The solubility of rhodochrosite (MnCO3) and siderite (FeCO3) in anaerobic aquatic environments

The solubility of rhodochrosite (MnCO3) and siderite (FeCO3) in anaerobic aquatic environments

Natural groundwaters are often reported to be highly supersaturated with the carbonate minerals siderite (FeCO3) and rhodochrosite (MnCO3). The kinetics of precipitation and dissolution were determined in the light of new determinations of the solubility products of siderite and rhodochrosite. Laboratory experiments showed that the precipitation kinetics of siderite and rhodochrosite were much slower than that of calcite, and also much slower than their dissolution kinetics. Experiments with supersaturated solutions failed to reach steady state within 474 days in the case of siderite, whereas steady state for rhodochrosite was reached after 140 days. Suspensions of siderite and rhodochrosite crystals reached steady state after 10 and 80 days, respectively. The solubility product of siderite (log KS0(FeCO3)) was 11.03 ± 0.10 for dried crystals and 10.43 ± 0.15 for wet crystals. For rhodochrosite the solubility product (log KS0(MnCO3)) was 11.39 ± 0.14 for dried crystals and 12.51 ± 0.07 for wet crystals. The solubility product determined from supersaturated solutions was log KS0(MnCO3)=11.65 ± 0.14. The observed slow precipitation kinetics of siderite and rhodochrosite might explain the apparent supersaturation that is often reported for anaerobic aquatic environments. # 2002 Elsevier Science Ltd. All rights reserved.