**Explaining differences**

Copper is insoluble.



Copper sulfate is soluble.



1. Choose a statement that you think gives the best explanation for this difference.

A Copper becomes soluble when it is in copper sulfate.

B Copper is a different substance to copper sulfate and has different properties.

C Copper is a metal.

D Copper is an element and copper sulfate is a compound.

*Chemistry > Big idea CCR: Chemical reactions > Topic CCR2: Understanding reactions > Key concept CCR2.1: Reactions in solution*

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| **Response activity** |
| **Explaining differences** |

**Overview**

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| Learning objective: | When two solutions react, a product may be insoluble, resulting in the formation of a precipitate. |
| Observable learning outcome: | Recognise that a compound has properties (including solubility) that are distinct from its constituent elements. |  |
| Activity type: | simple multiple choice |
| Key words: | soluble, insoluble, substance, element, compound, metal, property |

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

* Is copper soluble?

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| **P** | **PRIOR UNDERSTANDING**  This activity explores ideas from a previous key concept CPS2.1: Atoms and molecules in order to aid transition from earlier stages of learning. |

**What does the research say?**

Research by Stavridou and Solomonidou (1998) and others has shown that some students lack the concept of chemical substance and that, as a consequence, a significant number have difficulty in identifying that a chemical reaction has taken place. Without the conceptual understanding to tell whether a new product (a new substance) has formed, students rely upon common-sense criteria. The research concluded that, in order to develop a secure understanding of chemical reactions students first need to develop the concept of a chemical substance.

The reasons for differences in solubility are beyond this stage of learning but it is important that students recognise that solubility is a property of each substance. This could support students in interpreting observations of chemical reactions in solution.

**Ways to use this activity**

This activity requires students to think about not only whether statements are scientifically correct but also whether they explain what is being asked.

Students could be asked to work in pairs to discuss each statement in turn before sharing thinking with the class.

**Expected answers**

B

**Acknowledgments**

Developed by Helen Harden (UYSEG.

Images: Peter Fairhurst and Helen Harden

**References**

Stavridou, H. and Solomonidou, C. (1998). Conceptual reorganization and the construction of the chemical reaction concept during secondary education. *International Journal of Science Education,* 20(2)**,** 205-221.