**Diagram practice**

Underline the correct label for each diagram.

For each row, explain how you decided which labels were correct.

|  |  |  |
| --- | --- | --- |
| Diagram | Diagram | Explanation |
| element / compound | element / compound |  |
| compound/ mixture | compound/mixture |  |
| mixture of elements/ mixture of compounds | mixture of elements/ mixture of compounds |  |

*Chemistry > Big idea CPS: Particles and structure> Topic CPS2: Elements and compounds > Key concept CPS2.1: Atoms and molecules*

|  |
| --- |
| **Response activity** |
| **Diagram practice** |

**Overview**

|  |  |
| --- | --- |
| Learning objective: | The properties of elements and compounds arise from the structural arrangement of their constituent atoms. |
| Observable learning outcome: | Distinguish particle diagrams for elements, mixtures and compounds. |
| Activity type: | application and practice |
| Key words: | substance, atom, molecule |

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

* Element, mixture or compound?

**What does the research say?**

Research carried out through the Children’s Learning in Science Project (Briggs and Holding, 1986) showed that a large proportion of students failed to appreciate that two circles in contact represented atoms that were joined. Instead they regarded the atoms as being intermingled in some way. This led to confusion for students in distinguishing a diagram showing a single compound made up of molecules containing two different types of atom with another diagram showing a mixture of atoms of two elements.

Whereas some students focused on the diagram showing two different atoms in order to identify a compound, a small proportion considered that a diagram of a diatomic element represented a compound. These students believed that the joining of atoms shown in the diagram meant that the substance was a compound.

A very small proportion of students confused a representation of a single compound with an element explaining that the ‘molecules were the same’.

**Ways to use this activity**

This activity could be carried out in pairs. Students could use discussion to help write the explanations for each row of the table.

*Differentiation*

Some students may benefit from some sentence starters and key words to support the writing of their explanations.

**Expected answers**

|  |  |  |
| --- | --- | --- |
| Diagram | Diagram | Explanation |
| element / compound | element / compound | A compound is made up of two or more types of atoms that are joined. The atoms in the first diagram are joined but are the same type of atom, so this represents an element. The atoms in the second diagram are joined and are different types of atom, so this represents a compound. |
| compound/ mixture | compound/mixture | The first diagram represents a compound because it contains two different types of atom that are joined. In the second diagram there are different types of atom but they are not joined. This therefore represents a mixture and not a compound. |
| mixture of elements/ mixture of compounds | mixture of elements/ mixture of compounds | The first diagram shows separate atoms and pairs of joined atoms that are the same type. This represents two different elements. The diagram therefore represents a mixture of elements.  The second diagram includes pairs of atoms that are joined but the atoms are of different types. There are two different types of atom pairs so this diagram shows a mixture of compounds. |

**Acknowledgments**

Developed by Helen Harden (UYSEG).

Images: Helen Harden

**References**

Briggs, H. and Holding, B. (1986). *Children's Learning in Science Project. Aspects of secondary students' understanding of elementary ideas in chemistry: Full repoty.* [Online]. Available at: <https://www.stem.org.uk/elibrary/resource/26944>.