

A REAL SCIENCE PROJECT FOR SCHOOLS INVESTIGATING HOW CALCIUM CARBONATE FORMS



Calcium carbonate made in schools by Project M Scientists

Samples sent to Diamond Light Source

Look at structure of all 800 samples using X-rays in one giant 24-hour experiment

Results analysed and scientific findings published

WHAT WAS PROJECT M?

A chemistry research project: 1,000 students and teaching staff from schools all over the UK were the Project M Scientists working with staff at Diamond Light Source.

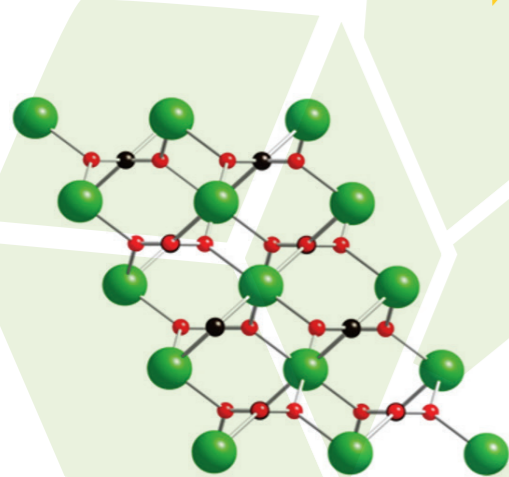
Project M Scientists did all the weighing, mixing, recording and preparation of samples of calcium carbonate (CaCO_3) using different additives.

Nature can control calcium carbonate formation to make super strong shells, using molecules and proteins as additives. Together our team investigated how our samples of CaCO_3 made with different additives, formed two different polymorphs: calcite and vaterite.

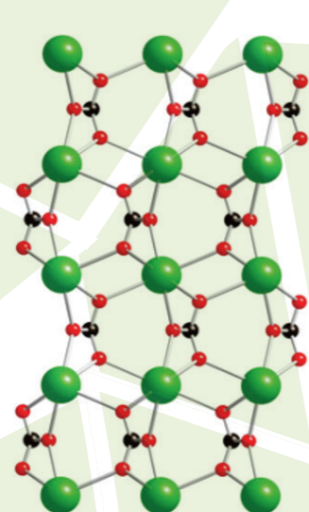
*'Polymorph' = material has the same chemical composition but a different crystal structure.

What happens to the structures when we use additives to make calcium carbonate?

Calcite



Vaterite



The samples were sent to Diamond Light Source, a research laboratory that creates extremely bright light. We used X-ray light and a robot sample changer at the laboratory "Beamline I11" to look at the structures the Project M Scientists had made.

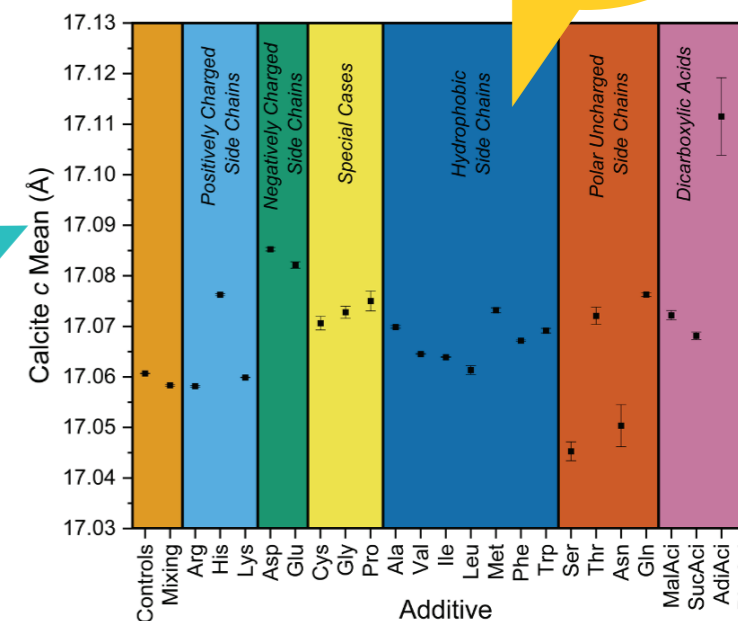
Calcite and Vaterite structures, where green is calcium, black is carbon and red is oxygen.



THE RESULTS

The calcite structure is more affected than vaterite by additives. Different additives have different effects. They interact with the structure in different ways depending on their functionality – whether they have a positive or negative charge or can mix with water.

This tells us about the size of the calcite structure



Some additives make the calcite structure bigger as they can be incorporated in the structure

The additives are mainly amino acids – similar to the additives used by nature to make calcium carbonate

WANT TO KNOW MORE?

About our results?

Check out the paper via the link below or the QR code on the right
<https://doi.org/10.1039/d3ce01173a>

About Diamond? Come visit us online or in person:
<https://www.diamond.ac.uk/Public.html>

