The effect of impurity cations in calcite on its dissolution: A case study of Mn^{2+}, Co^{2+} and Cd^{2+}

Xiaohang Zhang[1,2], Shijun Wu[1*], Fanrong Chen[1]

[1] Guangzhou Institute of Geochemistry, Chinese Academy of Science, Guangzhou 510640, China (*correspondence: wus@gig.ac.cn)

[2] University of Chinese Academy of Science, Beijing 100049, China (zhangxiaohang14@mails.ucas.ac.cn)

The dissolution of calcite can be inhibited by trace impurity cations in aqueous solution[1,2] and calcite lattice[3]. However, the influence of specific cations in calcite on its dissolution is not clear. This study focuses on the effect of impurity cations (M= Mn^{2+}, Co^{2+}, Cd^{2+}) in calcite on its dissolution in deionized water at initial pH5.0.

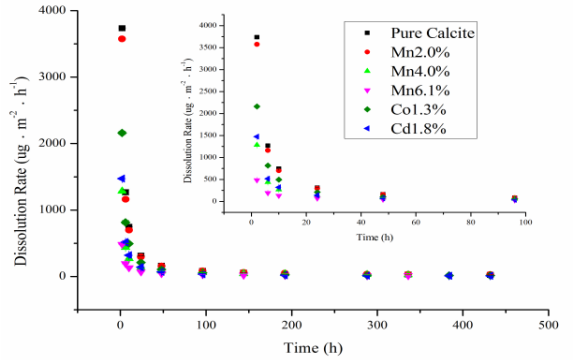

Figure 1: Variation of calcite dissolution rate with time at 25℃

Table 1： The ration of M/(M+Ca) in solution after 288 hours comparing to in solid

Sample	M/(M+Ca)	
	Solution	Calcite
Mn2.0%	0.0004	0.0197
Mn4.0%	0.0029	0.0396
Mn6.1%	0.0031	0.0607
Co1.3%	0.0030	0.0135
Cd1.8%	0.0001	0.0180

As shown in Fig. 1 and Table 1, our results illustrated that Mn^{2+}, Co^{2+}, Cd^{2+} in calcite can inhibit the dissolution of calcite though the calcite dopted with impurities has more surface area. The effect of the inhibition is positive with the quantity of the impurities. It implies that calcite dopted with heavy mentals such as Mn^{2+}, Co^{2+}, Cd^{2+} is more stable than the pure calcite in environment.

[1] Asrtid *et al*. (1996) *J Crystal Growth* 158, 310-315. [2] Rolf *et al.* (2006) *Geochimi Cosmochim Acta* 70, 583-594. [3] Harstad *et al.* (2007) *Geochimi Cosmochim Acta* 71, 56-70.