

---

# Convenient Technique for Estimating Smectite Layer Percentage in Randomly Interstratified Illite/Smectite Minerals

Atsuyuki Inoue<sup>1</sup>, Alain Bouchet, Bruce Velde<sup>2</sup> and Alain Meunier

Laboratoire de Pétrologie des Altérations Hydrothermales, UA 721 CNRS Université de Poitiers, 40, Avenue du Recteur Pineau 86022 Poitiers Cedex, France

<sup>1</sup> Present address: Geological Institute, College of Arts and Sciences, Chiba University, Chiba 260, Japan.

<sup>2</sup> Laboratoire de Géologie, ER 224 CNRS, Ecole Normale Supérieure, 24, rue Lhomond, 75231 Paris Cedex 05, France.

**Abstract:** The validity of the saddle/001 method for estimating the percentage of smectite layers in randomly interstratified illite/smectite (US) minerals as a routine laboratory technique has been examined with respect to the effects of the crystallite size distribution ( $N$  = number of layers) of I/S and the degree of preferred orientation of crystallites in the prepared specimen. X-ray powder diffraction experiments of I/S clays indicated that the crystallite size distribution was  $3 < N < 12$ ; these values were supported satisfactorily by the variation of the  $d(002)$  value of the samples. An analysis of the Lorentz factor concerning the degree of preferred orientation of crystallites indicated that a calibration curve calculated using the random powder Lorentz factor and the above crystallite size distribution fit the data better than an assumption of perfect orientation. Consequently, if a calibration curve of the saddle/001 ratio is used to estimate the percentage of smectite layers in I/S, an error of 10–15% should be expected from the variable crystallite size distribution of actual samples, in which I/S dominates over other phyllosilicate phases that give reflection between 10–14 Å. This method is useful, however, in estimating the relative percentage of smectite layers in randomly interstratified US for samples examined under identical experimental conditions.

**Key Words:** Crystallite size • Illite • Illite/smectite • Orientation • Smectite layer percentage • X-ray powder diffraction

*Clays and Clay Minerals*; June 1989 v. 37; no. 3; p. 227-234; DOI:

[10.1346/CCMN.1989.0370305](https://doi.org/10.1346/CCMN.1989.0370305)

© 1989, The Clay Minerals Society

Clay Minerals Society ([www.clays.org](http://www.clays.org))

---