

## Worksheet 4.3

# Balancing chemical equations

NAME:

CLASS:

### INTRODUCTION

The law of conservation of mass states that 'Matter can be neither created nor destroyed; it can only be changed from one form to another'. For chemical equations, this means that there must be the same number of each type of atom on both sides of a chemical equation.

Balance the following equations by adding coefficients to the chemical formulas where needed.

No.	
1	$\text{Li}_2\text{SO}_4 + \text{AgNO}_3 \rightarrow \text{Ag}_2\text{SO}_4 + \text{LiNO}_3$
2	$\text{Ni}(\text{NO}_3)_2 \rightarrow \text{NiO} + \text{NO}_2 + \text{O}_2$
3	$\text{P} + \text{O}_2 \rightarrow \text{P}_4\text{O}_{10}$
4	$\text{CH}_3\text{COOH} + \text{K}_2\text{CO}_3 \rightarrow \text{CH}_3\text{COOK} + \text{CO}_2 + \text{H}_2\text{O}$
5	$\text{Al} + \text{HI} \rightarrow \text{AlI}_3 + \text{H}_2$
6	$\text{C}_5\text{H}_{12} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
7	$\text{Cu} + \text{AgNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{Ag}$
8	$\text{Cu} + \text{O}_2 \rightarrow \text{CuO}$
9	$\text{KBrO}_3 \rightarrow \text{KBr} + \text{O}_2$
10	$\text{Ca} + \text{N}_2 \rightarrow \text{Ca}_3\text{N}_2$
11	$\text{HCl} + \text{Zn}(\text{OH})_2 \rightarrow \text{ZnCl}_2 + \text{H}_2\text{O}$
12	$\text{C}_2\text{H}_4 + \text{O}_2 \rightarrow \text{H}_2\text{O} + \text{CO} + \text{CO}_2$
13	$\text{CO}_2 + \text{Ba}(\text{OH})_2 \rightarrow \text{BaCO}_3 + \text{H}_2\text{O}$
14	$\text{Rb} + \text{H}_2\text{O} \rightarrow \text{RbOH} + \text{H}_2$
15	$\text{C}_7\text{H}_{14} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$

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# Balancing chemical equations

For each of the following multiple-choice questions, select the correct response.

No.	Question	Answer
16	<p>The following equation represents the reaction of copper with concentrated nitric acid:</p> $a\text{Cu}(\text{s}) + b\text{HNO}_3(\text{aq}) \rightarrow c\text{Cu}(\text{NO}_3)_2(\text{aq}) + d\text{NO}_2(\text{g}) + e\text{H}_2\text{O}(\text{l})$ <p>The set of coefficients that will balance this equation is:</p> <p><b>A</b> 1, 4, 1, 2, 2 <b>B</b> 3, 8, 3, 2, 2 <b>C</b> 3, 8, 3, 2, 1 <b>D</b> 1, 4, 1, 2, 1</p>	
17	<p>Iron can react with water to produce iron oxide and hydrogen gas. The unbalanced equation is:</p> $a\text{Fe}(\text{s}) + b\text{H}_2\text{O}(\text{l}) \rightarrow c\text{Fe}_3\text{O}_4(\text{s}) + d\text{H}_2(\text{g})$ <p>The set of coefficients that will balance this equation is:</p> <p><b>A</b> 3, 4, 1, 4 <b>B</b> 3, 1, 1, 1 <b>C</b> 6, 4, 2, 6 <b>D</b> 3, 4, 1, 1</p>	
18	$a\text{H}_2\text{S}(\text{g}) + b\text{SO}_2(\text{g}) \rightarrow c\text{S}(\text{s}) + d\text{H}_2\text{O}(\text{g})$ <p>The coefficients that correctly balance this equation are:</p> <p><b>A</b> 2, 4, 6, 3 <b>B</b> 2, 1, 3, 2 <b>C</b> 1, 1, 2, 2 <b>D</b> 1, 2, 3, 1</p>	
19	<p>What is the value of <math>x</math> when the following equation is correctly balanced?</p> $\text{C}_3\text{H}_{18}(\text{l}) + x\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{g})$ <p><b>A</b> 17 <b>B</b> 20 <b>C</b> 25 <b>D</b> 34</p>	
20	<p>What is the value of <math>x</math> when the following equation is correctly balanced?</p> $\text{NaHCO}_3(\text{aq}) + \text{H}_3\text{C}_6\text{H}_5\text{O}_7(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + x\text{H}_2\text{O}(\text{l}) + \text{Na}_3\text{C}_6\text{H}_5\text{O}_7(\text{aq})$ <p><b>A</b> 2 <b>B</b> 3 <b>C</b> 4 <b>D</b> 5</p>	