

Equilibrium on Mars

Student worksheet

Studying Mars

Scientists in laboratories all around the world are very interested in finding out more about our nearest planetary neighbour - Mars.

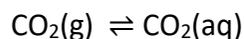
One of these scientists is Lucy, who works in The University of Oxford's Department of Earth Sciences. She is a chemist who is studying what went on in lakes on the surface of Mars billions of years ago.



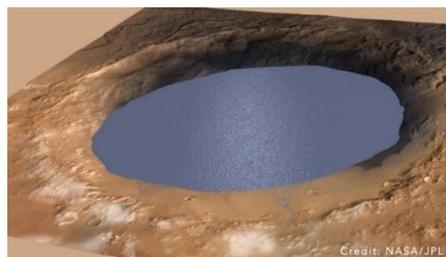
Mars today is a cold, dry planet but we have evidence that Mars' surface was once covered in rivers and lakes. This is especially exciting because it means that perhaps Mars was once home to early life.

Chemical reactions in Martian lakes

Carbon dioxide in the air dissolved into the lake water.



The solubility of carbon dioxide decreases as temperature increases.



Carbon dioxide reacts with water to form carbonic acid.



Carbonic acid is a weak acid, so partially dissociates.



In her research, Lucy changes the amount of carbon dioxide in the air and looks to see how this changes the pH of the water, and what minerals form. The lower the pH, the more iron will dissolve from the lake walls, to form new minerals.

Your task

Work out how changes in the concentration of carbon dioxide in Mars' atmosphere would have affected the pH of the Martian lakes, and therefore the amount of new carbonate minerals formed.

You should:

1. Complete the practical task to investigate Le Châtelier's principle.
2. Explain your results.
3. Explain how you could modify your method to find out if the enthalpy change of the reaction is positive or negative.
4. Apply Le Châtelier's principle to Martian lakes: Explain how the concentration of carbon dioxide in Mars' atmosphere would have affected the amount of carbonate minerals formed.
5. Predict how changes in Mars' temperature would have affected the amount of carbonate minerals formed.

