

# Chemistry Equations Answers

Speedy Study Guides

## CHEMISTRY EQUATIONS & ANSWERS

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**How To Balance Chemical Equations**

Being able to balance chemical equations is a very important skill for students of chemistry, making this one of our most popular chemistry tutorials. All chemical calculations require you to work with a balanced equation. Here we will show you a simple, easy way to balance all chemical equations you will meet at introductory level chemistry courses.

It's completely different method to what you have to work with Hall Equations. If you don't know what a Half Equation is, then don't worry, as that means they are not to your course and you will not have to worry about balancing them. The key to balancing chemical equations is to apply the rules below. If you already know the rules, then try these worked examples for revision practice.

**WHAT IS A BALANCED EQUATION?**

A chemical equation is balanced when the number of atoms of each type on each side of the equation is the same. Which means if you have 12 hydrogens on the left hand side of the equation, you must have 12 hydrogens on the right hand side. If there are 4 oxygens on the left, there must be 4 oxygens on the right, and so on. This is because of the law of conservation of mass - you can't make or destroy atoms during a chemical reaction. But you can't just add atoms at random to each side, you have to work with the molecules of the reactants. Also, you will find it very tricky to try to balance a word equation, it is very much easier to use a chemical equation with chemical symbols, so then you will be able to use how many atoms of each type are in each chemical.

**Example 1**

**Unbalanced Equation:**  $\text{C}_2\text{H}_6 + \text{O}_2 \rightarrow \text{H}_2\text{O} + \text{CO}_2$

There are three carbons on the left, but only one on the right. There are eight hydrogens on the left but only two on the right. There are two oxygens on the left but three on the right.

**Balanced Equation:**  $\text{C}_2\text{H}_6 + 5\text{O}_2 \rightarrow 3\text{H}_2\text{O} + 2\text{CO}_2$

**HOW DO WE BALANCE THE EQUATION?**

Balancing chemical equations isn't difficult, since you know the way to do it. Start by finding out how many atoms of each type are on each side of the equation. Some teachers recommend making a little table listing the numbers of each atom for the left hand side and for the right hand side.

Next, look for an element which is in only one chemical on the left and in only one on the right of the equation. (That it is

usually a good idea to leave hydrogen and oxygen until you've done the others first.)

To balance that element, multiply the chemical species on the side which doesn't have enough atoms of that type by the number required to bring it up to the same as the other side. The number is called the coefficient. But if you have to multiply by say 2, 1/2, do so. THIS multiplies EVERYTHING on each side of the equation by two to get rid of the half.

We don't like having halves in equations, so you can't get half a molecule. Now look for the next element or species that is not balanced and do the same thing. Repeat until you are forced to balance the hydrogen and oxygen.

If there is a complex ion, sometimes called a polyatomic ion, on each side of the equation that has remained intact, then that ion often balances first, as it acts as a single species. The ions  $\text{NO}_3^-$  and  $\text{CO}_3^{2-}$  are examples of a complex ion.

A VERY useful rule is to leave balancing oxygen and hydrogen to the last step as these elements are often in more than one chemical on each side, and it is not always easy to know where to start. Some people also say you should leave any atoms or species with a valency of one until the end, and also generally leave anything present in an element to the end.

In Example 1 above, you would balance the carbon first, by putting a 2 in front of the  $\text{CO}_2$ , then balance the hydrogen by putting a 3 in front of the  $\text{H}_2\text{O}$  and finally the oxygen (which are in more than one compound on the right, so we leave them until last) by putting a 5 in front of the  $\text{O}_2$ .

**Example 2**

**Unbalanced equation:**  $\text{MgSO}_4 + \text{Fe} \rightarrow \text{Fe}_2(\text{SO}_4)_3 + \text{H}_2$

Balance the SO4 first (as it is a complex ion and it is in one chemical species on each side)

$3\text{MgSO}_4 + \text{Fe} \rightarrow \text{Fe}_2(\text{SO}_4)_3 + \text{H}_2$

Now balance the Fe (which is also in one chemical on each side)

$3\text{MgSO}_4 + 2\text{Fe} \rightarrow \text{Fe}_2(\text{SO}_4)_3 + \text{H}_2$

Finally, balance the hydrogen (although it is in one chemical species on each side, it is usually a good idea to leave it until last)

**Balanced Equation:**  $3\text{MgSO}_4 + 2\text{Fe} \rightarrow \text{Fe}_2(\text{SO}_4)_3 + 3\text{H}_2$

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## Reviews

*Absolutely essential read publication. It is amongst the most incredible book i have study. Your lifestyle period will be convert when you full reading this ebook.*  
 (Dr. Meghan Streich V)

## CHEMISTRY EQUATIONS ANSWERS



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