it in one form or another. A Department of Conservation would be almost as illogical as a department of typewriting or a department of wastebaskets, which everybody has to use.

The conservation policy itself, and about every important conservation movement for the last thirty years, originated in the Department of Agriculture. It has shown practical horse sense in dealing with natural resources intelligently, uprightly and without fraud or loss.

In contrast, the record of the Interior Department is far and away the worst in Washington. Every natural resource, without exception, that has been held for disposal by the Interior Department—public lands, Indian lands, coal, oil, water power and timber—has been wasted and squandered at one time or another. It is one long story of fraud in public lands, theft in Indian lands and throwing the people's property away.

Most of the fights for conservation have been made to save natural resources belonging to the people which the Interior Department was throwing away. The national forests must not go the same road.

Secretary of the Interior Ickes is sincere and honest, but he cannot live forever. Secretary Garfield was honest, but Secretary Ballinger, his successor, tried to give away the people's water powers and the coal lands in Alaska. The resulting scandal cost Taft his reelection. And everybody remembers Teapot Dome, when Secretary Fall handed the navy's oil lands over to the despoilers. Fall tried hard to get his hands on the national forests.

Ickes is my friend, Wallace is my friend. But the national forests could not be better handled in the Interior Department than in the Department of Agriculture, where they have been safe for thirty years. What is the use of rocking the boat?

The Forest Service is completely free from politics where it is. Ickes himself is straight, but the whole history of the Interior Department is reeking with politics. The tradition of the Interior Department is to put private interests first. The tradition of the Agricultural Department is to put public interests first.

Wood is a crop. Forestry is tree farming. It belongs in the Department of Agriculture with all other farming and production from the soil.

Undoubtedly if Secretary Ickes got the national forests he would do his level best. But he has more work now than any other cabinet officer in Washington. The national forests are bigger than all the Atlantic States, from Maine to Virginia inclusive. Why put this additional load on a man who has too much to do already? Let the national forests stay where they are.—*Gifford Pinchot, former governor of Pennsylvania, forester, U. S. Department of Agriculture, 1896 to 1910, in The New York Times.*

SCIENTIFIC APPARATUS AND LABORATORY METHODS

CONSTRUCTION OF A CARTESIAN NOMOGRAM FOR THE LAW OF MASS ACTION

GIVEN the equations

$$(1)\quad [\text{Total A}]^* = [\text{A}] + [\text{AB}]$$

$$(2)\quad [\text{Total B}] = [\text{B}] + [\text{AB}]$$

and the mass action equation

$$(3)\quad \frac{[\text{A}] \times [\text{B}]}{[\text{AB}]} = \text{K}$$

it is often required to calculate values for [A] or [B] from values for [Total A] and [Total B]. This is most conveniently done with the aid of a Cartesian nomogram, of which the abscissas and ordinates represent [Total A] and [Total B], respectively, and on which [A] or [B], or both, appear as families of curves, each value for [A] or [B] being represented by a straight line.

The general equations for such a nomogram, as obtained from Equations 1 to 3, are

$$(4)\quad [\text{Total A}] = \frac{[\text{A}] \times [\text{Total B}]}{\text{K} + [\text{A}]} + [\text{A}]$$

$$(5)\quad [\text{Total B}] = \frac{[\text{B}] \times [\text{Total A}]}{\text{K} + [\text{B}]} + [\text{B}]$$

Construction of the nomogram from these equations offers no difficulties, but can be still further simplified.

From Equation 3, when $[\text{A}] = [\text{AB}]$, $[\text{B}] = \text{K}$, and when $[\text{A}] = [\text{AB}] = [\text{B}] = \text{K}$, $[\text{Total A}] = [\text{Total B}] = 2\ \text{K}$. It follows that a straight line passing through the points $[\text{Total B}] = \text{K}$, $[\text{Total A}] = 0$, and $[\text{Total A}] = [\text{Total B}] = 2\ \text{K}$, represents all points at which $[\text{A}] = [\text{AB}]$ and therefore at which $[\text{Total A}] = 2\,[\text{A}]$. If this line is drawn the desired points for $[\text{A}] = \frac{[\text{Total A}]}{2}$ may be located upon it and connected by straight lines with the corresponding points for $[\text{A}] = [\text{Total A}]$, $[\text{Total B}] = 0$. Figure 1 illustrates the construction of the nomogram by this method. If desired the iso-[B] lines may be located by the same method.

When the value for K is small, graphic extrapolation of the line representing the points $[\text{Total A}] = 2\,[\text{A}]$, and of the iso-[A] lines passing through points located upon it, may be inaccurate. In such a case a line further removed from the [Total A] axis, includ-

* The brackets [ ] indicate concentrations, in moles per liter.

