Homantin Government Secondary School

Year 2013-14

S.1 Integrated Science

Chapter 16 – Water as a wonderful solvent

Saturated solution and Crystallization

Name：_____Answer Key_____( ) Class：S. 1 _____

Date：_____

A. Saturated solution

Prepare a beaker with 50 cm^3 of water. Add one spoonful of salt to the beaker of water and stir it.
What do you observe?

Salt _____dissolve_____ (dissolve / cannot dissolve) in water.

What do you observe when **15 more spoonfuls** of salt are added?

Salt _____cannot dissolve_____ (dissolve / cannot dissolve) in _____water_____.

> The salt solution now is called _____a saturated solution_____ because ***no more*** salt _____can dissolve_____ (can dissolve / cannot dissolve) in it.

B. Preparation of a saturated solution

Prepare a beaker with 50 cm^3 of water. Add one spoonful of copper(II) sulphate to the beaker of water and stir it.
What do you observe?

The copper(II) sulphate **dissolves in the water.**

_____.

What do you observe when **15 more spoonfuls** of copper(II) sulphate are added?

The copper(II) sulphate cannot dissolve in the water._____.

> The copper(II) sulphate solution now is called _____a saturated solution_____ because **no more copper(II) sulphate can dissolve in it.**_____.

C. Discussing factors increasing the rate of dissolving (Recall knowledge)

What can you do to dissolve copper(II) sulphate ***more quickly*** in a beaker of water?

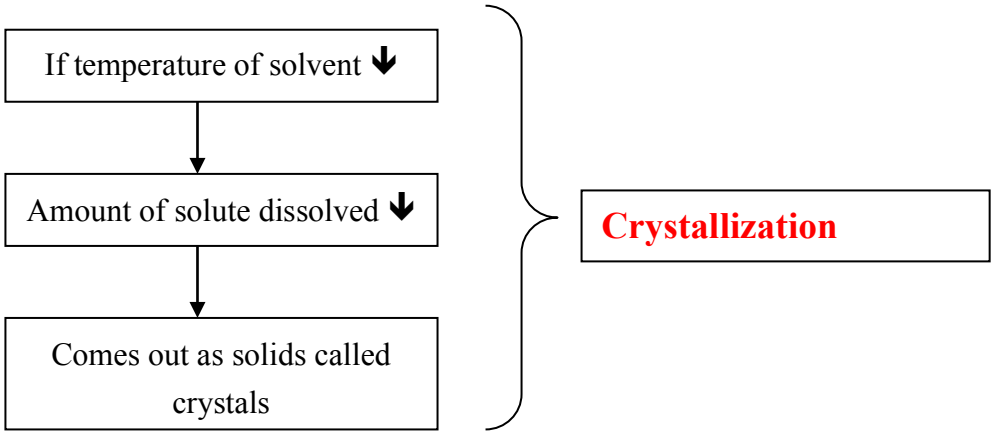
- Volume of water - Amount of copper(II) sulphate - Temperature of water	- Size of copper(II) sulphate - Rate of stirring

Choose from the above factor(s) that affects the amount of solute that can dissolve.

- Temperature of water
- Amount of copper(II) sulphate

D. Explanation of the process of crystallization

Brainstorm flowchart:



Solutes dissolve less in a solvent at a low temperature.

Solutes dissolve more in a solvent at a high temperature.

Hot saturated solution is cooled.

Hot saturated solution cannot hold all the solute in it.

Solute comes out as solids.

Solids have regular shapes

Solids are called crystals

This process is called crystallization.

Solutes dissolve ___less___ in a solvent at a low temperature than at a high temperature.

