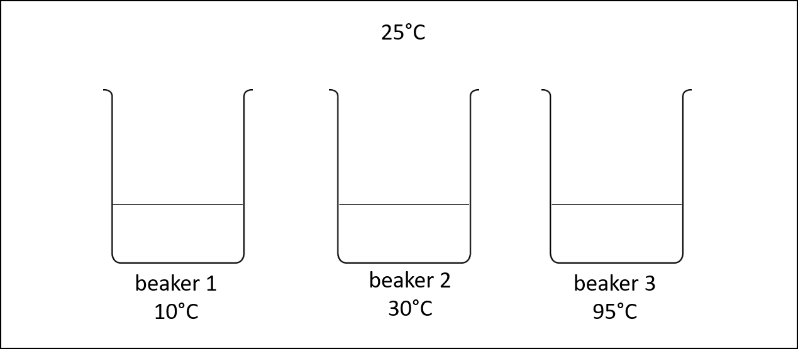
**Evaporating temperatures**

The same volume of water is added to three beakers.

Each beaker is kept at a different temperature.

The temperature of the room is 25°C.



The beakers are left for 3 weeks

In which beaker or beakers do you expect the water to have evaporated?

Put a tick (✓) in the box next to the best answer.

|  |  |  |
| --- | --- | --- |
| **A** | beakers 2 and 3 |  |
|  |  |  |
| **B** | beaker 1 only |  |
|  |  |  |
| **C** | beaker 3 only |  |
|  |  |  |
| **D** | beakers 1,2 and 3 |  |
|  |  |  |

*Chemistry > Big idea CPS: Particles and structure > Topic CPS5: Evaporation > Key concept CPS5.1: Explaining evaporation*

|  |
| --- |
| **Diagnostic question** |
| **Evaporating temperatures** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Evaporation takes place at any temperature between melting and boiling point. |
| Observable learning outcome: | Predict that evaporation will occur in liquids with a temperature that is less than or greater than that of the surroundings. |
| Question type: | Diagnostic, simple multiple choice |
| Key words: | evaporation, temperature |

**What does the research say?**

Research (Coştu and Ayas, 2005) found that some students thought that heating was necessary for evaporation to take place. The process of evaporation was therefore linked to a temperature difference between the liquid and the surroundings. According to these students, if the temperature of the surroundings was higher than the temperature of the liquid then evaporation would take place, but otherwise it would not.

**Ways to use this question**

Students should complete the question individually. This could be a pencil and paper exercise, or you could use an electronic ‘voting system’ or mini white boards and the PowerPoint presentation.

The answers to the question will show you whether students understood the concept sufficiently well to apply it correctly.

If there is a range of answers, you may choose to respond through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs.

*Differentiation*

You may choose to read the questions to the class, so that everyone can focus on the science. Showing the clearly labelled beakers may also ensure understanding of the question.

**Expected answers**

D

**How to respond - what next?**

A student who selects option B (beaker 1 only) may think that the surrounding temperature has to be higher than the temperature of the liquid for evaporation to occur.

In contrast, a student who selects option A (beakers 2 and 3) may think that a liquid has to be warm in order to evaporate. Choice of option C (beaker 3 only) could indicate that a student is linking evaporation with the boiling process. Follow-up questions could be used to probe student misunderstandings further.

If students have misunderstandings about the requirement of a temperature difference for evaporation to occur to ask students to think about some everyday examples of evaporation where there is not a temperature difference.

The following BEST ‘response activity’ could be used in follow-up to this diagnostic question:

* Garden problem

**Acknowledgments**

Developed by Helen Harden (UYSEG), from an idea by Bayram Coştu and Alipaşa Ayas (Karadeniz Technical University, Turkey).

Images: Helen Harden and Alistair Moore (UYSEG)

**References**

Coştu, B. and Ayas, A. ş. a. (2005). Evaporation in different liquids, secondary students' conceptions. *Research in Science and Technological Education,* 23(1)**,** 75-97.