

CHEM C500

Experiment Manual

 Thames & Kosmos®



WARNING – This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Contents



Your CHEM C500 experiment kit contains:

No.	Description	Quantity	Part No.
1.	Bottle for litmus solution (see p. 13 for how to make it), including safety cap with dropper insert	1	771501
2.	Litmus powder	1	704092
3.	Potassium ferrocyanide (or potassium hexacyanoferrate (II))	1	033422
4.	Ferric ammonium sulfate (or ammonium iron (III) sulfate)	1	033442
5.	Sodium carbonate	1	033412
6.	Citric acid	1	032132
7.	Test tube	3	062118
8.	Double-headed measuring spoon	1	035017
9.	Dropper pipette	2	232134
10.	Rubber stopper	1	071078
11.	Safety goggles	1	052297
12.	Lid opener	1	070177
13.	Clip for the 9-volt battery	1	042106

Please check to make sure that all parts indicated in the list are contained in the kit box.

21 Experiment

→ Procedure:

Dissolve 1 spoonful of sodium carbonate in a test tube with 5 cm of water, and add this solution to the Prussian blue. The blue color will gradually disappear, leaving behind a yellowish color.

i Why?

Potassium ferrocyanide is an indicator – chemists also call it a **reagent** – for iron. As this experiment shows, however, the solution should not be allowed to undergo an alkaline reaction; in an alkaline solution, Prussian blue is unstable.

Prussian blue is also useful, by the way, for invisible inks and other magic tricks.

22 Experiment

Blue invisible ink

→ Procedure:

For this experiment, you will need a fine paintbrush or an ink pen with a metal nib. As an “ink,” you will use ferric ammonium sulfate solution: 1 small spoonful of the chemical dissolved in 2 cm of water. As writing paper, it is best to use paper with a slight yellowish tint, so that nothing will be visible after the ink has dried. The recipient of your letter will just need to soak a piece of blotting paper with potassium ferrocyanide (added drop by drop with the pipette) and lay it onto the sheet: When your friend removes the blotting paper, the secret message will show up clearly in blue.

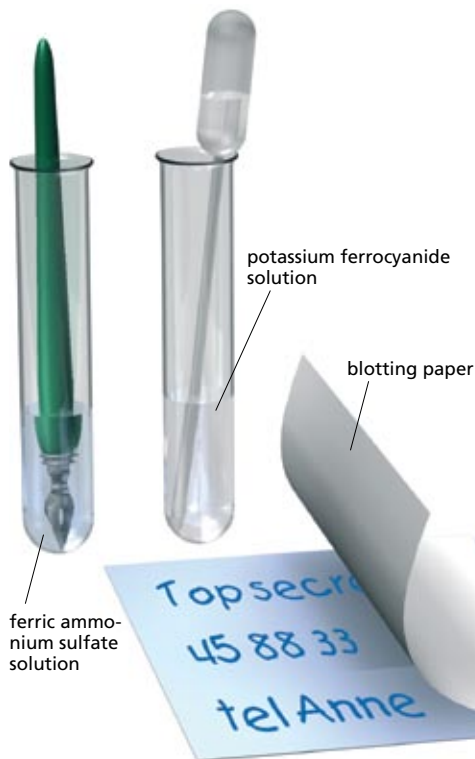
Think about how you could make the text disappear again. We have already shown you one simple method.

Xi



Safety Note

Sodium carbonate, citric acid, and ferric ammonium sulfate are irritants. Observe advice on page 6!



Writing a secret message with Prussian blue

23 Experiment

→ Procedure:

Fill two test tubes with 3 cm of water each and place them in the holes provided for them in the experiment kit box. To the first test tube (A), add 1 small spoon tip of ferric ammonium sulfate, and to the second (B) add 1 small spoon tip of potassium ferrocyanide – in each case, just a few crystals.

In the third test tube, dissolve 1 small spoonful of citric acid in 3 cm of water. Seal the test tube and shake well. Pour the colorless citric acid solution into test tube A. Seal the test tube again and shake thoroughly. You will get a golden yellow solution, which will be the “sunshine.”

Pour the sunshine into test tube B: “Night” will fall very fast. This means the golden yellow solution will turn into a dark blue solution very quickly.

i What Happened?

The sunshine solution is created when citric acid acts on iron compounds. After the last experiment, it should be clear to you what took place in test tube B.

24 Experiment

→ Procedure:

Put a shiny iron nail into a test tube and add potassium ferrocyanide solution (dissolve 1 spoon tip in 3 cm of water). No sign of blue!

i Why?

As already mentioned, many chemical reactions only take place in a water solution. Potassium ferrocyanide will only respond to dissolved iron, for example in the ferric ammonium sulfate solution.

You are about to learn another method for dissolving iron or copper without having to use the chemist’s caustic acids.

Sunshine to dark of night

