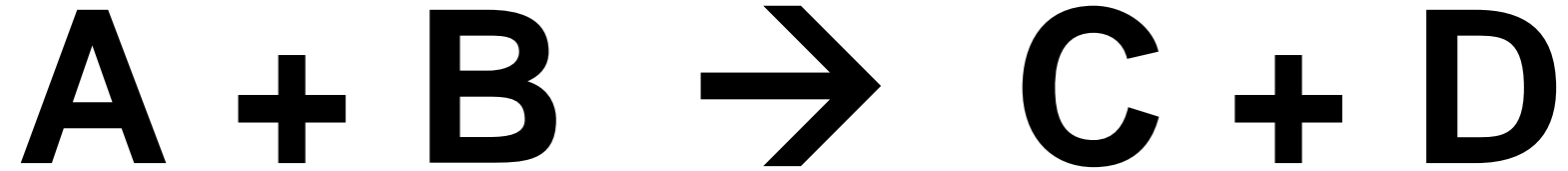
*hydrogen gas and chlorine gas  
combine to form hydrogen chloride gas*

## Skeleton Equations

Written with formulas



# Parts of Equations



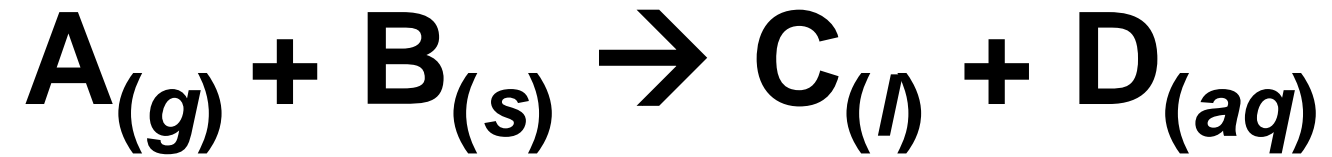
**Reactants**

**(starting materials)**

**Products**

**(ending materials)**

# Phases



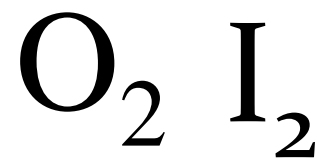
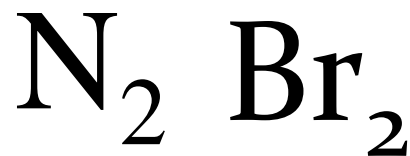
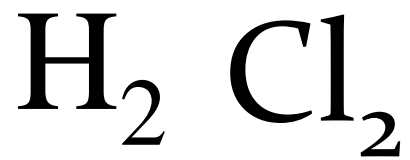
***g*** = gas

***s*** = solid

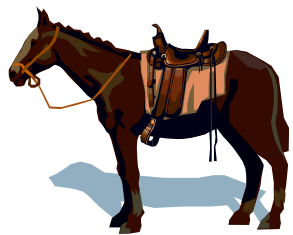
***l*** = liquid

***aq*** = “aqueous” – ions in water

# Diatomic Gases



Horses Need  
Oats For Clear  
Brown “Eyes”





# Rules for Balancing

- 1) Write the skeleton equation
- 2) Count atoms on each side of arrow  
*(look at the subscripts & the coefficients!)*
- 3) Change coefficients so the atoms are balanced; NEVER change subscripts!
- 4) Make sure coefficients are in lowest ratio possible
- 5) Check your work!

**USE  
PENCIL!!!**

# Tips for Balancing that (sometimes) Help!

- **Stuck? Erase and start over!**
- **Try to balance atoms that appear in the fewest number of places first**
- **Try to leave any diatomics until the end**
- **Oxygens are often the hardest to balance**
- **Try to balance polyatomic ions as a “chunk”**
- **Combustion reactions – put a “2” in front of the hydrocarbon and THEN count & balance (may need to reduce your coefficients at the end, but it makes it easier!)**

# Practice Problems

Show your work in your notes the way I do!

Yes, eventually you should be able to do these mostly in your head.

**BUT** you need to be able to show your work when asked, or when you get a hard problem.

**SO PRACTICE  
SHOWING YOUR  
WORK!**

**USE  
PENCIL!!!**

**USE PENCIL!!!!**

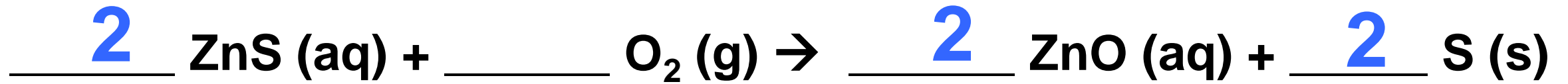
**BRACE YOURSELF**

**IT IS GOING TO GET WORSE BEFORE  
IT GETS BETTER**

makeameme.org

# #1

Count each atom – BEFORE, DURING, and AFTER!



