**Grouping changes**

Here is a list of changes.

Sort the changes into groups.

Each group must have something in common.

|  |  |
| --- | --- |
| wax melting | nail rusting |
| wood burning | water boiling |
| perfume evaporating | milk turning sour |
| meat cooking in an oven | salt added to soup |
| sugar added to tea | egg boiling |

*Chemistry > Big idea CCR: Chemical reactions > Topic CCR1: Chemical change > Key concept CCR1.1: Formation of new substances*

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| --- |
| **Diagnostic question** |
| **Grouping changes** |

**Overview**

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| --- | --- |
| Learning focus: | During a chemical reaction a new substance (or substances) are formed which have different properties. |
| Observable learning outcome: | Categorise everyday observations of change. |
| Question type: | categorising |
| Key words: | melting, boiling, |

|  |  |
| --- | --- |
| **P** | **PRIOR UNDERSTANDING**  This diagnostic question probes understanding of ideas that are usually taught at age 5-11, to aid transition from earlier stages of learning. |

**What does the research say?**

This diagnostic question was inspired by a task created by Stavridou and Solomonidou (1998). This formed part of their research into the conceptual reorganisation that students require in order to understand the concept of chemical reactions. The research found that in this free categorisation task students initially used ‘natural’ categories such as actions (mixing), heating, destruction, or disappearance. As students moved up through school they were found to gradually abandon some of these common-sense criteria, replacing them with more scientific ones. However, categories such as heating and disappearance seemed highly persistent, with older students reluctant to relinquish them.

**Ways to use this question**

This question is presented in a format that allows for the different examples of change to be cut out and physically sorted into groups.

Follow-up questioning about why these groups were chosen and any rationale for allocating the changes to a particular group could provide valuable insights into student thinking.

*Differentiation*

The purpose of this diagnostic task is to establish existing student perceptions of the changes listed. Therefore, the groups that the students choose for their groupings are as important as what changes are placed in each group. It is important not to guide students in organising their grouping.

**Expected answers**

A scientific answer could be to group the changes as examples of either physical or chemical change.

**How to respond - what next?**

Findings from this diagnostic question could be used to inform teaching of a topic about chemical change. If students are using everyday experiences to group the changes, it may be beneficial to consolidate understanding of physical change before introducing chemical change. Alternatively, the diagnostic question ‘Which change?’ could be used to find out if students can distinguish physical and chemical change when prompted by the question to use these scientific categories.

**Acknowledgments**

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Images: None

**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.