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## Imagine - Chemistry in the Sixth Grade!

Helen W. Hawkins and Mildred L. Schultz  
Emerson and Castle Hill Schools, Waterloo

The introduction of an organized science program in the elementary school has brought about a reorganization of the science offerings at the junior and high school levels. The background in science that is developed at the elementary level has made it possible for the junior and senior high school science teachers to expand their programs. The problem that educators face is to determine what phases of science can be most effectively introduced in the elementary school.

Chemistry has usually been considered as a senior high school offering. Recently chemistry has been successfully introduced in the junior high school. The Waterloo school system undertook a project to determine if chemistry could be introduced at the sixth grade level.

The sixth grade science classes are using an experimental unit in chemistry that was developed by Richard Beitzel, Bemidji State College, as a part of his research project for a doctoral degree. He is endeavoring to discover what principles of chemistry twelve-year-olds can grasp. Modifications of the unit have been made as teachers have conferred with Mr. Beitzel. As this chemistry unit is

taught and evaluated by the sixth grade teachers revisions of the program should make it even more effective.

Objectives of the unit are simple: first, to stimulate problem-solving situations; second, to introduce some principles of chemistry.

The procedure adopted attempts to give children an opportunity to identify themselves with the kinds of problems scientists face. An activity—an experiment, a demonstration, or an exercise,—is presented to the class. In order to provide experiences in critical thinking, the pupils are encouraged to form theories to explain what is happening. They are asked not to consult books until they have formulated hypotheses that fit all the facts known to them, as well as all their observations.

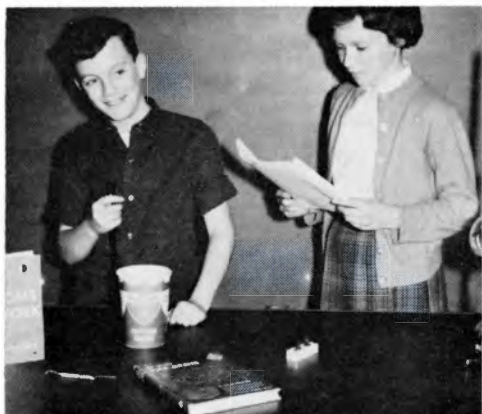
The topics touched on, briefly, are:

- I. What is chemistry?
- II. Structure of the atom
- III. Language of chemistry

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The students, Kent McElvania and Judy Ridder, prepared an experiment to show a dust explosion. They built an explosion chamber using a large cottage cheese box with a hole made near the bottom where a rubber tube is inserted. A candle is placed within the chamber as well as a small amount of flour. After one lights the candle, he blows through the rubber tube and the students observe the explosion—fire coming from the explosion chamber. Atoms are doing things! The students discover that atoms combined to form compounds. The flour particles are blown into the air and ignited by the candle flame. Since each particle of flour is surrounded by air, the flour burns rapidly. The air is heated by the rapid burning and so it expands. The combination of burning and expansion produces the explosive effect. The carbon in the flour unites with the oxygen from the air to produce carbon dioxide and heat. This is very exciting for the students.



**IMAGINE—CHEMISTRY**

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- IV. Nature of matter
  - States of matter
  - Classification
- V. How atoms are held together
- VI. Chemical reactions
- VII. Electricity and matter
- VIII. Acids, bases, and salts
- IX. Chemical tests: iodine, litmus, and lime water

An all-inclusive test was furnished by Mr. Beitzel, to be administered before and after study of the unit. Teachers may, or may not, use the testing materials as they wish.

The language of chemistry is one of the difficult areas. Symbols are readily grasped; some children understand formulas, too. But the balancing of chemical equations leaves pupils confused. The Atomic Chart (the first three periods of the Periodic Table) is most interesting to the children. Diatomic molecules and radicals are difficult to understand.

Some children intensely dislike having to think out a possible solution to explain what is happening. They would rather look in a book for the solution. Perhaps teachers have been at fault in over-teaching by supplying too many work-sheets. As a result the child doesn't know how to proceed under self direction.

The authors feel that chemistry is a desirable addition to the elementary school science program. It gives some depth to previous and to subsequent science learnings. If teachers at the junior and senior high school level are aware of the progress that has been made at the lower levels, they should be able to capitalize on this background and this would prove to be an asset rather than an interference with their domain.

**INCREASING OUR MEMBERSHIP**

At this writing we have approximately 111 members in good standing or should I say just standing and not doing much else. If we are to become a group of scientists who teach, then why don't we quit standing and attempt to get at least one fellow teacher in each school system to join our association? I know it's nice to join a group and just sit back and watch someone else do the work, and then if things don't go too well we can criticize and moan and groan about how it should have been done.

On December 14th your executive officers met at Iowa State University for two high level meetings concerning our future in Iowa professional ranks. The morning meeting was with the college officials with whom we will work in sponsoring the Iowa Science Teachers' Short Course in March. We have taken over the introductory part of the meeting in the morning session and are going to organize a junior high school teachers' session on physical sciences. This will include a meeting on the teaching of "The Periodic Chart" and "the setting-up of some elementary electrolytic chemical cells" that can be used to demonstrate the flow of electrons.

The physics group will see some demonstrations on how "the spectrograph works in determination of subatomic particles" and how the spectrograms are used in analyzing atoms. The high school level sessions have also been revised and new topics will be discussed. All in all, our organization is on the move. What can you do to volunteer your services? Sell yourself on the fact that we've got a good thing going and then sell this to a fellow teacher. Don't sell yourself short. A good salesman believes in his product. **How about YOU?**

Lindy Solon  
Secretary of ISTA

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