**Property mistakes**

1. Copper is ductile It can be drawn out into wires.



Which explanation best explains this property?

A There are no forces of attraction between copper atoms.

B Atoms of copper are easily stretched.

C Atoms of copper can slide across each other.

D Copper has a low melting point.

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

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| --- |
| **Response activity** |
| **Property mistakes** |

**Overview**

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| Learning objective: | The properties of elements and compounds arise from the structural arrangement of their constituent atoms. |
| Observable learning outcome: | Link the properties of an element to the collective behaviour its atoms. |
| Activity type: | application and practice/simple multiple choice |
| Key words: | atom, property |

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

* Properties of copper

**What does the research say?**

A research study (Ben-Zvi, 1986) investigated student perceptions of atoms, including misunderstandings about the atom being a ‘piece of the matter’ that has the macroscopic properties of the substance. This question was inspired by the title of this research article ;’Is an atom of copper malleable?’.

Other research (Tümay, 2016) suggests that the fundamental sources of many students’ difficulties in chemistry is a failure to understand the emergent nature properties of chemical substances and their interactions. He argues that the concept that properties emerge from the collective arrangement of atoms that make up a substance should be taken into account when addressing students’ misunderstandings.

Talanquer (Talanquer 2017) researched whether the prediction of wrong answers could improve student assessment results. His conclusion was that this method did show a significant impact on questions in certain areas of chemistry. The research was insufficient to explain why the approach has this effect but he speculates that the prompt to consider incorrect answers could have raised awareness of the presence of potential intuitive ‘traps’ and could have led some students to rethink their own answers or perhaps to spend more time in discriminating between multiple choice options.

**Ways to use this activity**

This question provides an opportunity for students to practise. Students could be encouraged to discuss reasons why the other options provide incorrect explanations.

**Expected answers**

C

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Images: Cooper wire, by Emilian Vicol (byrev) via <https://pixabay.com/en/copper-enamelled-lp-lmx-polyamide-88248/>

**References**

Ben-Zvi, R. (1986). Is an atom of copper malleable? *Journal of Chemical Education,* 63(1)**,** 64-66.

Talanquer, V. (2017). Concept inventories: Predicting the wrong answer may boost performance. *Journal of Chemical Education,* 94**,** 1805-1810.

Tümay, H. (2016). Reconsidering learning difficulties and misconceptions in chemistry:emergence in chemistry and its implications for chemical education. *Chemistry Education Research and Practice,* 17**,** 229-245.