**Sweet model**

A teacher uses sweets to model a chemical reaction.

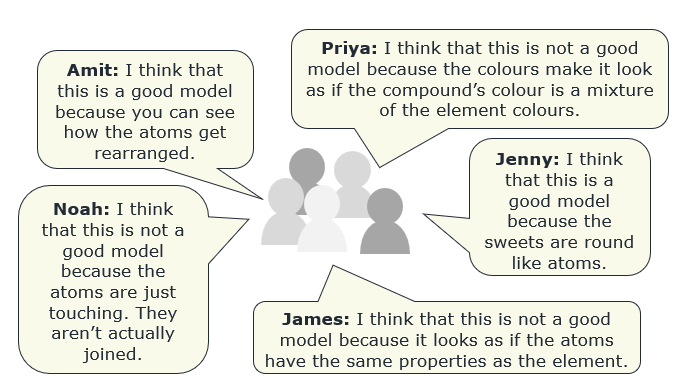
The model shows two elements in the gas state reacting.

They make a new compound. The compound is also in the gas state.



Some students discuss how good the teacher’s sweet model is.

Who do you agree with, and why?



*Chemistry > Big idea CPS: Particles and structure > Topic CPS3: Chemical change > Key concept CPS3.1: Rearrangement of atoms*

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| **Response activity** |
| **Sweet model** |

**Overview**

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| Learning objective: | During a chemical reaction, atoms are rearranged and a new substance (or substances) are formed with different properties. |
| Observable learning outcome: | Evaluate models of the rearrangement of atoms during a chemical reaction between two elements. |
| Activity type: | talking heads |
| Key words: | element, compound, model |

This activity can help develop students’ understanding by addressing the difficulties revealed by the following diagnostic question:

* Modelling chemical reactions

**What does the research say?**

Research (Kern et al., 2010) found that in a large sample of U.S. high school students whilst over half could successfully balance a chemical equation, less than half could provide an adequate particle representation.

Research (Jaber and BouJaoude, 2012) concluded that part of the challenge students appeared to face in considering the scope and function of particulate representations was an inadequate understanding of the nature and role of models. Some students considered models to be a ‘source of truth’ rather than a tool for reasoning that could provide a simplified representation of reality.

Any particle representation is in itself still a model and is not a direct copy of reality.

This activity supports students in discussing how good the sweet model is in representing the rearrangement of atoms during a chemical reaction. This provides an opportunity to reinforce with students that a model may be a good way to explain a phenomenon but, as it is not an exact copy of reality, it will also have limitations.

**Ways to use this activity**

This task is intended for discussion in pairs or small groups. It may be projected for discussion.

Feedback from each group can be used, with careful teacher questioning, to bring out the key idea which is that any given model has both strengths and limitations.

Students may need further prompting when reflecting upon Jenny’s response in order to consider the link between a model and its purpose. A model’s purpose is not necessarily to directly reflect reality, so the shape used in this case does not matter (see the building brick model used in the related diagnostic question: Modelling chemical reactions).

*Differentiation*

The quality of the discussions may be improved by careful selection of groups; or by allocating specific roles to students in each group. For example, you may choose to select a student with strong prior knowledge as the scribe. They may question the others and only write down what they have been told. This strategy encourages contributions from more members of each group.

**Expected answers**

The answers by Amit, Priya, Noah and James all make valid points about the sweet model.

**Acknowledgments**

Developed by Helen Harden (UYSEG).

Images: Helen Harden

**References**

Jaber, L. Z. and BouJaoude, S. (2012). A macro-micro-symbolic teaching to promote relational understanding of chemical reactions. *International Journal of Science Education,* 34(7)**,** 973-998.

Kern, A. L., et al. (2010). A qualitative report of the ways high school chemistry students attempt to represent a chemical reaction at the atomic/molecular level. *Chemistry Education Research and Practice,* 11**,** 165-172.