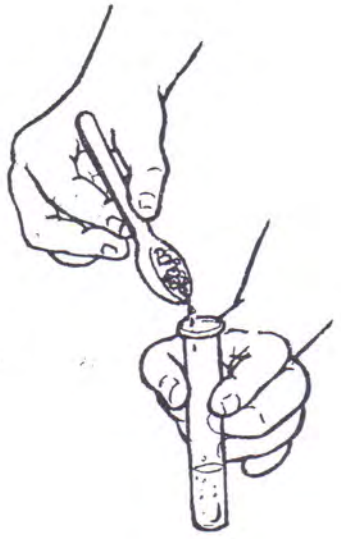
LET'S MAKE CRYSTALS

Chapter 18

In the chapter "Solubility", you learned that urea is soluble in water. You also observed that on heating a solution of urea, more urea can be dissolved in it.

When the solution is cooled, the excess urea solidifies in the solution. This process is called **crystallisation**. To make good **crystals**, we have to control this process.

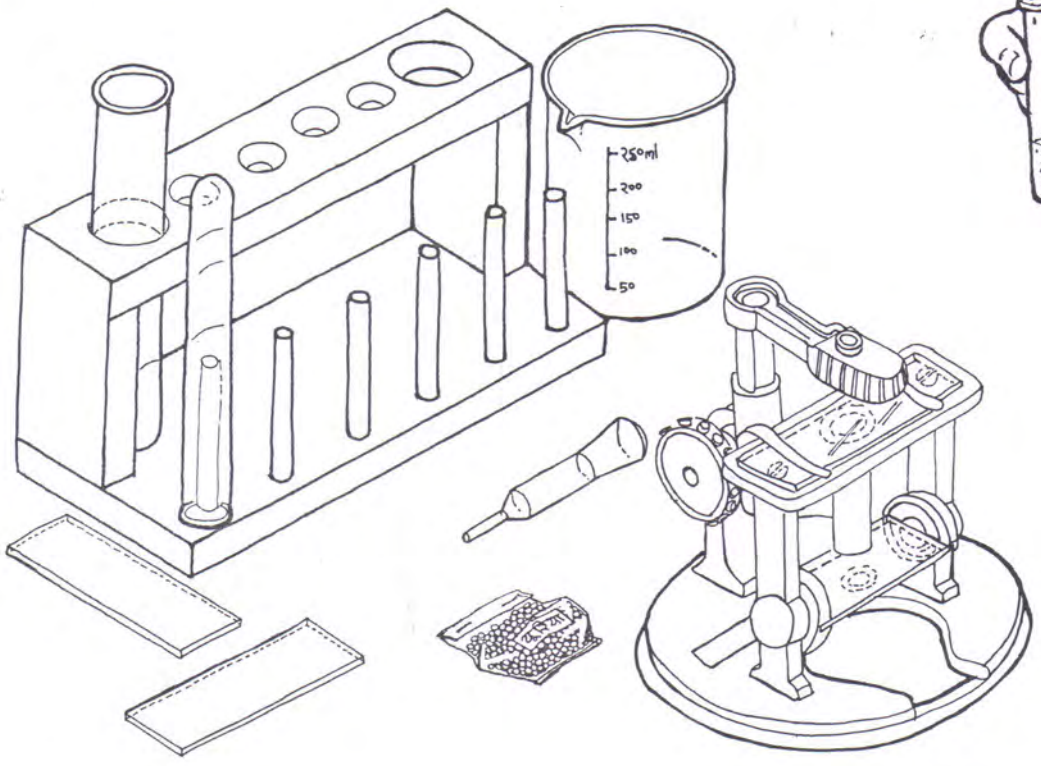
So let's try making crystals with urea and some other substances.

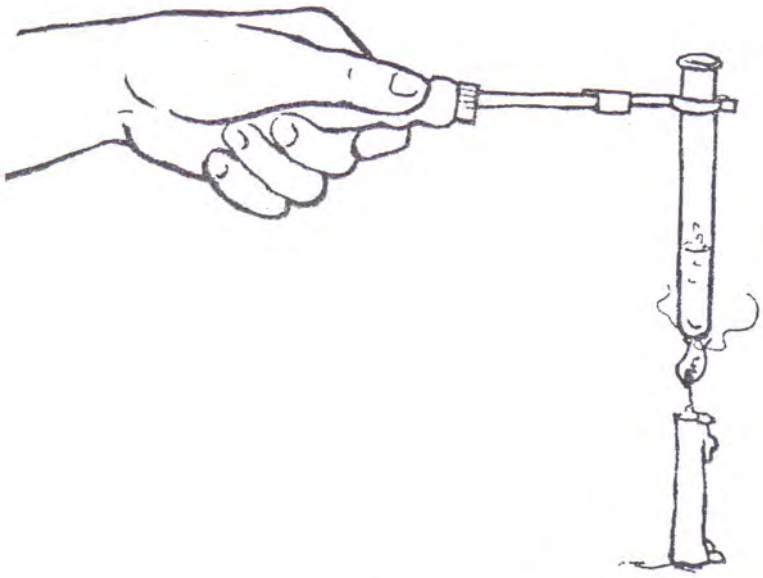


Experiment 1

Urea crystals

Pour about 5 ml of water in a test tube. Add about 8 gm of urea to it.





