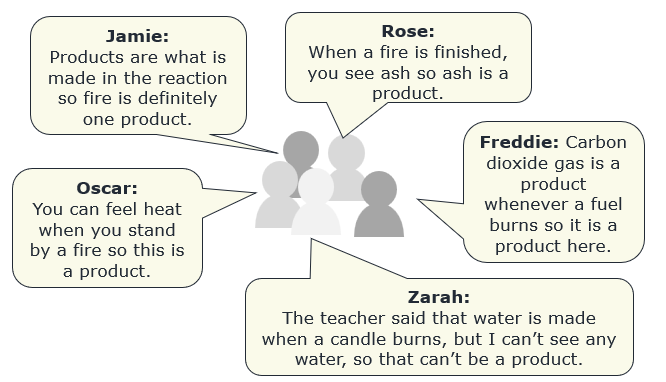
**Product discussion**

1. Wood burns. What are the products of the reaction?
   1. Who do you agree with and why?
   2. Who do you disagree with? What misunderstanding may they have?



|  |
| --- |
| **Jamie**  Products are what is made in the reaction, so fire is definitely one product. |
| **Oscar**  You can feel heat when you stand by a fire so this is a product. |
| **Rose**  When a fire is finished, you see ash so ash is a product. |
| **Freddie**  Carbon dioxide gas is a product whenever a fuel burns so it is a product here. |
| **Zarah**  The teacher said that water is made when a candle burns, but I can’t see any water, so that can’t be a product. |

*Chemistry > Big idea CPS: Particles and structure > Topic CPS4: Understanding reactions > Key concept CPS4.1: Representing reactions*

|  |
| --- |
| **Response activity** |
| **Product discussion** |

**Overview**

|  |  |
| --- | --- |
| Learning objective: | A chemical reaction can be summarised by a chemical equation. |
| Observable learning outcome: | Select the word equation that correctly represents the chemical reaction described. |
| Activity type: | simple multiple choice |
| Key words: | word equation, reactant, product |

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

* Writing word equations

**What does the research say?**

Research by Taber and Bricheno (2009) cautions that although word equations may seem straightforward, some students still find them conceptually challenging. This could be because the conceptual framework needed by students to confidently interpret what a word equation represents (a chemical reaction) may be insufficiently developed when word equations are first introduced.

Research (Johnson, 2000) suggests that two key concepts are required in order for students to understand chemical reactions. The first is the concept of chemical substance which then enables understanding of chemical change as the formation of a new substance or substances.

Research (Stavridou and Solomonidou, 1998) found that even where students had developed the conceptual idea that a chemical reaction results in the formation of a new substance (product) they may still have some misunderstandings. For example, some students thought that a ‘new product’ constituted something that was different to the original substance. This extended to include not only chemical substances, but also other observed phenomena such as ‘fire’.

**Ways to use this activity**

Students should complete this activity in pairs or small groups, and the focus should be on the discussions. The statements are also provided as cut-out cards for students to physically organise and discuss.

Listening in to the conversations of each group will often give you insights into how your students are thinking.

*Differentiation*

The quality of the discussions may be improved with a careful selection of groups; or by allocating specific roles to students in each group. For example, you may choose to select a student with strong prior knowledge as a scribe, and forbid them from contributing any of their own answers. They may question the others and only write down what they have been told. This strategy encourages contributions from more members of each group.

**Expected answers**

1a Rose is correct that, in everyday language, ash is left after wood burns. Freddie’s answer is scientifically correct.

b Jamie and Oscar are both incorrect because they are regarding fire and heat are products. They have either misunderstood that the product of a chemical reaction must be a substance, or they do not realise that heat and fire are not substances.

Zarah has misunderstood that when water is produced during burning it is in the gas state and can therefore not be seen.

**Acknowledgments**

Developed by Helen Harden (UYSEG).

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