

# Physical Chemistry Seminar

Tuesday,  
September 4, 2012

11:00 am

Room 1315  
Chemistry Building

## Reactions of OH radicals, H atoms, and Solvated Electrons in Supercritical Water



Professor David Bartels

*Radiation Laboratory  
University of Notre Dame*

Host: Professor Gil Nathanson

Supercritical water is proposed as the coolant for efficient Generation-IV nuclear reactors, and is the medium for an important advanced oxidation technology for hazardous waste destruction. The properties of water change dramatically in the supercritical region as the water density changes continuously between zero and 1 g/cc. The primary free radicals in radiolysis breakdown of water – hydrated electrons, H atoms, and OH radicals—are respectively ionic, hydrophobic, and dipolar, providing opportunity to investigate nearly all possible solvent effects using high energy beta or gamma excitation. Many strange effects are found, such as rate constants that decrease as the temperature is raised. The talk will introduce supercritical water properties, stress corrosion cracking in reactors, pulse radiolysis, transient absorption spectroscopy, diffusion-limited reaction rates, and the transition to the high pressure gas phase limit. New data for the second order recombination reactions of these radicals in water will be presented.

Refreshments will be available prior to the seminar at 10:45 a.m. outside room 1315

Graduate Students may meet with the speaker at 1:00 p.m. in Room 8335