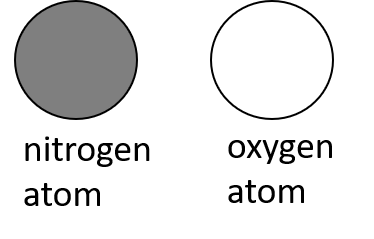
**Molecule expressions**

1. Write an expression that represents each molecule diagram.

Use the following key:



|  |  |
| --- | --- |
| **Molecule diagram** | **Expression** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

*Chemistry > Big idea CPS: Particles and structure > Topic CPS2: Elements and compounds Key concept CPS2.2: Symbols and formulae*

|  |
| --- |
| **Response activity** |
| **Molecule expressions** |

**Overview**

|  |  |
| --- | --- |
| Learning objective: | A chemical formula provides information on the composition of a substance. |
| Observable learning outcome: | Interpret expressions that represent more than one molecule. |
| Activity type: | application and practice |
| Key words: | atom, molecule, formula |

This activity can help develop students’ understanding by addressing the misunderstandings revealed by the following diagnostic question:

* More than one molecule

**What does the research say?**

A review of empirical research (Taskin and Bernholt, 2012) describes student misunderstandings in translating chemical formulae into particle diagrams. The inclusion of a multiplying coefficient (for example 2N2O) caused additional difficulties.

Some students confused the meaning of a subscript with a multiplying coefficient. They drew O2 as two separate atoms and 2N as two atoms joined.

Another study observed that some students who were given the expression 2NO2 matched it with a diagram showing two separate N atoms and an O2 molecule. In other words, they did not recognise that NO2 was an integrative formula for a substance that could not be broken down into discrete particles. Instead they appeared to have regarded 2N as separate to O2.

The review also summarises research findings that concluded that these misunderstandings were contributory factors to student difficulties in balancing chemical equations.

**Ways to use this activity**

Students could carry out this activity in pairs, using the opportunity to discuss each answer and justify why the expression should be written in that way.

*Differentiation*

Some students may benefit from the availability of physical props (for example counters) to support learning.

**Expected answers**

|  |  |
| --- | --- |
| **Molecule diagram** |  |
|  | N2 |
|  | 2N |
|  | N2O |
|  | 2NO |
|  | 2NO2 |

**Acknowledgments**

Developed by Helen Harden (UYSEG).

Images: Helen Harden

**References**

Taskin, V. and Bernholt, S. (2012). Students' understanding of chemical formulae: A review of empirical research. *International Journal of Science Education,* 36(1)**,** 157-185.