INFRARED SPECTROSCOPY OF THE MUSCOVITE (SOPRON)–ILLITE (FÜZÉRRADVÁNY) SYSTEM

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Mid-infrared (MIR) spectral regions of muscovite (Sopron, Hungary) and illite (Füzérradvány, Hungary) samples were measured as KBr pellets with a Globar source and a MCT detector at ANKA, Institute for Synchrotron Radiation (ISS), Forschungszentrum Karlsruhe, Germany. The cut-off of this detector is about 530 cm^{-1}. Muscovite/illite exhibits MIR spectral features at 552/538 (bending vibration of SiO_4^{4-}), 1030/1038 (stretching vibrations of SiO_4^{4-}), 1661/1664 (bending vibrations of H_2O), 3475/3481 and 3634/3641 (stretching vibrations of OH group) (Figs. 1A,B). These spectral features mainly show similarities indicating that there is a very strong structural relationship between muscovite and illite. But, in the lower frequencies some differences occur, which might be due to more stretching Si modes involving weakly bonded cations in illite. FIR spectrum of Sopron muscovite as reference material for the muscovite-illite system contains ten peaks at 110, 137, 166, 189, 262, 351, 382, 407, 478, and 532 cm^{-1}. Füzérradvány illite shows eleven peaks at 94, 118, 193, 260, 334, 384, 419, 473, 505, 528, and 544 cm^{-1}. There are five peaks, which are dominant in both spectra at around 189, 262, 382, and 478 cm^{-1} (Figs. 1C,D). These peaks also belong to the bending and stretching vibrations (NAVROTSKY, 1994).

Reference

NAVROTSKY, A. (1994): Physics and chemistry of earth materials. Cambridge: Cambridge University Press, 116 p.

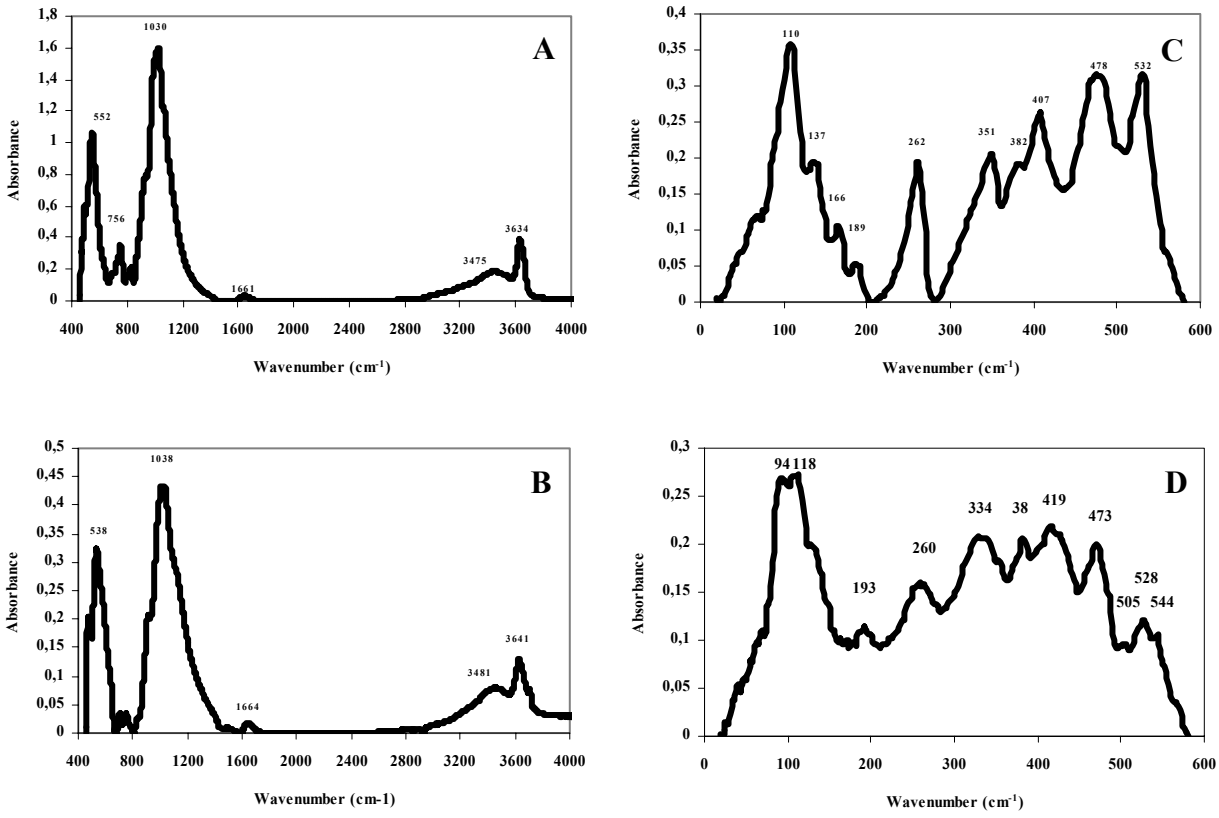

Fig. 1: Mid-infrared (MIR) and far-infrared (FIR) spectroscopic features of muscovite (Sopron: A, C) and illite (Füzérradvány: B, D).