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Contents of the Kit

Microscope Parts

- 1 envelope containing 12 sections die-cut from heavy paperboard
- 1 tube adhesive
- 1 light bulb socket with attached cord
- 2 rubber gaskets for light bulb socket
- 1 five-power glass lens
- 1 piece polarizing film, 2 x 4 inches
- 1 blue filter sheet
- 1 red filter sheet

Microscope Accessories

- 8 long glass microscope slides
- 4 short glass microscope slides
- 1 plastic auxiliary converging lens
- 1 piece opaque paper

Specimens To Be Examined (in order of use)

- 1 small piece polarizing film, $\frac{1}{2}$ x 1 inch
- 1 cleavage rhomb of calcite
- 1 tourmaline crystal
- 2 cellophane bags
- 2 pieces of muscovite mica
- 1 vial benzoic acid
- 1 vial salol (phenyl salicylate)
- 1 vial sodium thiosulfate
- 2.4 grams ammonium dihydrogen phosphate powder, in glass bottle
- 1 slice ammonium dihydrogen phosphate crystal
- 1 vial levulose
- 1 empty vial

Other Things You Will Need

- 1 40-watt light bulb
- 2 paper clips
- a protractor
- a fine-toothed saw
- fine sandpaper
- adhesive tape
- cellophane ("Scotch") tape
- aluminum foil
- salt
- granulated sugar
- ice
- unflavored gelatin
- a white pebble

Introduction

The purpose of Bell System Science Experiment No. 4 is to suggest to you some experiments with crystals and light. You will think of many others yourself. The explanation of what is happening in some of the experiments may occur to you as you do them. More often, you will need to learn more about crystals or about light in order to understand your results. Some of this information is given in this booklet, but for some of it you should read the accompanying paperback book, *Crystals and Light, An Introduction to Optical Crystallography*. As you experiment more and learn more, questions may occur to you for which this book does not give a satisfactory answer. Then you will want to consult textbooks on optical crystallography, some of which are listed at the back of *Crystals and Light*.

With the paperboard pieces in this kit, you will build a microscope. However, do not put the microscope together until you have done the first five experiments, because you will need to use for these experiments things that will later become part of the microscope. A microscope is just a device for holding a magnifying lens or lenses and a well-lighted specimen in positions such that the specimen can be conveniently viewed through the magnifier.

The rest of this booklet is made up of descriptions of experiments for you to do and discussions of the significance of the results. *Be sure to do the experiments in the order in which they are numbered.* As in all science, understanding the results of more complicated experiments depends on understanding the results of simpler experiments.

With the descriptions of experiments there are questions that you can answer by performing the experiments and thinking about them. Whether or not you arrive at a satisfactory answer, you should read the answer in the back of the book before proceeding to the next experiment, because it is likely to contain information that will be useful to you in that experiment.