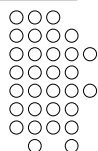


## Balancing Chemical Equations



---

---

---

---

---

---

---

---

## Balanced Equation



- Atoms can't be created or destroyed
- All the atoms we start with we must end up with
- A balanced equation has the same number of each element on both sides of the equation.

---

---

---

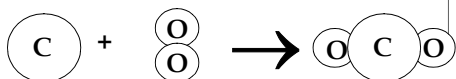
---

---

---

---

---



- $C + O_2 \rightarrow CO_2$
- This equation is already balanced
- What if it isn't?

---

---

---

---

---

---

---

---

- $C + O_2 \rightarrow CO$
- We need one more oxygen in the products.
- Can't change the formula, because it describes what it is (carbon monoxide in this example)

---

---

---

---

---

---

---

---

- Must be used to make another CO
- But where did the other C come from?

---

---

---

---

---

---

---

---

- Must have started with two C
- $2C + O_2 \rightarrow 2CO$

---

---

---

---

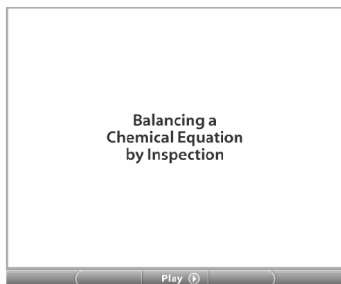
---

---

---

---

## In other words . . .



---

---

---

---

---

---

---

---

## Rules for balancing:



- 1 Assemble, write the correct formulas for all the reactants and products
- 2 Count the number of atoms of each type appearing on both sides
- 3 Balance the elements one at a time by adding coefficients (the numbers in front) - save H and O until LAST!
- 4 Check to make sure it is balanced.

---

---

---

---

---

---

---

---

# Never



- Never change a subscript to balance an equation.
  - If you change the formula you are describing a different reaction.
  - $H_2O$  is a different compound than  $H_2O_2$
- Never put a coefficient in the middle of a formula
  - $2 NaCl$  is okay,  $Na_2Cl$  is not.

---

---

---

---

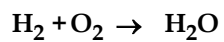
---

---

---

---

**Example**



Make a table to keep track of where you are at

---

---

---

---

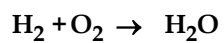
---

---

---

---

**Example**



<u>R</u>	<u>P</u>
2 H	2
2 O	1

Need twice as much O in the product

---

---

---

---

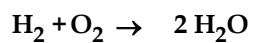
---

---

---

---

**Example**



<u>R</u>	<u>P</u>
2 H	2
2 O	1

Changes the O

---

---

---

---

---

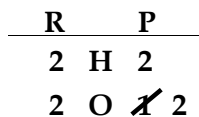
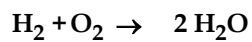
---

---

---



### Example



Also changes the H

---

---

---

---

---

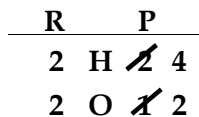
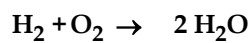
---

---

---



### Example



Need twice as much H in the reactant

---

---

---

---

---

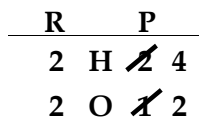
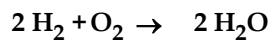
---

---

---



### Example



Recount

---

---

---

---

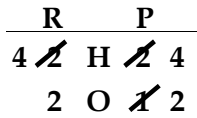
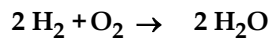
---

---

---

---

### Example



The equation is balanced, has the same number of each kind of atom on both sides



---

---

---

---

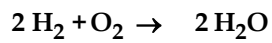
---

---

---

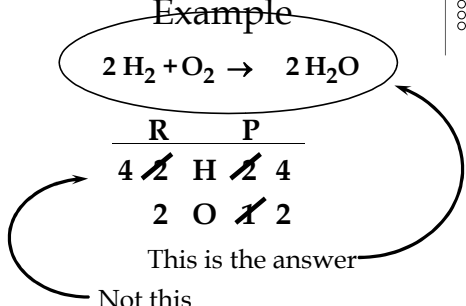
---

### Example



This is the answer

Not this



---

---

---

---

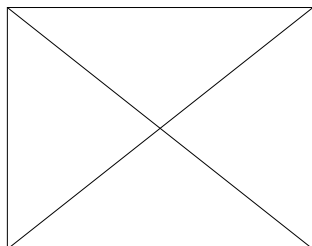
---

---

---

---

### Balancing by Inspection



---

---

---

---

---

---

---

---

### Balancing Examples



- $\_AgNO_3 + \_Cu \rightarrow \_Cu(NO_3)_2 + \_Ag$
- $\_Mg + \_N_2 \rightarrow \_Mg_3N_2$
- $\_P + \_O_2 \rightarrow \_P_4O_{10}$
- $\_Na + \_H_2O \rightarrow \_H_2 + \_NaOH$
- $\_CH_4 + \_O_2 \rightarrow \_CO_2 + \_H_2O$

---

---

---

---

---

---

---

---