CONCERNING THE SURFACE pH OF CLAYS

Harter and Ahlrichs (2) have published a new method for estimating pH at the surface of clays and found that the surface of bentonite seems to be about 100 times more acid than ambient solution at a pH of about 7.0. Their rational has been mildly criticized by Mortland (5) and rebutted by the authors (1). Although we have nothing to add to Mortland’s specifics, we wish to call attention to two other procedures in addition to those mentioned by Harter and Ahlrichs.

1) Surface pH and electrophoretic mobility, \( \mu \).

According to the Hartley-Roe equation, surface pH, \( pH_s \), is related to bulk pH for a suspension of particles by

\[
\text{pH}_s = \text{pH}_b - 0.217\mu = \Delta \text{pH} \text{ for large particles and} \\
\Delta \text{pH} = 0.325\mu \text{ for small particles.} \\
\text{Strictly speaking this pertains to the plane of shear. For kaolinite \( \Delta \text{pH} \) is about} \\
1 \text{ in sodium phosphate-borate buffer at an ionic strength of} \\
0.05 \text{ and } \text{pH}_b = 8.05, \text{ as measured by G. V. F. Seaman in (3)}. \\

2) An enzyme as a molecular pH meter (3).

The action of chymotrypsin on denatured lysozyme as a substrate, in solution and adsorbed on bentonite and kaolinite reveals differences in pH optima for activity of ca. 2 pH units (3). For free lysozyme \( \Delta \text{pH} = -1.3 \) and for lysozyme on kaolinite \( \Delta \text{pH} = 0.54 \) for the complex, both being calculated from electrophoretic measurements. Thus the effective pH at the surface of lysozyme molecules in solution is 9.4 and that on kaolinite in suspension is somewhere between 7.05 and 7.51 in the same solvent, \( \text{pH}_b = 8.05 \). Alternately, subtracting 1.3 units from 2 units for the shift in enzyme optima leaves \( \Delta \text{pH} \) of about 0.7 for both bentonite and kaolinite (4).

Although these acidity differences between surface and solution are smaller than those reported by Harter and Ahlrichs, Mortland is of course correct in stating that a whole range of acidsities are possible with clays, depending on water content, ionic strength, and the particular electrolytes present. This could account for the smaller values for \( \Delta \text{pH} \) found by us.

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G. V. F. Seaman

References


MORE ON REQUIRED USE OF METRIC UNITS

I have read with considerable interest the statement by Koehler and Moodie (“Society Policy on Obligatory Use of Metric Units Questioned,” Sept.-Oct. 1967 SSSA Proceedings, p. 712). This statement expresses quite well my reaction over the past several months to the policy on obligatory use of metric units in Society publications.

I have talked with a number of associates, mostly in the applied research or extension field, who share the feeling that the majority of those concerned in crop production are not only annoyed but handicapped by the obligatory data in metric units.

I am undoubtedly remiss in not knowing exactly how this policy came into being. Was it a matter presented to the membership for approval? Can you give me the answer to this question and if convenient let me have a statement that outlines the reasoning on which this policy was decided?

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[Mandatory use of the metric system (along with Kelvin or Celsius units in place of Fahrenheit units) effective with papers published after January 1, 1967, came about as a result of SSSA Editorial Board action at the 1965 meetings in Columbus, Ohio and approved by the SSSA Board of Directors subsequently at the same meetings. An opinion poll of Society membership was not taken. These actions were preceded by written discussions with members of the ASA Editorial Committee, which recommended such adoption to the associated societies for the technical journals of ASA, CSSA, and SSSA, and consideration of a written proposal supplied earlier to editorial board members. Cognition was taken of the adoption of similar policy by the Agronomy Journal effective with papers published after January 1, 1967.—WALTER H. GARDNER, Editor-in-Chief]

To the letter submitted by Koehler and Moodie we must add our hearty, Amen! Use of a common scientific language is commendable. However, long established legal and economic usage of such units as pounds, bushels, acres, feet, etc. makes it highly improbable that the metric system would ever be adopted in this country.

Use of the metric system exclusively can not help but discourage the nonscientifically trained reader. This reader is least likely to make conversions of units to familiar terms.