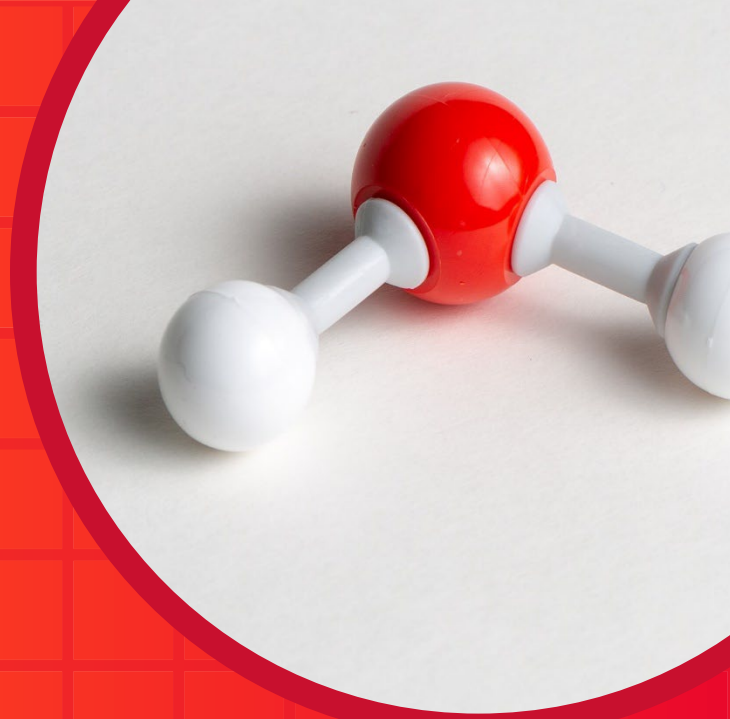
14–16 years

Using multiple models



ROYAL SOCIETY OF CHEMISTRY

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Learning objectives

1. Use a variety of models to develop scientific understanding of a molecule of hydrogen.
2. Discuss limitations of models in science.

The problem

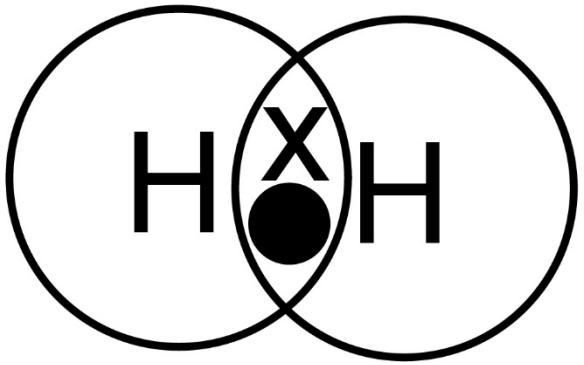
Many models are used in science to represent the same idea.

Your challenge is to use multiple models and representations to build a more concrete understanding of an abstract idea.

By answering a set of questions, you will evaluate each representation and gain a deeper understanding of the overall concept.

The hydrogen molecule

Here are five representations of the hydrogen molecule.
Answer the questions on your worksheet to critique.



A

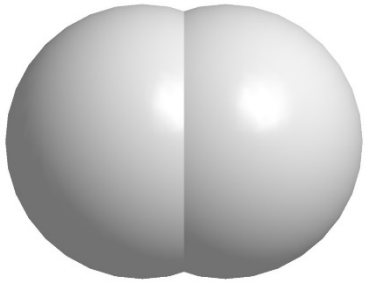
H_2

B

C

H—H

D



E

Peer review

Scientific claims from research published in journals must be peer reviewed. This means it is evaluated by other scientists who are experts in that field.

Discuss with a partner your answers to the questions.

- Have they thought of something you haven't?
- Is there something you might question about their answers?

Discussion

Ideas you might have had

- All models show the hydrogen molecule is made of two atoms.
- Models B and E don't show any information about the type of bonding.
- Models C and E don't specify what particular atoms are in the molecule.
- Models A, C and D show a single bond between the two atoms, so give more information than B and E.
- Model A gives further information about the type of bonding (covalent) by showing the overlapping electrons.
- Models C and E show the structure in 3D giving information about the shape of the molecule.
- Model C shows the bond as if it is a fixed structure, but E shows the atoms overlapping as they bond.