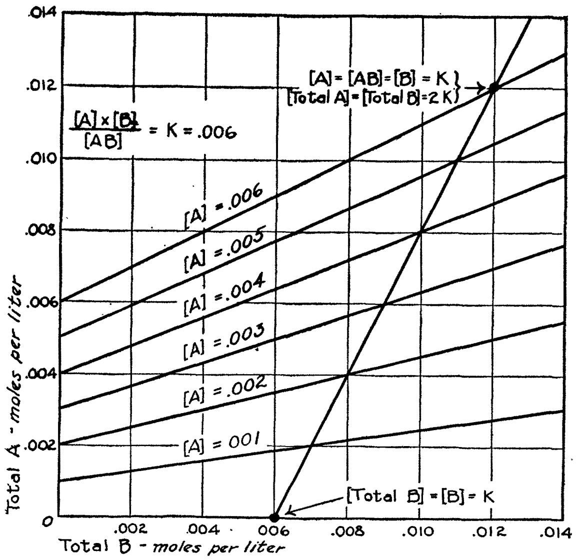

FIG. 1. Cartesian nomogram for law of mass action.

ing all points for [Total A] = n [A], and representing all points at which [B] = $(n-1)K$, when n is a number chosen to give a line suitable for the purposes of graphic extrapolation, may be readily located. It follows from Equation 3 that when [A] = [B] = $(n-1)K$, [Total A] = [Total B] = $(n-1)K + (n-1)^2K$. A line is drawn through the points [Total B] = $(n-1)K$, [Total A] = 0, and [Total A] = [Total B] = $(n-1)K + (n-1)^2K$. The desired points for $[A] = \frac{[\text{Total A}]}{n}$ may be located upon it and connected, by straight lines, with the corresponding points for [A] = [Total A], [Total B] = 0.

The method as described is, of course, applicable only to mass-action equations in which all of the components appear in the first power. A similar, but somewhat more complex nomogram, in which all necessary curves are straight lines, has proved of value in the case of mixtures of two substances when two dissociation constants are involved.

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SEPARATION OF ONE COMPONENT OF POTATO RUGOSE MOSAIC BY pH DIFFERENCE

KOCH[1] showed that certain treatments inactivated one component of potato rugose mosaic without affecting another component ("mottle") which is probably identical with that called "latent mosaic" by Schultz *et al.*[2] In the writer's experiments juice from rugose mosaic potato plants was applied mechanically to tobacco plants after its adjustment to different pH values by means of dilution with citrate or phosphate buffer solutions. With the pH 3.6 or less, no infection occurred. At a range of 4.0 to 5.5, only the latent mosaic appeared. From 5.6 to 7.6 rugose mosaic resulted and at 9.7 only the latent mosaic was transmitted. It was also found that borate ions exhibited a marked toxic effect on the components, while citrate and phosphate ions showed little difference, if any, in their specific toxicity at concentrations less than 0.1 normal. The toxicity was found to vary with the time of contact between the infectious juice and the buffer solutions.

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A SIMPLE METHOD FOR READING FILM-STRIPS

IN a recent communication in SCIENCE[1] Dr. Seidell called attention to the "Biblio Film Service" maintained by the library of the U. S. Department of Agriculture, Washington, and described a magnifier, to cost in the neighborhood of $10, for reading the film-strip. The writer recently obtained some of these film-strips and discovered that they could be read with ease under the low power of the ordinary binocular dissecting microscope. With such magnification about two thirds of the page may be brought into sharp focus, with the added advantage of being able to use both eyes in reading.

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SPECIAL CORRESPONDENCE

BIOLOGY OF SHELL-MOVEMENTS OF THE OYSTER

IN recent work by Nelson,[1] Galtsoff,[2] Marshall Webb[3] and Hopkins[4] on recording graphically and continuously the opening and closing movements of oysters during one or more days, interesting observa-

[1] T. C. Nelson, Report N. J. Exp. Sta., U. S. A., for 1920 (1921).
[2] P. S. Galtsoff, *Bull. Bur. Fish.*, U. S. A., Vol. 44, Doc. No. 1035, 1928.
[3] H. Marshall Webb, *Jour. du Conseil*, 5: 3, 1930, Copenhagen.
[4] A. E. Hopkins, *Bull. Bur. Fish.*, U. S. A., 47: 1, 1931.

[1] Karl Lee Koch, *Phytopath.*, 23: 319–342, 1933.
[2] E. S. Schultz, *et al.*, *Phytopath.*, 24: 116–132, 1934.

[1] SCIENCE, February 15, 1935.