
The Adsorption of Yeast RNA by Allophane

D. H. Taylor¹ and A. T. Wilson

Department of Chemistry, University of Waikato, Hamilton, New Zealand

¹ Present address: Division of Laboratories and Research, New York State Department of Health, Albany, New York 12201.

Abstract: Phosphate in the form of organic compounds can be bound in soils containing the aluminosilicate allophane. A significant part of this phosphorus is believed to be present as nucleic acids. The interaction of yeast RNA with allophane was studied to further the understanding of the allophane/organic macromolecule interaction as well as the binding of organic phosphorus by allophanic soils. The extent of RNA adsorption on the allophane was dependent upon the pH, the charge and concentration of simple cations, the concentration of RNA, and the time of interaction. From a mixture containing 145 mg/liter RNA and 2.9 g/liter allophane in 10^{-2} M NaCl, the amount of RNA adsorbed increased from 6% at pH 10 to 98% at pH 3. The adsorption also increased as the concentration of added NaCl was increased from 10^{-4} M to 10^{-1} M, but only when the pH was greater than 5, *i.e.*, above the isoelectric point of the clay. Mg^{2+} and Ca^{2+} were equally much more effective at promoting adsorption than Na^{+} at the same concentrations. There was no difference in the effectiveness of SO_4^{2-} , Cl^{-} , or NO_3^{-} at pH 5 or higher. The adsorption isotherm at pH 7 can be described by the Langmuir equation; the apparent adsorption maximum was 38 mg/g. Van der Waals and simple electrostatic forces appear to dominate the interaction leading to the adsorption of RNA by allophane.

Key Words: Adsorption • Allophane • Electrolytes • Phosphate • RNA

Clays and Clay Minerals; August 1979 v. 27; no. 4; p. 261-268; DOI: [10.1346/CCMN.1979.0270404](https://doi.org/10.1346/CCMN.1979.0270404)

© 1979, The Clay Minerals Society

Clay Minerals Society (www.clays.org)
