**Describing reactions**

1. Write down what would be observed for each reaction.

Use the following words to help you.

**colourless solution white solid colourless liquid**

**colourless gas bubbles white precipitate**

* 1. calcium carbonate + hydrochloric acid

CaCO3 (s) + 2HCl(aq) → CaCl2(aq) + H2O(l) + CO2 (g)

* 1. sodium carbonate + calcium chloride solution

Na2CO3 (aq) + CaCl2 (aq) → CaCO3 (s) + 2NaCl (aq)

*Chemistry > Big idea CCR: Chemical reactions > Topic CCR4: Acids and alkalis > Key concept CCR4.1: Neutralisation*

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| **Response activity** |
| **Describing reactions** |

**Overview**

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| --- | --- |
| Learning objective: | A salt is formed from a neutralisation reaction between an acid and a base. |
| Observable learning outcome: | Explain what happens when an acid appears to ‘eat away’ a material. |
| Activity type: | Clarifying |
| Key words: | acid |

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

* Damaged marble

|  |  |
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| **P** | **PRIOR UNDERSTANDING**  This activity explores ideas from a previous key concept (CCR1.1) to aid transition from earlier stages of learning. |

**What does the research say?**

Driver (1994) summarises research (Hand and Treagust, 1989) about student conceptions of acids. Two major conceptions were that ‘acids eat material away’ and ‘acids burn you’. It was found that a widely held idea was that an acid could be tested for by seeing whether it ate something away. Researchers found that, even after use of a ‘conflict’ teaching strategy one third of students still did not perceive the reaction of acids with either metals of calcium carbonate as being due to the properties of an acid. Instead they saw them as further examples of ‘acids eating something away’.

This may be explained by the findings of research by Andersson (1990) which categorised five different types of answer that students gave when explaining observations of chemical reactions. Only one of these categories, chemical interaction in which substances combine to form a new substance of substances is scientifically correct. The perception of acids as ‘eating away’ a material is consistent with the category ‘disappearance’. The student observes a reaction and sees the loss of a reactant but does not recognise the formation of a new soluble product.

**Ways to use this activity**

This activity gives students the opportunity to clarify their thinking through discussion. To support this, students should answer the question in pairs or small groups.

Listening to individual groups as they work often highlights any difficulties they might have. These can often be overcome, through a whole class clarification or redirection part way through the activity.

It is important that students understand what information a chemical equation does give (for example whether the product formed is in solution) and what it does not (the colour of any reactant or product).

Johnstone (1991) explains the difficulties that many students face in understanding science as being due to the degree of ‘multilevel’ thought required. In chemistry students are frequently required to think about very different types of thing all at once.

Johnstone presented this in the form of a triangle:



*(after Johnstone, 1991, p78)*

This activity supports students in practising moving between a symbolic representation and thinking about macroscopic observations of a chemical reaction.

*Differentiation*

If some students are working with a teaching assistant, then a list of prompt questions for the teaching assistant could help to make this activity more purposeful.

**Expected answers**

1 a A white solid is added to a colourless solution. Bubbles of a colourless gas are formed.

b Two colourless solutions are mixed. A white precipitate is formed.

**Acknowledgments**

Developed by Helen Harden (UYSEG).

Images: None

**References**

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