



FACULTAD DE CIENCIAS EXACTAS Y NATURALES
UNIVERSIDAD DE BUENOS AIRES

Departamento de Química Inorgánica, Analítica y Química Física

CARRERA: Doctorado en Ciencias Químicas

CUATRIMESTRE: Segundo

AÑO: 2005

CÓDIGO DE CARRERA: 51

MATERIA: IRON REDOX PROCESSES IN SMECTITES

CODIGO:

PUNTAJE: 2 (dos) propuesto

PLAN DE ESTUDIO: ----

CARÁCTER DE LA MATERIA: ----

DURACIÓN: *5 días

HORAS DE CLASE SEMANAL:

- Teóricas: 20 hs.

TOTAL:

CARGA HORARIA TOTAL: 20 hs.

ASIGNATURAS CORRELATIVAS: Lic. en Química, Física, Biología, Geología y carreras afines.

FORMA DE EVALUACIÓN: seminario de exposición.

PROGRAMA ANALÍTICO:

1. Smectites

Structure, Composition and Morphology

Chemical and Physical Properties (Surface Area, Cation Exchange Capacity and Shrink-Swell Characteristics)

Identification and Quantification (X-Ray Diffraction, Electron Microscopy, Thermal Analysis, Infrared Spectroscopy)

Environmental Significance (Mineral Weathering, Soil Composition and Fertility, Pollutant Adsorption)

2. Phases of Iron in Smectite Clays

Phase identification

Distribution between octahedral and tetrahedral sites

3. Methods of Iron Reduction

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Abiotic

Biotic

4. Effects of Reduction on Smectite Structure
5. Surface Interactions with Water
6. Layer Charge, Cation Exchange, and Cation Fixation
7. Clay-Organic Interactions

Chlorinated Aliphatics and Nitro Aromatics

Pesticides

Atrazine and Alachlor

Oxamyl

Choropicrin

Trifluralin

Mammalian Toxicity of Pesticides

8. Bioremediation of Contaminated Environments
9. Reduction Potentials and Reactions with Redox-active Ions
10. Reaction Mechanisms

Bibliografía

Environmental Chemistry of Soils M B McBride Oxford University Press 1994

Soil Mineralogy with Environmental Applications SSSA Book Series: 7 J B Dixon and D G Schulze Editors Soil Science Society of America, 2002

Chemical Weathering Rates of Silicate Minerals A F White and S L Brantley Editors Mineralogical Society of America Reviews in Mineralogy Vol 31, 1995

Stucki, Joseph W., Bernard A. Goodman, and Udo Schwertmann Editors. 1988. Iron in Soils and Clay Minerals. D. Reidel, Dordrecht, The Netherlands. 693 p.

Sumner, M. E., A. W. Warrick, P. M. Huang, E. A. Paul, E. J. Kamprath, L. P. Wilding, J. W. Stucki, I. Schainberg, and M. F. Baumgardner (editors). 2000. Handbook of Soil Science CRC Press, Boca Raton, 2081pp.

Effects of reduction and reoxidation of structural iron on the surface charge and dissolution of dioctahedral smectites Stucki J., Golden D., Roth C. Clay and Clay Min. 32, 350-356, 1984.

Preparation and handling of dithionite reduced smectite suspensions Stucki J., Golden D., Roth C. Clay and Clay Min 32, 191-7, 1984

Effects of oxidation state of octahedral iron on clay swelling Stucki J., Low P., Roth C., Golden D. Clay and Clay Min. 32, 357-62, 1984

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Stucki J and Banwart Advanced Chemical methods for soil and clay Mineral Research 1979 Rediet 6
Publishing Co.

Xu, Jennifer C., Joseph W. Stucki, Jun Wu, Joel E. Kostka, and Gerald K. Sims. 2001.
Fate of atrazine and alachlor in redox-treated ferruginous smectite. Environ. Toxicol.
Chem. 20:2717-2724.

Cervini-Silva, Javiera, Richard A. Larson, Jun Wu, and Joseph W. Stucki. 2001.
Transformation of chlorinated aliphatic compounds by ferruginous smectite. Environ. Sci.
Technol. 35:805-809.

Stucki, Joseph W., Kangwon Lee, Lingzhi Zhang, and Richard A. Larson. 2002. The
effects of iron oxidation state on the surface and structural properties of smectites. Pure
and Applied Chemistry 74:2079-2092.

Sorensen, Kara C., Joseph W. Stucki, Richard E. Wamer, and Michael J. Plewa. 2004.
Alternation of mammalian-cell toxicity of pesticides by structural iron(II) in ferruginous
smectite. Environmental Science Technology 38:4383-4389.

Cervini-Silva, Javiera, Joel E. Kostka, Richard A. Larson, Joseph W. Stucki, and Jun Wu.
2003. Dehydrochlorination of 1,1,1-trichloroethane and pentachloroethane by microbially
reduced ferruginous smectite. Environmental Toxicology and Chemistry 22:1046-1050.

Ribeiro, F.R., J.W. Stucki, R.A. Larson, K.A. Marley, P. Komadel, and J.D. Fabris. 2004.
Degradation of oxamyl by redox-modified smectites: Effects of pH, layer charge, and
extent of reduction. Pp. 471-474 in Pecchio, M. et al. (Eds.), Applied Mineralogy,
Developments in Science and Technology, Volume 1. ICAM 2004 Brazil, São Paulo.

Dr. J. Stucki


Dra. M. dos Santos Afonso

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