seemed necessary. A simple legal formula could be devised for the administration of such a specific bequest, with some provision against capitalization and the assignment of unexpended balances to some other object after a definite period. The donor's benevolence could be recorded in perpetuity, were the memoirs describing the results associated with his name.

THE AMERICAN PLAN

But there are also donors who wish to provide capital funds, large or small, for the perpetual benefit of science or of some branch of natural knowledge. One of the members of the National Research Council of America has proposed a scheme in which he hopes to have combined permanence with flexibility. In that western home of liberty a very large interference with what in Europe we still think the inalienable rights of the individual is not only advocated, but is accepted with docility, and I gather that the intention is to compel benefactors to wisdom.

It is proposed, in brief, that the board of trustees to whom is to be committed the administration of any permanent gift for the advancement of science should be elected at stated periods by a committee of electors. Of the latter, five are to be appointed annually, two chosen by the board itself, and three by some stable institution such as, for example, the National Research Council, which is a working organization of the National Academy of Sciences. The duration of office should be for five years, and a member would not be eligible for re-election for one year. The object is that every board of trustees should be chosen by persons a

majority of whom are approved representatives of the science or sciences named, fully conversant with the situation in the age in which they are acting, free from self-interest in the election, and, by virtue of their position, charged with responsibility for rendering this type of service.

The trustees so elected and so kept in continuous touch with the best interests of science should have full power in regard to the supervision of projects and expenditure of funds. But what is the vital element in the scheme is that they would have power to adapt the provisions of their original charter to what *they* conceive to be the object of the funds, so as to meet "changing conditions and needs in the spirit of the original intent of the donor." It is a very interesting proposal, which if carried out on a large scale would probably do much for the progress of science, and certainly increase to a very marked extent the power of the National Research Council. But *Quis custodiet ipsos custodes?* Is it quite certain that even a National Research Council will prove a perpetual fount of wisdom and impartiality?—London *Times*.

SCIENTIFIC BOOKS

An Advanced Course of Instruction in Chemical Principles. By ARTHUR A. NOYES and MILES S. SHERRILL. Complete Revision. pp. XVIII + 310. The Macmillan Company, New York.

PERHAPS in no other subject is the *method* which is employed for instruction more vital than it is in Physical Chemistry; for it is in that subject that the distinction between Power and Knowledge is probably most marked.

In striking contrast to the many books on this subject which are written from the purely descriptive point of view, books which are attractive because easy to read, but which leave the reader only with a vague knowledge of what has been done, and with no acquired power to apply the principles studied to the new questions of to-day and to-morrow, this book is intended primarily to make the principles and at the same time their general and specific application so clear, that the knowledge and the power to apply and use it practically are developed simultaneously. In other words, the problem-method of instruction, first introduced in Physical Chemistry by Speyers in his "Text-book," and amplified by the Reviewer in the second edition of his "Elements" (1902), is the method recognized in this work as the only one which will "give that intensive training which is essential for pursuing more specialized courses of scientific study, or for applying chemical principles to industrial problems."

It is to be regretted that the authors have not seen fit to include any journal-references in the text, either to the things directly con-

sidered, or to those which are expansions and continuations of them, for the student is thus confirmed in his bad habit of being satisfied with a statement from a text-book, rather than encouraged to seek the real source, the journal article. Another disadvantage arising from this lack of references is the very real danger that the reader will feel that at any point the last word had been said on the subject, whereas a glance at the original papers would show him in truth that it was only the first.

Since an international committee has already established a notation for use in Physical Chemistry, it would seem a pity that the authors in this text have adhered to a local one, for it will needlessly confuse the reader.

The fact that this is the final revision of the preliminary editions of 1917 and 1920 is assurance that few if any misprints or errors are likely to be found in the text.

A list of the chapter headings given below will show the general scope of the book:

Part I *The atomic, molecular and ionic theories and properties of substances directly relating to these theories.*
The composition of substances and atomic theory. The molal properties of gases and the molecular and kinetic theories. The molal properties of solutions and the molecular theory. The atomic properties of solid substances. The electrolytic behavior of solutions and the ionic theory.

Part II *The rate and equilibrium of chemical changes from mass-action and the phase view points. The rate of chemical changes.*
The equilibrium of chemical changes at constant temperature. Equilibrium of chemical systems in relation to the phases present.

Part III *The energy effects attending chemical changes, and the equilibrium of chemical changes in relation to these effects.*
The production of heat by chemical changes. The production of work by isothermal chemical changes in relation to their equilibrium conditions. The production of work from isothermal changes by electrochemical processes. The effect of temperature on work producible by isothermal chemical changes and on their equilibrium conditions. Systematization of free-energy values.

J. LIVINGSTON R. MORGAN

SPECIAL ARTICLES

SAND DROWN, A CHLOROSIS OF TOBACCO AND OTHER PLANTS RESULTING FROM MAGNESIUM DEFICIENCY

IN connection with recent field investigations in the improvement of tobacco production conducted by the Bureau of Plant Industry in cooperation with the North Carolina Department of Agriculture attention was directed to a characteristic chlorosis of the leaves of tobacco plants on certain test plots. Investigation disclosed the fact that this disease often causes serious damage to the tobacco crop on certain types of soil, particularly in comparatively wet seasons. The popular name of this chlorosis is "Sand Drown," a term referring to the fact that the disease is likely to occur in aggravated form on the more sandy portions of the field after heavy rainfall. As a result of considerable field and laboratory study extending through several seasons this malady has been found to be due to an insufficient supply of magnesium in the soil or fertilizer. It has been found, further, that the ratio between the quantities of sulfur (sulfate) and magnesium contained in the fertilizer is a factor of importance, the symptoms of magnesium deficiency being intensified by increase in the quantity of sulfur applied to the soil. The details of the investigations will eventually appear in the *Journal of Agricultural Research* but because of considerable delay in publication resulting from temporary suspension of this journal it seems desirable to present at this time a brief outline of the principal facts established. The chlorosis in question usually begins at the tip and along the outer margins of the older leaves, advancing toward the leaf base and extending progressively to the upper leaves of the plant. In some cases, however, the chlorosis involves large portions of the leaf surface when first clearly recognizable. The veins and midrib of the leaf tend to retain their normal color. There is more or less complete blanching of the leaf lamina, both yellow and green chlorophyll pigments being affected