

# Why "dissolving" is a difficult idea

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These notes help explain why dissolving is not a straightforward concept for students to grasp. Researchers warn that this concept is much harder than teachers may realise. Even 16-17 year olds may try to describe the unseen events of dissolving based on their understanding of changes they can observe.

### **Misconception 1: Dissolving is confused with "melting"**

The Learning in Science Project (LISP) reported that 25% of the students interviewed used the terms melt and dissolve as if they were synonyms. Two reasons students might think like this are:

- In both melting and dissolving a solid appears to turn into a liquid;
- The use of hot water speeds up dissolving, just as heat speeds up melting.

### **Misconception 2: The solid ceases to exist when it dissolves**

Students' reasoning may be along the lines:

sugar + water                      ———                      »                      water (without sugar)

Students who state this are relying on what they see, and may not yet understand that:

- Even though you cannot see the solid it is still present;
- Solids break up into very tiny (but still essentially solid) particles as they dissolve. These particles are so tiny they are no longer visible to our eyes.

### **Misconception 3: Physical change and chemical reactions are confused**

Some students may not realise that when a solid dissolves each molecule of the solid remains unchanged. It does not combine with the water to make a new substance, as in a chemical reaction.

### **Misconception 4: Dissolving is thought of as storing away in small spaces**

Some students think that dissolved particles move into little "pockets" in the water where air bubbles have previously been.

This may relate to the appearance of air bubbles as water gets warmer. Gases can dissolve in water too – but *less* gas particles can stay dissolved as water gets warmer. That's why the air comes out, not because it is replaced by a solute.

## **References**

- Ebenezer, J., & Ericson, G. (1996). Chemistry Students' conceptions of Solubility: A Phenomenography. *Science Education*, 80,(2), 181-201.
- Osborne, R., & Freyberg, P. (1985). Learning in Science: The implications of children's science. Auckland: Heinemann.

## **Resources that involve dissolving**

### **Resource List**

- Dissolving sugar II
- Melting or dissolving?
- Dissolving salt faster
- Which type of sugar dissolves best?
- What is happening?
- Dissolving milo
- Sugar and water
- Rates of dissolving
- Dissolving sugar
- Melting and dissolving
- Sugary drinks

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