



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
1989 Volume VI: Crystals in Science, Math and Technology

Introduction

Crystals, such as diamonds, snow flakes, and table salt are familiar to everyone and, therefore, provide a good starting point for a wide variety of discussions. The seven syllabus units collected in this volume illustrate this wide range.

Five of the units are designed to be used by seventh and/or eighth grade students, but even within this range there are widely divergent possibilities. Thus one can discuss basic atomic structure and chemical bonding, minerals, rocks and the different states of matter, as well as some of the technologic applications of crystals to the generation of electricity from sunlight. But one can also use crystals at that level to provide a simple “hands on” experience for students by allowing them to grow crystals of their own from solution. There are also quantitative aspects of atoms and crystals which can be used to motivate simple numerical calculations involving very small and very large numbers. One of the units builds on this idea to introduce the metric system of units and powers of ten for students in mathematics. Another presents the ideas in ways which will be useful to the needs of Special Education students at the eighth grade level. Other off-shoots involve the introduction of some basic scientific techniques such as measuring masses, densities and volumes, and plotting results as graphs from which predictions can be made.

Two of the units address the needs of quite different groups of students. For the first time this year, there is a unit designed for elementary school students in the fourth grade. This unit emphasizes such basic skills as maintaining a journal and uses crystals to motivate students to observe and record their observations. The other unit is designed for high school students in mathematics. Even here crystals are grown from solution in class, this time to illustrate geometrical regularities and concepts of symmetry and groups of symmetry operations.

The intrinsic beauty of crystals and their ubiquitous occurrence in nature provide a strong driving force for interesting students in the methods and orderliness of science, and these units explore some of the possible approaches. Moreover, each of the units contains a list of references suggested for further reading, in most cases carefully annotated to explain the fields covered, and some list videos, computer software and other materials. It is our hope that these resources will serve to stimulate other teachers to explore the fascinating world of crystals for their own classes. This is a field of science which is truly accessible at all levels and it can serve to introduce many different important concepts. We hope that the reader will be inspired to look into this subject further.

Werner P. Wolf

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