

4-1941

High School Science Preparation Of College Freshmen At Winona State Teachers College

Nels Minne

Winona State Teachers College

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Recommended Citation

Minne, N. (1941). High School Science Preparation Of College Freshmen At Winona State Teachers College. *Journal of the Minnesota Academy of Science*, Vol. 9 No.1, 76-77.

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Science Education

GENERAL

HIGH SCHOOL SCIENCE PREPARATION OF COLLEGE FRESHMEN AT WINONA STATE TEACHERS COLLEGE

NELS MINNE

Winona State Teachers College

ABSTRACT

A study of science courses pursued by students before entering college has been carried on since 1932 by questioning freshmen, and by consulting their high school records. It was found that:

40% took only one high school science; 29% biology, 8% chemistry, 4% physics.

31% took two high school sciences; 19% biology and chemistry, 7% biology and physics, 6% physics and chemistry.

12% took three high school sciences.

16% took no high school science beyond 9th grade general science.

These figures pertain to 507 students who planned to major in non-scientific fields—thus to a group of potential teachers and citizens whose college training should enable them to understand in a general way, and appreciate the scientific background of our life today. A similar study of data pertaining to all (214) Freshmen entering in the fall of 1940—those planning to major in science as well as those planning non-scientific majors—revealed percentages very close to those given above.

Since groups representing individual classes are small, no very reliable information can be obtained regarding possible trends over the nine-year period of study, but there does seem to be a decline in the percentage of those studying physics.

It is recognized that many students who have no interest in science or who have a low level of ability and hence avoid the courses in physical sciences in high school, will not be found in the group entering college. However, the group studied here is one which must be given some scientific background in college. The data here presented point toward the conclusion that the background of college freshmen is inadequate in chemistry and especially so in physics. If we look upon our college curriculum as the means of providing information, attitudes, understanding, and apprecia-

tion in the major fields of knowledge, then provision should be made to include some training in the physical sciences for non-science majors.

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CHEMISTRY DEMONSTRATIONS IN PUBLIC

LEONARD A. FORD

State Teachers College, Mankato, Minnesota

Chemistry open house programs serve a useful purpose in entertainment and education of the public by demonstrations and exhibits. When performed in the laboratory where it is possible to prepare adequately for a public showing with all the apparatus at one's disposal, many startling as well as commonplace experiments can be carried out.^{1 2 3}

Is it possible to conveniently perform a series of interesting and entertaining experiments at public gatherings such as parent teachers organizations, service clubs and school assemblies? The experimenter is limited to apparatus and chemicals which he can conveniently take with him from the laboratory. Gas and water connections will not be available and demonstrations will likely have to be performed on a small table before an audience.

No subject can be made to create so much interest or entertainment for a large group as chemistry because no subject lends itself so well to visual demonstration. Working with colored flames, solids, liquids and gases, the experimenter can easily hold the attention of his audience. The element of motion in which the demonstrator adds a reagent to a beaker, pours liquids, produces colored gases and smokes that rise and fall helps to sustain interest. The added mystery associated in the lay mind by a lack of understanding of chemistry makes a series of demonstrations as intriguing as the slight of hand performance of a magician. Curiosity is aroused by the pop of an explosion, formation of precipitates and effervescence of gases.

The experiments to be selected for a public performance must go to completion rapidly. Gases, liquids, solids and flames should be colored and should be visible at some distance from the demonstrator. Since a bunsen burner will not be available, reactions must be selected which require no heating or the relatively small amount of heat evolved by an alcohol lamp. Small volumes of solutions must be used since water connections will not be available. Demonstrations must be selected that require a small amount of chemical which can easily be carried about.

¹ Kindy, M. M., "A Successful Open-House Program," *J. Chem. Educ.* S, 2-46051, (1931)

² Billinger, R. D., "Open-House Programs," *J. Chem. Educ.* 11, 494-499, (1934)

³ Vesconte, Amy Le, "A Plan for the Open House in Chemistry," *J. Chem. Educ.* 13, 72-73, (1936)