LETTERS

The Error in ln x
To the Editor:

I found Leonard Nash's article on the "Ice Point and Triple Point" in the December 1981 issue quite interesting, particularly his pointing out that a *four* digit logarithm can yield a *six* digit antilogarithm.

Although his demonstration was most convincing, I should like to suggest an alternative derivation of his result. If we use the notation of calculus for *finite* changes (errors), then we may write than an error in x, $d(x)$, causes, in the logarithm of x, $\ln x$, an error $d(\ln x)$ given by

$$d(\ln x) = \frac{1}{x} d(x)$$

Thus $d(x) = x\, d(\ln x)$, the error in x is x itself multiplied by the error in the logarithm.

In one of Nash's cases, where $\ln x = -8.230 \times 10^{-4} = -0.0008230$, if we assume an error of ± 1 in the last digit quoted, then $d(\ln x) = 2 \times 10^{-7}$. Now x itself is manifestly near 1 (i.e., 0.9991. . .), thus

$$d(x) \approx (1)(2 \times 10^{-7})$$

or the resulting x is determined to within 2 in the seventh figure.

Note that the above relationship indicates that the error increases with increasing x and that the inverse process of obtaining $\ln x$, given x, can lead to quite large errors if x is very small.

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More on Chemical Stereoviews
To the Editor:

Since writing the note on the construction of a resource file for chemical stereoviews,[1] I have come across a number of additional references dealing with the history of chemical stereoviews as well as several new sources of potentially useful stereoviews, both of which may be of interest to the readers of THIS JOURNAL. Dr. Ivan Bernal has called my attention to an extremely interesting collection of stereoscopic drawings, edited by von Laue and Mises, and published as two separate volumes by Springer Verlag in 1926 and 1936.[2] These volumes contain a total of 48 hand-drawn stereoviews illustrating the 14 Bravais lattices and the structures of 34 elements and simple inorganic compounds, ranging from NaCl to perovskite. The 1921 crystallography text by Groth[3] also contains a collection of stereoviews, though these are stereophotographs of actual physical models rather than line drawings.

The back cover of the April, 1929 issue of the JOURNAL OF CHEMICAL EDUCATION carries an advertisement for Fisher Scientific, complete with a photograph, of a "Camerascope" for "visual instruction in X-ray crystallography." This device sold for the then rather expensive price of $18.00 and consisted of a small folding stereoscope and 37 stereoviews.[4] From the description it is apparent that it was essentially an American version of the Bragg set mentioned in my original note.

As for sources of stereoviews, the first volume of the series "Molecular Structures and Dimensions," published by the International Union of Crystallography,[5] contains close to 920 computer-drawn stereoviews of organic compounds, organometallic π-complexes, charge-transfer complexes, clathrates, carboranes, and traditional metal complexes of organic ligands. Regrettably, a similar source of stereoviews for nonmolecular solids is apparently still lacking.

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[1] Jensen, W. B., J. CHEM. EDUC., **59,** 385 (1982).
[2] von Laue, M., and Mises, R. (*Editors*), "Stereoscopic Drawings of Crystal Structures," Vols. 1 and 2, Springer, Berlin, **1926** and **1936.**
[3] Groth, P., "Elemente der Physikalischen und Chemischen Kristallographie," Oldenbourg, Berlin, **1921.**
[4] J. CHEM. EDUC., **6,** 4 (1929).
[5] Kennard, O., et al. (*Editors*), "Molecular Structures and Dimensions," Vol. A1, International Union of Crystallography, **1972.**

The Supporting, Rather than Initiating, Role of Science In Technology
To the Editor:

In his editorial in the May, 1982 issue of THIS JOURNAL ("The Public Attitude Toward Science"), J. J. Lagowski correctly laments the priorities of the American public for the support of science and technology with tax revenues, as indicated by the most recent annual report of the National Science Board, *Science Indicators 1980.* He comments that "It should be more than slightly disturbing to the scientific community that the general public perceives the acquisition of new knowledge—the fundamental basis of modern technology—to be so lacking in merit as to place it among the lowest on the list of areas to be supported." While the public's lack of appreciation for the benefits to modern society of fundamental research is indeed cause for concern, Lagowski's justification for the acquisition of new knowledge as "the fundamental basis of modern technology" is ill-suited to his purpose. Historians of science and technology have in recent years devoted much effort towards the elucidation of the in-