One day course on
Reactive Transport in Porous Media:
Models, Analysis and Simulation

Peter Knabner, Erlangen University

January, 17th 2008,

Institut Henri Poincaré, Paris, Salle 314

Program

Introduction
What is a Porous Medium ?
Porous Media Applications
Macroscopic vs. Microscopic Modelling

Fluid Flow Models
groundwater flow
Richards equation
multiphase flow

Inert Solute Transport
mechanical dispersion

Solute Transport and Adsorption
multiple site adsorption
equilibrium and non-equilibrium
singular adsorption isotherms and rate functions
Retardation (linear model)

The Diffusion-Convection-Adsorption-Equation
Analysis
Special Solutions
Finite Speed of Propagation
Asymptotic states
Generalizations
physical non-equilibrium, aggregated media
carrier influenced transport
Other Reactive Processes
ion exchange
homogeneous reactions
precipitation/dissolution

General Reactive Multi-component Transport
formulations
reaction network theory
existence of solutions
reduction (partial decoupling) based on reaction network
Applications