

## THE RESEARCH OF ADSORPTION/DESORPTION BEHAVIOR BETWEEN CLAY MINERALS AND ANTIBIOTIC- TETRACYCLINE

PO-HSIANG CHANG<sup>1\*</sup>, JIIN-SHUH JEANA<sup>1</sup>, ZHAOHUI LI<sup>2</sup>, WEI-TEH JIANG<sup>1</sup>

<sup>1</sup>Department of Earth Sciences, National Cheng Kung University, 1 University Road, Tainan 70101, Taiwan

<sup>2</sup>Department of Geosciences, University of Wisconsin, Parkside, 900 Wood Road, Kenosha, WI 53144, USA  
[jiinshuh@mail.ncku.edu.tw](mailto:jiinshuh@mail.ncku.edu.tw)

The livestock industry on Taiwan is well-developed, and due to in a subtropical region, temperature and humidity of the environment cause the bacteria growth in livestock farms, so antibiotics are often used in the treatment to prevent from the diseases of livestock and poultry. These excreta produced by the livestock containing antibiotics could affect rivers, lakes, groundwater, and other water bodies, through runoff and infiltration. So, a good sorbent that can remove the tetracycline (TC) from the aqueous environment is necessary to be developed.

Our research carried out to study the behaviour between the TC and montmorillonite such as SWy-2, SAz-1, SHCa-1 and SYn-1. The experimental result demonstrated that (1) the kinetic adsorption isotherm agrees with the pseudo-second order model and approaches at the maximum adsorption capacity in 2 hours; (2) it follows a Langmuir adsorption isotherm with the maximum adsorption amounts of 355 mg/g, 460 mg/g, 350 mg/g, 170 mg/g at pH=4~5; (3) the intercalation of TC makes the d-spacing of swelling clays become the full width at half maximum (FWHM) with a stack of 2 to 3 layers, indicating that after the intercalation, the TC can decrease the clay crystallinity. (4) Depending upon the nature of the swelling clay minerals and the TC concentration, the intercalation process could be transitional, involving the occurrence of mechanical mixtures, materials of intermediate layer thicknesses, and/or mixed layering of different ordering states.

It is concluded the montmorillonite can be a good sorbent to removal of tetracycline from water due to the maximum adsorption, compared to the clay minerals such as, rectorite, palygorskite, illite and kaolinite.

Keywords: kinetic, adsorption, desorption