Did the urea dissolve completely?

If it did not, then heat the test tube till all the urea dissolves.

Let the solution cool for some time. Check the test tube after about half an hour.

Can you see any urea crystals in the solution? (1)

Examine the crystals carefully. If necessary, use a magnifying glass.

What is the shape of the crystals? Make a diagram of a urea crystal. (2)

Is the shape of the crystals the same in every group? (3)

Experiment 2

Benzoic acid crystals

Pour about 30 ml of water in a glass beaker. Add about one gram of benzoic acid to it. Heat the beaker to dissolve the benzoic acid in the solution. After about half an hour, observe the crystals of benzoic acid that have formed.

What is the shape of the benzoic acid crystals? Make a diagram of a crystal. (4)

Are the shape and colour of the crystals the same for all the groups? (5)

Experiment 3

Alum crystals

Pour about 5 ml of water in a test tube. Add about 1 gram of alum to it.

Did all the alum dissolve? (6)

If it did not, then heat the solution until all the alum dissolves. Then place the test tube in a beaker containing cold water. Observe the test tube carefully.

Did crystals of alum form in the solution? (7)

What is the shape of the crystals? (8)

Compare the crystals of urea, benzoic acid and alum. (9)

There is one other way of making crystals. In the chapter "Separation", you saw that it is necessary to evaporate the water in a salt solution to obtain salt from it. Crystals of some other substances can also be obtained from their solutions in this way.

Let's make some crystals using this method.

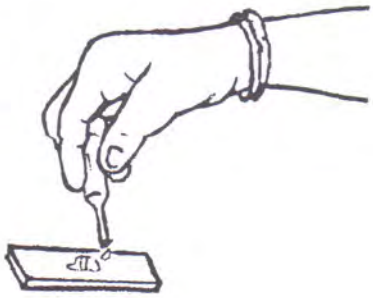
Experiment 4

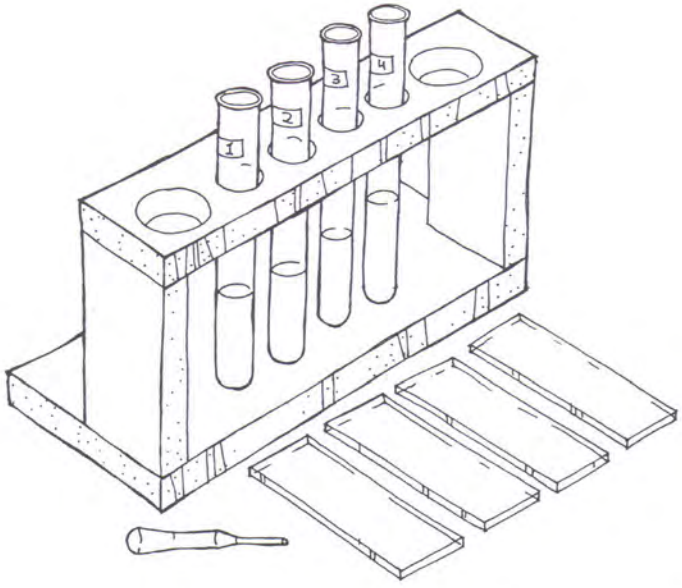
Crystals by evaporation

Take four test tubes and label them 1 to 4. Pour 10 ml of water in each test tube. Add one gram of copper sulphate to the first test tube. Then add one gram each of oxalic acid, urea and salt to test tubes 2, 3 and 4 respectively.

Wash and dry four glass slides. Number these 1 to 4. Use a dropper to put 4 to 5 drops of copper sulphate solution on slide 1. Put 4 to 5 drops each of oxalic acid, urea and salt solution on slides 2, 3 and 4 respectively. If you use the same dropper for all the solutions, wash it properly before adding each solution.

Observe the slides after about an hour.





Where did the water in the solutions on the slides disappear? (10)

Examine the crystals formed on the slides with a microscope and record your observations in the table given below. (11)

Are the shapes of the various crystals different? (12)

Compare the crystals of copper sulphate made by your group with those of the other groups.

Table

Substance	Colour of crystals	Shape of crystals
Copper sulphate		
Oxalic acid		
Urea		
Salt		

Is the shape of these crystals the same for all the groups or is it different? (13)

Similarly, compare the shapes of the crystals of other substances formed by all the groups.

Questions for revision

1. *Mishri* is nothing more than crystals of sugar. Try and find out how *mishri* is made.
2. In Experiment 3, you cooled the solution slowly to form alum crystals. What would happen if the solution is cooled quickly, for example by plunging the test tube in cold water? Do the experiment and find out.

New words

Crystals Crystallisation