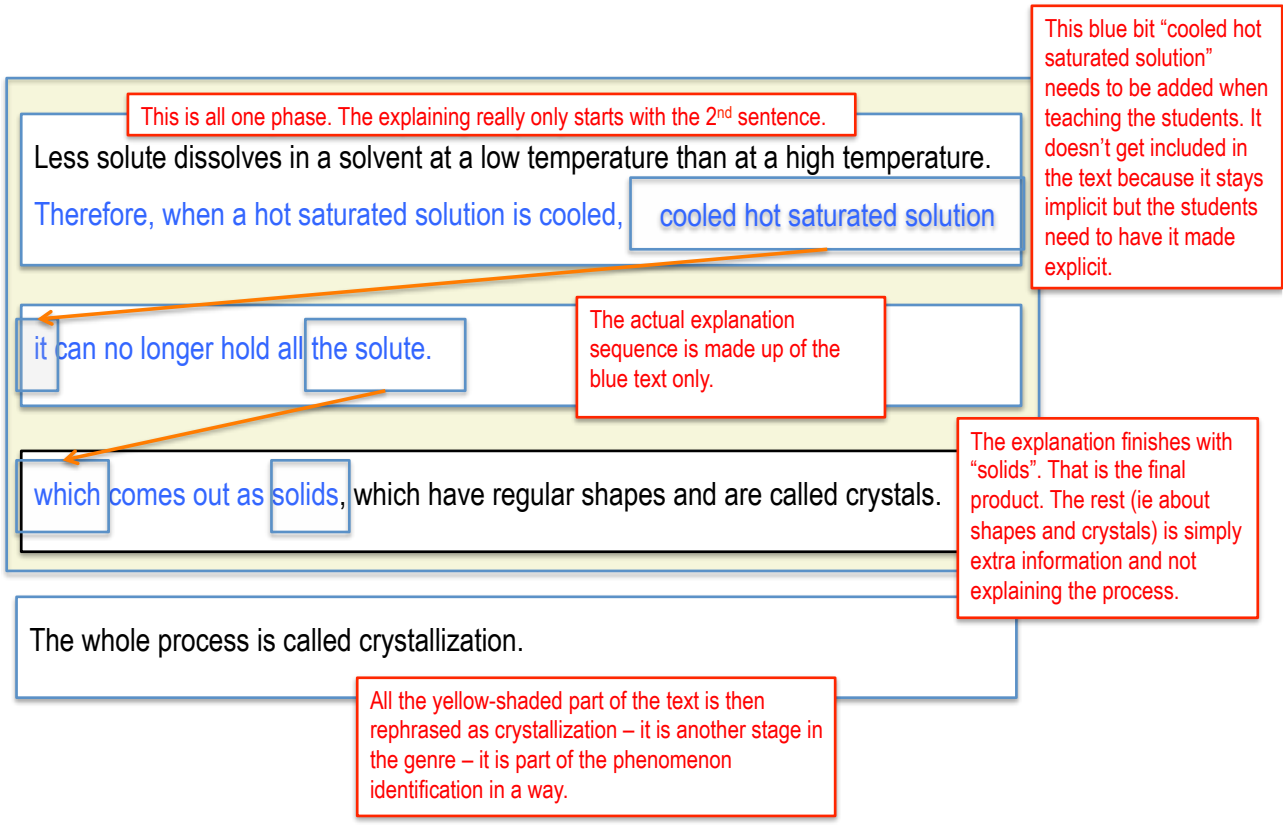
Therefore, when a ___hot___ saturated solution is cooled, the ___hot saturated solution___

cannot hold all the solute in it. Some ___solute___ comes out as solids. These ___solids___

have regular shapes. ___These solids___ are called crystals. The whole process is called **crystallization**

___.

Suggested organisation: two options.



Less solute dissolves in a solvent at a low temperature than at a high temperature.

Therefore, when a hot saturated solution is cooled, cooled hot saturated solution

it cannot hold all the solute.

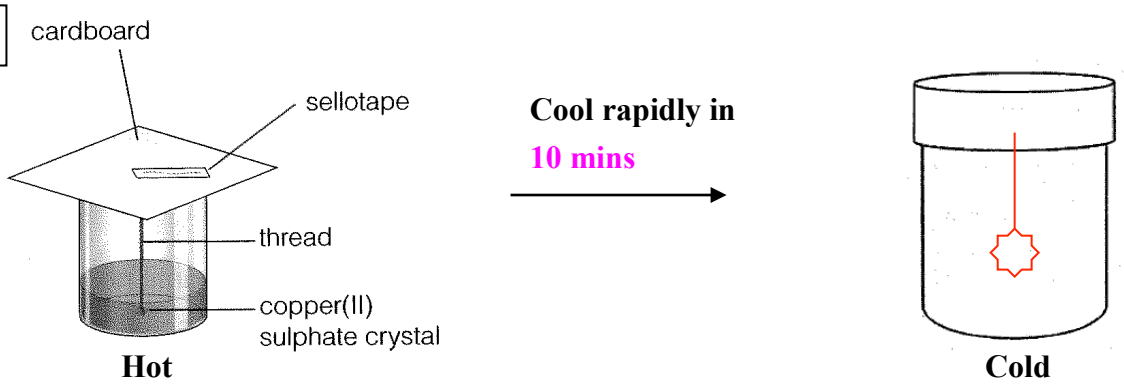
So, some of the solute comes out as solids. These have regular shapes and are called crystals.

The whole process is called crystallization.

E. Forming crystals by cooling a saturated solution under different conditions

In this experiment, you tried growing crystals from a saturated copper(II) sulphate solution. Let's look at the results now.

Case 1



(a) Draw what you saw in the bottle.

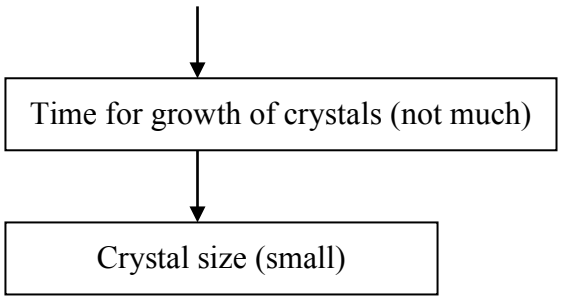
(b) Explain the result you got.

Brainstorm flowchart for explanation:

Reason (rate of cooling)

↓

Cooling time (Quick!)



