Generalized relationships between the ionic radii of octahedral cations and the *b* crystallographic parameter of clay and related minerals

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Over several decades, a wealth of literature has been devoted to correlations between the chemistries of phyllosilicates and the values of their crystallographic unit-cell parameters. The *c* parameter is particularly used because it generally corresponds to the layer-to-layer distance, characteristic of the different families of phyllosilicates. The *b* parameter is also of interest because it allows measuring the lateral dimensions of the octahedral sheet. This unit-cell distance can be extracted from experimental XRD patterns from the $(06\ell;33\ell)$ diffraction region and by attributing the main diffraction band observed to a (060) reflection leading to the relationship $b = 6.d(060)$.

The aim of this workis to explore the relationships between the mean ionic radius R of octahedral cations: $R = \sum_{i=1}^{n}(r_i.x_i)$ where r_i is the ionic radius of octahedral cation i, r_i its molar fraction over n types of octahedral cations ($\sum_{i=1}^{n}(x_i) = 1$), and the b parameter value (or equivalent) of the main phyllosilicates and hydroxides families.

The data are collected from literature and concern both natural and synthetic samples. Notably, the results are discussed in light of the dimensional misfit that often occurs between the tetrahedral and octahedral sheets of phyllosilicates. The b parameter values are clearly linked to R for many of the families of minerals studied. The b *vs.* R linear relations were interpreted mainly as resulted from the misfit accommodation by coupling more or less pronounced tetrahedral rotation and octahedral sheet flattening whatever the R value.