

Notes: Balancing Equations



Review of Formulas

- **Subscripts** indicate the number of atoms or entire polyatomic ions immediately preceding them
 - **Example: NO₂**
 - **1 nitrogen atom**
 - **2 oxygen atoms**
- **Superscripts** indicate charges of atoms or entire polyatomic ions

How many atoms of each element are there in one formula unit of **ammonium sulfide**?

How many atoms of each element are there in one formula unit of **barium nitrate**?

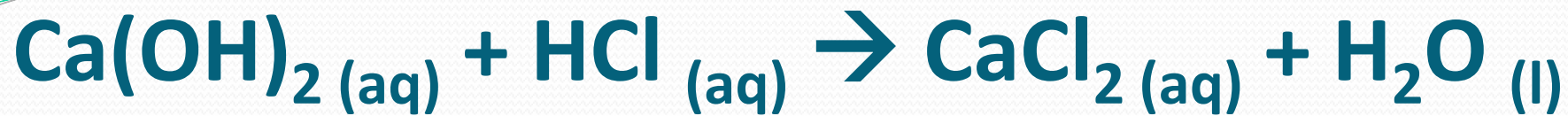
Law of Conservation of Mass/Matter

- Matter can neither be created nor destroyed
- According to this law, **chemical equations must be balanced.**
 - The total number of atoms of each element on the **reactant** side must equal the total number of atoms of each element on the **product** side





Balanced or Unbalanced?



Balanced or Unbalanced?

How do we balance equations?

- By adding **coefficients** to the equation to represent multiple molecules.

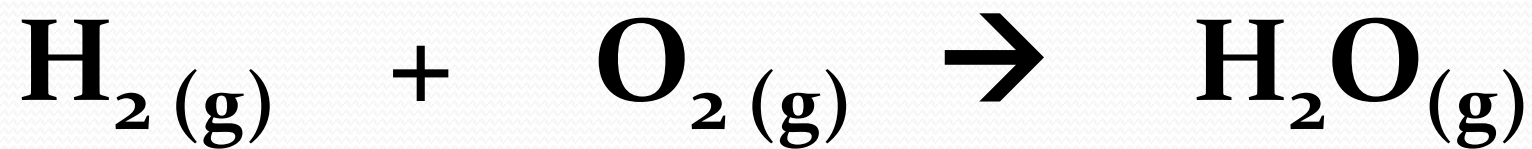
- Example: $2\text{Na}_3\text{PO}_4$
 - How many sodium atoms? 6
 - How many phosphorus atoms? 2
 - How many oxygen atoms? 8
 - How many phosphate ions? 2



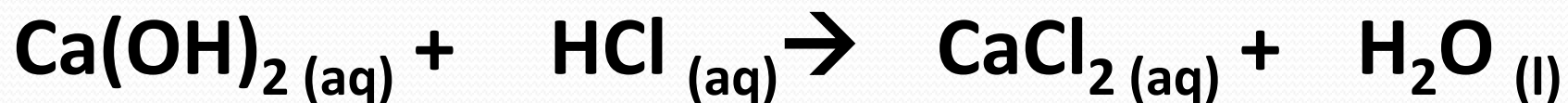
Tips

- Keep an inventory of how many of each atom you have on the reactant and product sides as you go.
- Once the formulas are written correctly, you may only add/change coefficients
- Balance elements that are only in one location on each side of the equation first...unless you want to go crazy.
- If a polyatomic ion is found on both sides of an equation, you can treat it like one unit.
- You may only use whole number coefficients, but temporary decimals can be helpful

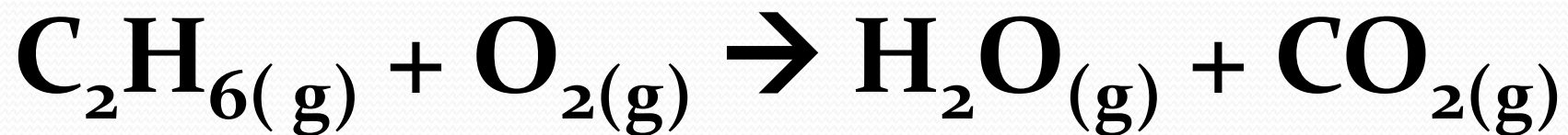
Balance the following equation:



Balance the following equation:



Balance the following equation:



Balance the following equation:

