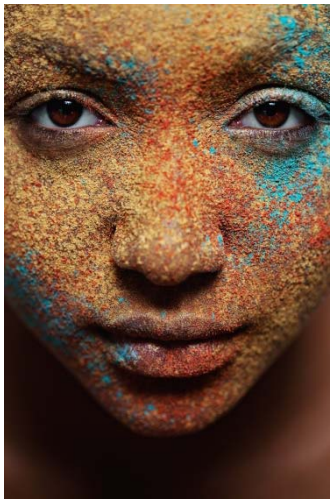
2014 international year of crystallography

United Nations Educational, Scientific and Cultural Organization

International Union of Crystallography

Partners for the International Year of Crystallography 2014



Where have you seen crystals before?

Can you come up with a definition of a crystal?

ROYAL SOCIETY OF CHEMISTRY

A crystalline solid is made up of atoms or molecules which are arranged in a repeating pattern and stacked over and over again.

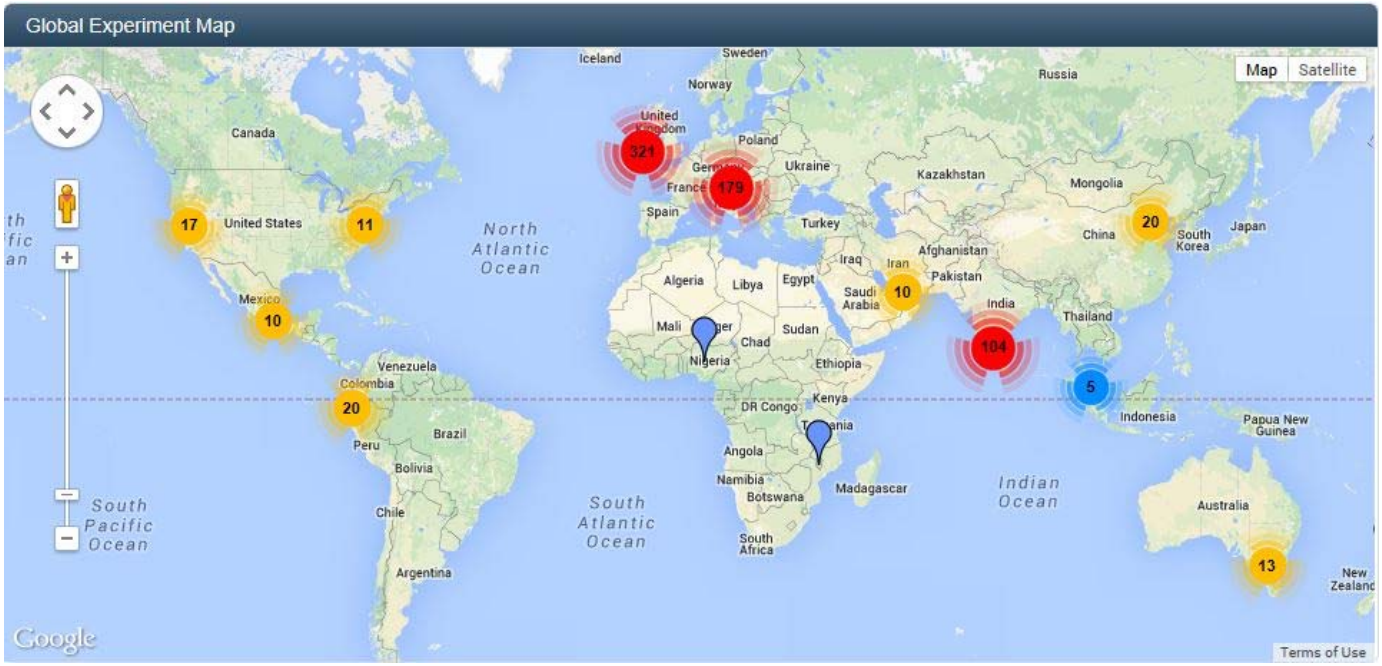
Where do we use crystals?

https://www.youtube.com/watch?v=J-Aof7marJQ

https://www.youtube.com/watch?v=m2maeeA9z84

- Teeth, bones
- Ice, minerals, rocks
- New materials
- Laser and superconductors
- Medicines, health
- Cultural heritage
- Art and architecture
- Jewels
- Cosmetics
- Foods
- Pigments
- Farming
- Green energy
- Space
- Biosciences

A Global Experiment…



- Last year over 22,000 people took part in our experiment.
- **This year – we want you to be part of it!**

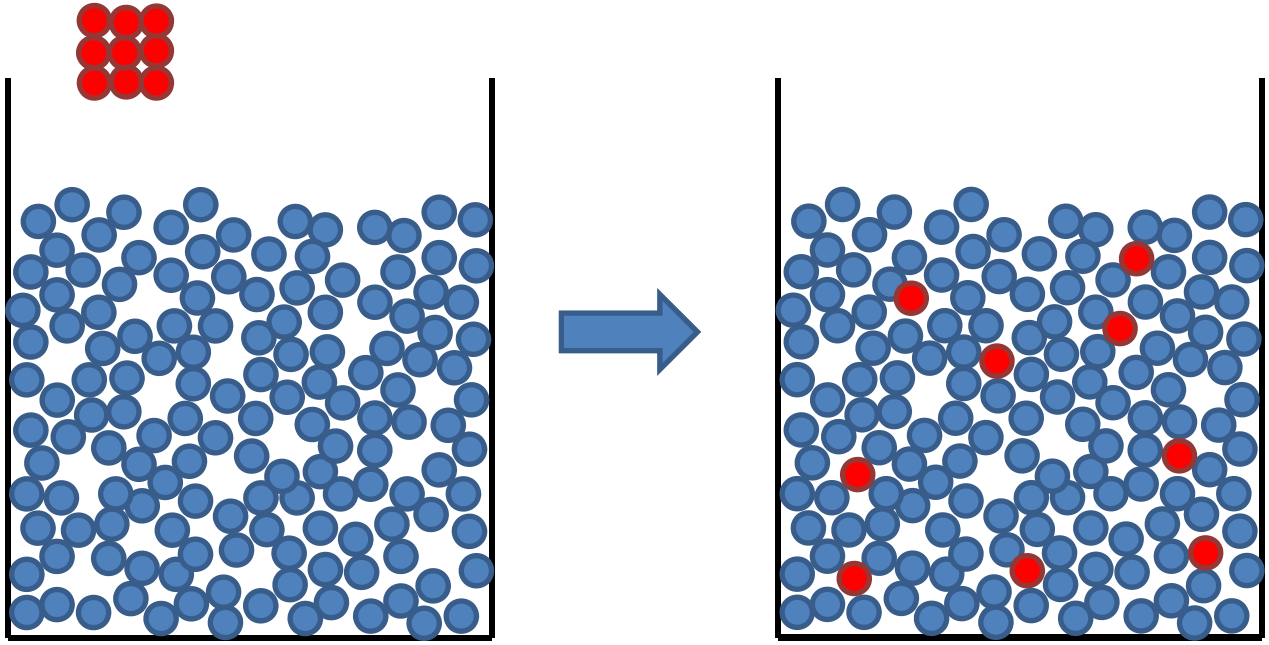
Learning Objectives

Things I will know…	Skills I will develop…
Define a crystal	Practice safe working
Describe some uses of crystals	Work collaboratively to gather data
Use the terms ‘dissolve’, ‘saturation’ and ‘crystallisation’ correctly	Explain why we repeat experiments

