

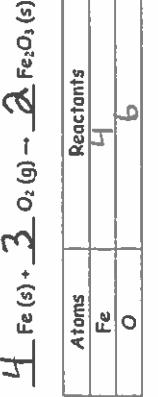
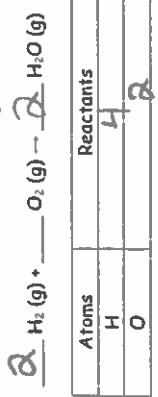
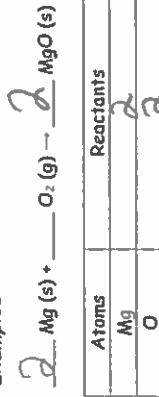
## Balancing Equations

All chemical equations must be balanced so that they are consistent with the Law of Conservation of Mass.

Here are some suggestions for balancing equations:

- When balancing equations, always start with the "ugliest" molecule first (polyatomics).
- To balance, place the desired number (coefficient) in front of the element or compound. Never split-up a compound and never change the subscripts in the chemical formula.
- It is often useful to balance the diatomic molecules, if they are present, last.
- Creating a chart to keep track of the type and number of each atoms on the reactant and product side of the equation can make balancing easier.
- Make sure to always recheck the final balanced equation.

Examples:



Atoms	Reactants	Products
Al	3	3
O	6	6
H	6	6



Atoms	Reactants	Products
Pb	3	3
NO <sub>3</sub>	6	6
B	2	2
F	6	6

- Sometimes to balance an equation, fractions must be used. Fractions are not to be left in the final balanced equation, as it impossible to have part of an atom. To get rid of the fraction, multiply every element or compound in the equation by the denominator of the fraction (i.e. If you use  $\frac{1}{2}$  as a coefficient, then multiply by 2).
- $\frac{1}{2} \text{NH}_3 \text{(l)} + \frac{1}{2} \text{O}_2 \text{(g)} \rightarrow \frac{1}{2} \text{NO}_2 \text{(g)} + \frac{3}{2} \text{H}_2\text{O(s)}$

Atoms	Reactants	Products
N	4	4
H	12	12
O	14	14
	4	4

- Balancing chemical equations becomes increasing more difficult when you are given the reaction as a word equation. To balance the equation, you must first convert the elements and/or compounds into their correct chemical formula. Even the slightest mistake will make your equation incorrect and could possibly create an equation that is impossible to balance. Be careful, and make sure to always check your work.
- Write out a balanced chemical equation for the following:

Oxygen gas reacts with solid aluminum sulfide to produce solid aluminum oxide and sulfur dioxide gas.



## Answers

### BCI SCIENCE SCIENCE

Name: \_\_\_\_\_ Date: \_\_\_\_\_

### Balancing Equations Practice

1.  $\underline{2}\text{F}_2 + \underline{2}\text{H}_2\text{O} \rightarrow \underline{4}\text{HF} + \underline{1}\text{O}_2$
2.  $\underline{2}\text{SO}_2 + \underline{1}\text{O}_2 \rightarrow \underline{2}\text{SO}_3$
3.  $\underline{1}\text{S}_8 + \underline{8}\text{O}_2 \rightarrow \underline{8}\text{SO}_2$
4.  $\underline{3}\text{C} + \underline{2}\text{Fe}_2\text{O}_3 \rightarrow \underline{2}\text{CO} + \underline{2}\text{Fe}$
5.  $\underline{1}\text{CO}_2 + \underline{1}\text{C} \rightarrow \underline{2}\text{CO}$
6.  $\underline{4}\text{Fe}_2\text{O}_3 + \underline{3}\text{CO} \rightarrow \underline{3}\text{CO}_2 + \underline{2}\text{Fe}$
7.  ~~$\cancel{\underline{2}}\text{FeS} + \cancel{\underline{2}}\text{O}_2 \rightarrow \cancel{\underline{2}}\text{Fe}_2\text{O}_3 + \cancel{\underline{4}}\cancel{\underline{2}}\text{SO}_2$~~
8.  $\underline{2}\text{KClO}_3 \rightarrow \underline{2}\text{KCl} + \underline{3}\text{O}_2$
9.  $\underline{6}\text{HCl} + \underline{1}\text{Fe}_2\text{O}_3 \rightarrow \underline{2}\text{FeCl}_3 + \underline{3}\text{H}_2\text{O}$
10.  $\underline{1}\text{MnO}_2 + \underline{4}\text{HCl} \rightarrow \underline{1}\text{MnCl}_2 + \underline{2}\text{H}_2\text{O} + \underline{1}\text{Cl}_2$
11.  $\underline{2}\text{C}_5\text{H}_{10} + \underline{15}\cancel{\underline{2}}\text{O}_2 \rightarrow \cancel{\underline{10}}\text{CO}_2 + \cancel{\underline{2}}\cancel{\underline{10}}\text{H}_2\text{O}$
12.  $\underline{2}\text{C}_6\text{H}_6 + \underline{15}\cancel{\underline{2}}\text{O}_2 \rightarrow \cancel{\underline{12}}\text{CO}_2 + \cancel{\underline{2}}\cancel{\underline{12}}\text{H}_2\text{O}$
13.  $\underline{2}\text{KOH} + \underline{1}\text{Cl}_2 \rightarrow \underline{1}\text{KClO} + \underline{1}\text{H}_2\text{O}$
14.  $\underline{2}\text{Al} + \underline{6}\text{NaOH} \rightarrow \underline{2}\text{Na}_3\text{AlO}_3 + \underline{3}\text{H}_2$
15.  $\underline{2}\text{AsCl}_3 + \underline{3}\text{H}_2\text{S} \rightarrow \underline{1}\text{As}_2\text{S}_3 + \underline{6}\text{HCl}$