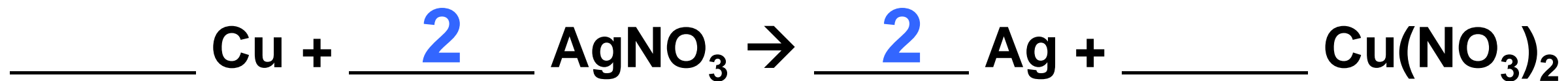
Zn:	<del>1</del>	2		2
S:	<del>1</del>	2		2
O:		2		2



Zn:	<del>1</del>	2		2
S:	<del>1</del>	2		2
O:	<del>1</del>	2		2

# #2

Count each atom – BEFORE, DURING, and AFTER!



Cu: 1

1

Ag: ~~1~~ 2

2

N: ~~1~~ 2

2

O: ~~3~~ 6

6



Cu: 1

1

Ag: ~~1~~ 2

2

N: 2

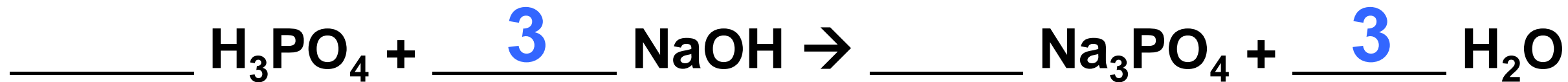
2

O: 6

6

# #3

Count each atom – BEFORE, DURING, and AFTER!



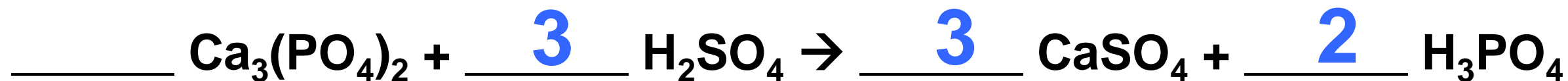
H:	<del>4</del>	6		6
P:	1			1
Na:	<del>1</del>	3		3
O:	<del>5</del>	7		7



H:	<del>2</del>	6		6
P:	1			1
Na:	3			3
O:	<del>5</del>	7		7

# #4

Count each atom – BEFORE, DURING, and AFTER!



Ca: 3

P: 2

O: ~~12~~ 20

H: ~~2~~ 6

S: ~~1~~ 3

3

2

20

6

3



Ca: ~~1~~ 3

P: ~~1~~ 2

O: ~~8~~ ~~16~~ 20

H: ~~3~~ 6

S: ~~1~~ 3

3

2

20

6

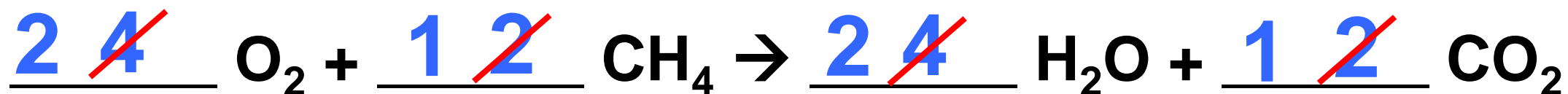
3



# #5

Count each atom – BEFORE, DURING, and AFTER!

\*Tip! Combustion reaction! Hydrocarbon reacting with oxygen to make carbon dioxide and water. Put a 2 in front of hydrocarbon and THEN count and start the problem



O: ~~2~~ 8

C: 2

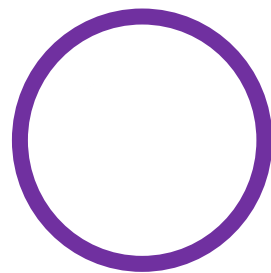
H: 8



8

2

8



O: ~~3~~ ~~5~~ 8

C: ~~1~~ 2

H: ~~2~~ 8

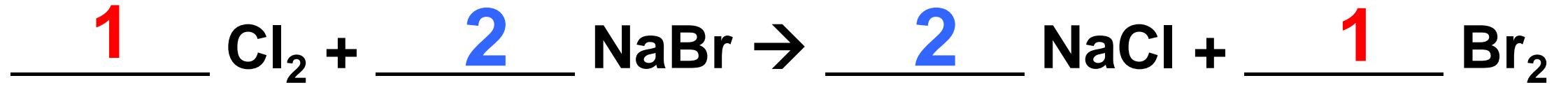


**REDUCE!!!!!!!!!!!!**

# #6

Count each atom – BEFORE, DURING, and AFTER!

How to turn it into a multiple choice question?



Cl:	2		2
Na:	<del>1</del> 2		2
Br:	<del>1</del> 2		2



Cl:	<del>1</del> 2		2
Na:	<del>1</del> 2		2
Br:	2		2

What is the SUM of the coefficients? **6**

List the coefficients: **1, 2, 2, 1**

Can't forget that there are 1's when you don't have a # for a coefficient!



**KEEP  
CALM  
AND  
USE A  
PENCIL**

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