**Reaction type**

* 1. Look at the following chemical equation.

2H2O2(aq) → 2H2O(l) + O2 (g)

Which type of chemical reaction does it represent?

A precipitation

B decomposition

C oxidation

* 1. How did you work out your answer?

You may choose one or more options.

A I thought about what I would see during the reaction.

B I worked out what the chemical formulae and state symbols meant.

C I imagined the particles.

D Other, please describe

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| --- |
| **Diagnostic question** |
| **Reaction type** |

**Overview**

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| --- | --- |
| Learning focus: | A chemical reaction can be summarised by a chemical equation. |
| Observable learning outcome: | Use a symbolic chemical equation to categorise a reaction as oxidation, decomposition or precipitation. |
| Question type: | two- step multiple choice |
| Key words: | precipitation, oxidation, decomposition |

**What does the research say?**

Johnstone (1991) used a triangle to summarise three levels of representation that he proposed are needed in order to understand chemistry.



*Figure 1 Johnstone’s triangle*

Johnstone (2000) highlights how in chemistry teaching students are often introduced to all three levels of representation simultaneously. Whilst an experienced chemist may be able to manipulate all three, he suggests that this may overload the “working space” (working memory) of school students.

This diagnostic question explores whether students choose to use one, two or three levels of representation to categorise the type of reaction.

**Ways to use this question**

This question aims to diagnose how students categorise a chemical reaction based on a symbolic chemical equation. It is important that they can recall what happens in each type of reaction as this is not the focus of this question. This could be recapped before answering the question.

The answers to the second part of the question may provide you with information on which representation or representations students used in solving the problem.

*Differentiation*

Some students may benefit from talking about what they can find out from the chemical equation before attempting to categorise the type of reaction.

**Expected answers**

C

**How to respond - what next?**

A student who selects option A may recall that precipitation reactions start with a solution. They are not making full use of the information provided on the right-hand side of the equation.

Choice of option C could be due to a student spotting oxygen in the chemical equation but not realising that it is a product rather than a reactant.

If students have misunderstandings about how to use a chemical equation to categorise a type of reaction, they may need to work through some more examples.

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

* Categorising reactions

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Images: None

**References**

Johnstone, A. H. (1991). Why is chemistry difficult to learn? Things are seldom what they seem. *Journal of Computer Assisted Learning,* 7**,** 75-83.

Johnstone, A. H. (2000). Teaching of chemistry- Logical or Psychological? *Chemistry Education:Research and practice in Europe,* 1(1)**,** 9-15.