MINERAL SURFACE AFTER REACTED WITH AQUEOUS SOLUTION AT HIGH TEMPERATURES AND PRESSURES

ZHANG Xuetong and ZHANG Ronghua

MINERAL SURFACE AFTER REACTED WITH AQUEOUS SOLUTION AT HIGH TEMPERATURES AND PRESSURESZHANG Xuetong and ZHANG Ronghua, Open Research Laboratory of Geochemical Kinetics, Chinese Academy of Geological Sciences, Baiwanzhuang Road 26, Beijing 100037, ChinaThis work presents new experimental results on surface chemistry of reacted minerals and interface kinetics between mineral and aqueous solution at elevated temperatures and pressures. These experiments were carried out by using a flow reactor (packed bed reactor) of an open system at temperature ranging from 25 to 400?C and pressure up to 23 M Pa. Authors have already measured reaction rates of minerals: zeolite, albite, carbonate (calcite, dolomite, rhodochrosite) and fluorite in various solutions, and corresponded to test mineral surface by using SEM, XPS, SIMS, FT-IR, etc. Investigation of surface modification after reacted with aqueous solutions is important to the understanding of the nature and behavior as we use them. The Na, Al and Si release rates for dissolution of albite and zeolite in water and various solutions were measured as function of temperature, flow velocity, pH and solution composition in the reaction system. Maximum release rates of Na, Al and Si of albite dissolution in water of a flow systems under different flow velocities were always obtained at 300?C, which also depends on nature of aqueous solutions (pH) and solution composition. The release ratio of Al/Si (or Na/Si) for albite in water is positive at T300?C, and it is negative at T300?C. The surface modification is different in the different release conditions for dissolution of albite and zeolite,. XPS study indicates that contents of Al, Na and Si changed in the surface layer (1000 A thickness) as function of the distance from surface and were characterized of a non-linear behavior. After reacted with acid solution, a smooth surface of zeolite (albite, carbonate, and fluorite) appeared and showed as a crystalline surface. As reacted with alkaline solution, surface is rough. Dissolution of rhodochrosite and dolomite is also incongruent in most cases and varied with T, pH, and nature of aqueous solutions.