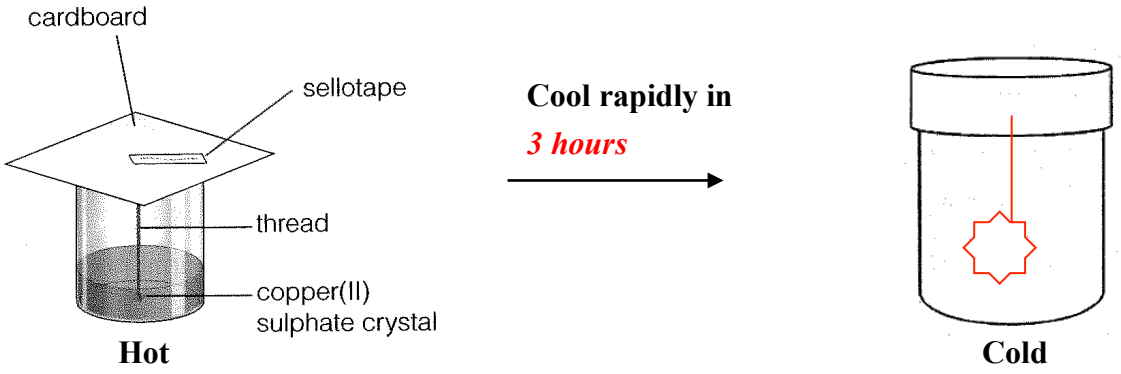
The **size** of the crystals depends on **the rate of cooling**.
(reason)

When the **rate of cooling** of the solution is **fast**,

the **crystals** do not have much **time** to grow.

Therefore, **the crystals** are **smaller** in size.

Case 2



(a) Draw what you saw in the bottle.

(b) Explain the result you got.

The **size of the crystals** depends on **the rate of cooling**.

When **the rate of cooling** of solution is **slow**, the **crystals**

have **enough time** to grow so **the crystals are larger in size.**

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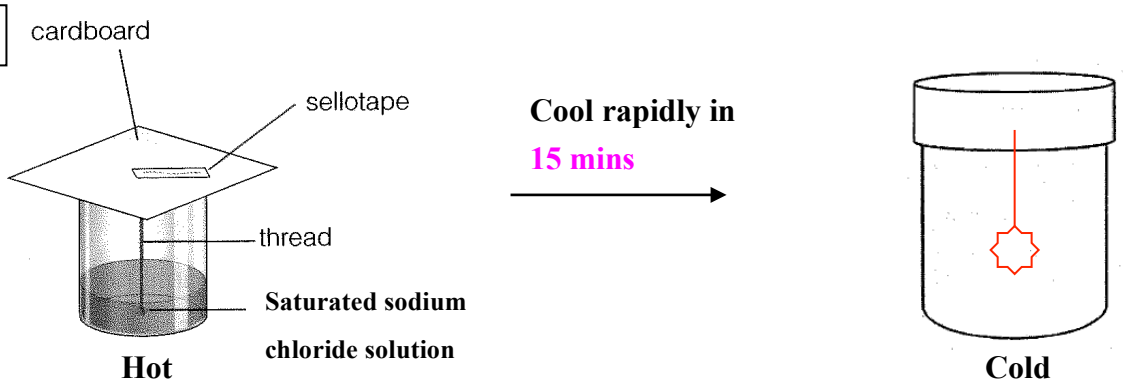
The you tried growing crystals from a saturated sodium chloride solution.

Case 1



(a) Draw what you saw in the bottle.

(b) Explain the result you got.

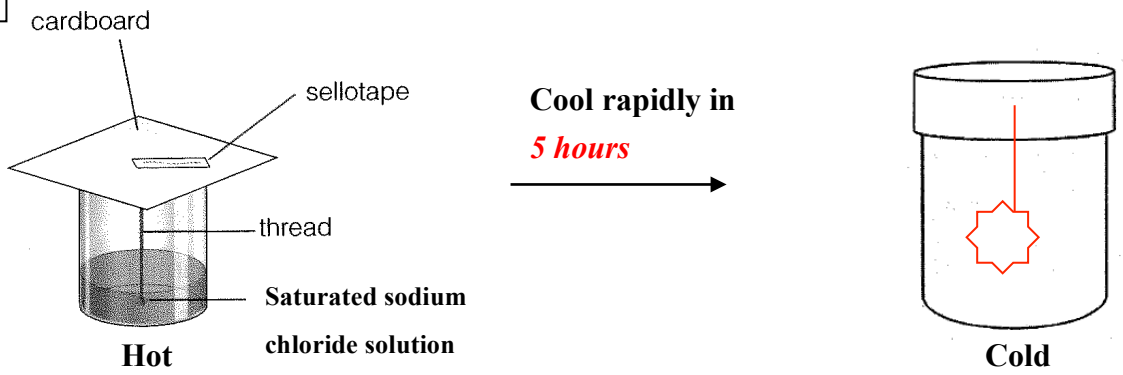
The size of the crystals depends on the rate of cooling.

When the rate of cooling of the solution is fast,

the crystals do not have much time to grow,

so the crystals are smaller in size.

Case 2



(a) Draw what you saw in the bottle.

(b) Explain the result you got.

The size of the crystals depends on the rate of cooling.

When the rate of cooling of the solution is slow,

the crystals have enough time to grow,

so the crystals are larger in size.