16.  $\underline{2}\text{CuH}_{10} + \underline{1}\text{O}_{2(g)} \rightarrow \underline{2}\text{CuO}_{(s)}$
17.  $\underline{2}\text{H}_2\text{O}_{(l)} \rightarrow \underline{2}\text{H}_{2(g)} + \underline{1}\text{O}_{2(g)}$
18.  $\underline{3}\text{Fe}_{(s)} + \underline{4}\text{H}_2\text{O}_{(l)} \rightarrow \underline{4}\text{H}_{2(g)} + \underline{1}\text{Fe}_3\text{O}_{4(s)}$
19.  $\underline{2}\text{AsCl}_{3(s)} + \underline{3}\text{H}_2\text{S}_{(aq)} \rightarrow \underline{1}\text{As}_2\text{S}_{3(s)} + \underline{6}\text{HCl}_{(aq)}$
20.  $\underline{1}\text{CuSO}_4 \cdot 5\text{H}_2\text{O}_{(s)} \rightarrow \underline{1}\text{CuSO}_{4(s)} + \underline{5}\text{H}_2\text{O}_{(g)}$
21.  $\underline{1}\text{Fe}_2\text{O}_{3(s)} + \underline{3}\text{H}_{2(g)} \rightarrow \underline{2}\text{Fe}_{(s)} + \underline{3}\text{H}_2\text{O}_{(l)}$
22.  $\underline{1}\text{CaCO}_{3(s)} \rightarrow \underline{1}\text{CaO}_{(s)} + \underline{1}\text{CO}_{2(g)}$
23.  $\underline{8}\text{Fe}_{(s)} + \underline{8}\text{S}_{8(s)} \rightarrow \underline{8}\text{FeS}_{(s)}$
24.  $\underline{1}\text{H}_2\text{S}_{(aq)} + \underline{2}\text{KOH}_{(aq)} \rightarrow \underline{2}\text{H}_2\text{O}_{(l)} + \underline{1}\text{K}_2\text{S}_{(s)}$
25.  $\underline{2}\text{NaCl}_{(l)} \rightarrow \underline{2}\text{Na}_{(l)} + \underline{1}\text{Cl}_{2(g)}$
26.  $\underline{2}\text{Al}_{(s)} + \underline{3}\text{H}_2\text{SO}_{4(aq)} \rightarrow \underline{3}\text{H}_{2(g)} + \underline{1}\text{Al}_2(\text{SO}_4)_{3(aq)}$
27.  $\underline{1}\text{H}_3\text{PO}_{4(aq)} + \underline{3}\text{NH}_3\text{OH}_{(aq)} \rightarrow \underline{3}\text{H}_2\text{O}_{(l)} + \underline{1}(\text{NH}_4)_3\text{PO}_4_{(aq)}$
28.  $\underline{1}\text{C}_3\text{H}_8\text{H}_{(l)} + \underline{5}\text{O}_{2(g)} \rightarrow \underline{4}\text{H}_2\text{O}_{(l)} + \underline{3}\text{CO}_{2(g)}$
29.  $\underline{4}\text{Al}_{(s)} + \underline{3}\text{O}_{2(g)} \rightarrow \underline{2}\text{Al}_2\text{O}_{3(s)}$
30.  ~~$\cancel{\underline{2}}\text{CH}_3\text{H}_{(l)} + \cancel{\underline{7}}\text{O}_{2(g)} \rightarrow \cancel{\underline{3}}\text{H}_2\text{O}_{(l)} + \cancel{\underline{4}}\text{CO}_{2(g)}$~~