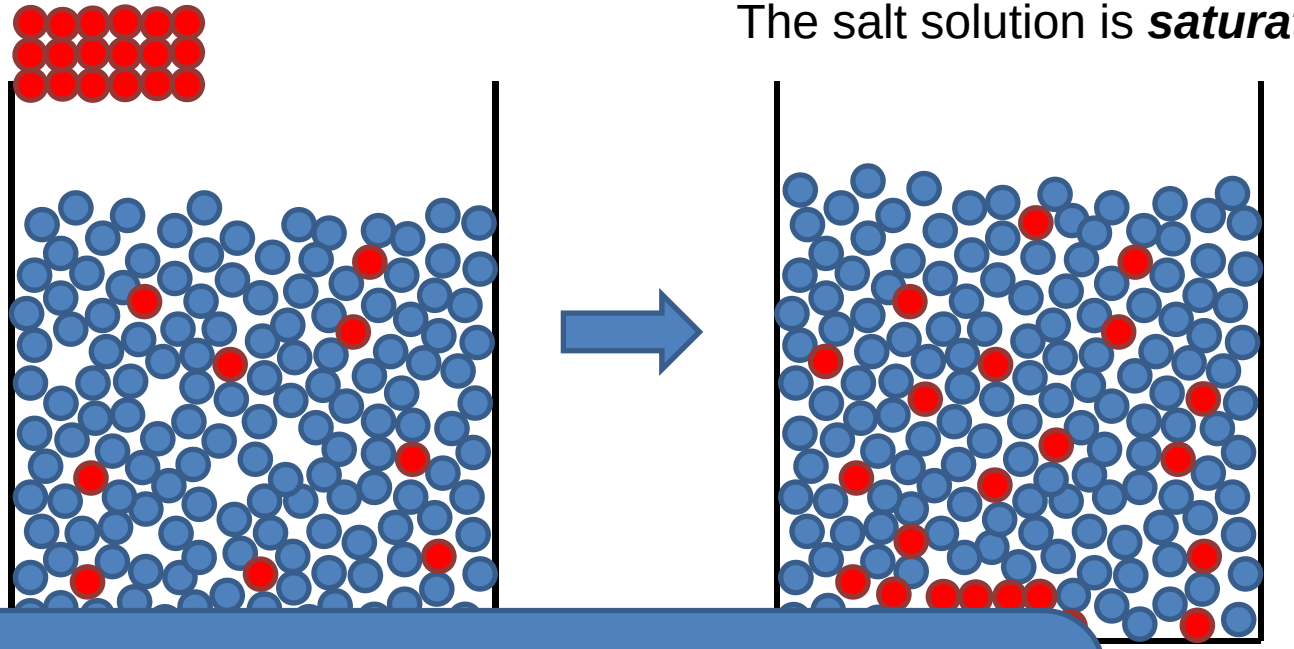
How do you make a crystal?

What happens if I add salt to water?

The salt ***dissolves*** in the water.



What happens if I keep on adding salt to water?



The salt solution is ***saturated***.

Your task is to determine how much of each of 5 different samples can be held by 40cm^3 water…

The experiment…

- Accurately measure 40 cm^3 of cold tap water into a clear cup.
- Record the mass in your table **(A)**.
- Add ¼ of a teaspoon of your sample to the cup of water and stir for 30 seconds.
- Once dissolved, add another ¼ of a teaspoon of the sample.
- This process is to be repeated until one whole addition is made and the sample will no longer dissolve.
- Measure the temperature of the saturated solution **(B)**.
- Record the new mass of the cup and saturated solution **(C)**.
- Calculate the mass of the sample added **(C-A=D)**.
- Repeat 3 times for each sample and calculate a mean of your data.

Our results

Discuss the class data and compare with the global experiment website: http://rsc.li/ge2014

Our conclusions

- Can you summarise what we have found in 3 sentences?

Key words:

dissolve	samples
saturated	40 cm^3

Lee Page (Education Executive, RSC) did an experiment…

I calculated that I had to add 9.5 g of my sample before it was saturated. It got quite cold – when I measured the temperature it was down to 8 °C!

Which substance do you think he used?

Making crystals

- Ask an adult to boil tap water.
- Into a clean container/cup add four full teaspoon measures of your sample (table salt, sugar, Epsom salts, alum or potassium nitrate).
- Ask an adult to measure 40 cm^3 of the hot water (the temperature needs to be at 70 ^oC or above) and transfer this to your container/cup with your sample inside. [Potential burns/spill/cup melting hazards] – [Safety Tip: you could use secondary containment to prevent burns or spills].
- Stir for 30 seconds and – if required – add more sample repeatedly until your sample will no longer dissolve (larger amounts than in Part A can be added to get to saturation).
- Fold a square filter paper into a triangle making two folds and open it making a cone shape (see **figure 3**).
- Pour your warm saturated sample through the cone-shaped filter paper into a clean, empty plastic disposable cup (this process removes undissolved material).

- Suspend a stick in the solution.
- Leave the cup for a week for crystal growth.

- Rapidly cool in icy water for instant crystals!

Our results

Discuss the class data and compare with the global experiment website: http://rsc.li/ge2014

How was your learning today?

Things I will know…		Skills I will develop…	
Define a crystal		Practice safe working	
Describe some uses of crystals		Work collaboratively to gather data	
Use the terms ‘dissolve’, ‘saturation’ and ‘crystallisation’ correctly		Explain why we repeat experiments