# Sequential extraction of arsenic in sediments of Paracatu, MG, Brazil

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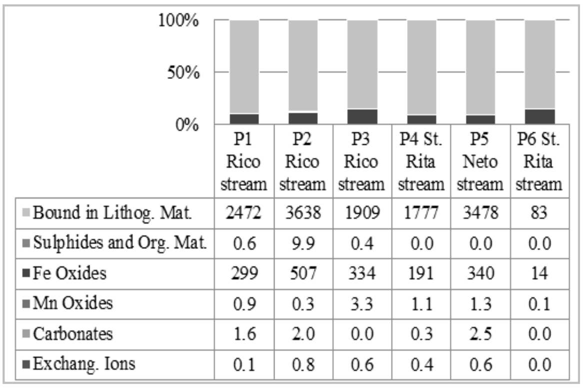
Mining activity is responsible for the release of arsenic (As) for the environment, compromising the quality of soils, sediments and surface water [1]. However, the mobility and the bioavailability of As in the environment is influenced by the solid phase which it is associated. In this sense, the study evaluated samples river sediments next a great pit mining area, in the region of Paracatu city, Minas Gerais, SE Brazil, by sequential extraction method [2].



| | P1 Rico stream | P2 Rico stream | P3 Rico stream | P4 St. Rita stream | P5 Neto stream | P6 St. Rita stream |
|---|---|---|---|---|---|---|
| ▨ Bound in Lithog. Mat. | 2472 | 3638 | 1909 | 1777 | 3478 | 83 |
| ■ Sulphides and Org. Mat. | 0.6 | 9.9 | 0.4 | 0.0 | 0.0 | 0.0 |
| ■ Fe Oxides | 299 | 507 | 334 | 191 | 340 | 14 |
| ■ Mn Oxides | 0.9 | 0.3 | 3.3 | 1.1 | 1.3 | 0.1 |
| ■ Carbonates | 1.6 | 2.0 | 0.0 | 0.3 | 2.5 | 0.0 |
| ■ Exchang. Ions | 0.1 | 0.8 | 0.6 | 0.4 | 0.6 | 0.0 |

**Figure 1**: Arsenic speciation obtained by sequential extraction method (mg.kg$^{-1}$ dry weight).

Total concentrations of arsenic recorded are above of the brazilian values for quality of sediments [3, 4] and indicate a high contamination. However, this preliminary evaluation indicates the presence of As is in a form less available. For a conclusive evaluation, further studies on the mobility and bioavailability of As in the study area are needed.

[1] Bidone *et al* (2001), *An. Acad. Bras. Cienc.*, **2**, 73. [2] Salomons & Förstner (1980) *Environ. Tech. Lett.* **1**:506–518. [3] Brasil (2004). (CONAMA). *Resol. n. 344. 25 de março de 2004*. [4] CETESB (2001). *Relatório técnico*. São Paulo, 247.

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# Oxygen isotope exchange (dis)equilibrium at the grain-size scale in metamorphic rocks

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The approach to oxygen isotope equilibrium among minerals at the grain-size scale in metamorphic rocks was surveyed by analyzing 66 minerals (10 different: Cal, Dol, Qtz, Pl, Kfs, Grt, Ky, Di, Wo, Fo) in 20 samples (13 regional, 7 contact) using the CAMECA ims-1280 ion microprobe at the University of Wisconsin. Lithologies include marble, calc-silicate hornfels, pelite, psammite, and metamorphosed marl from California and New England (USA), Scotland, and the Swiss Alps. With few exceptions, 10-40 analyses were performed of each mineral with a 10 μm spot and an average standard deviation of 0.12‰ in silicates and 0.14‰ in carbonates. Generalizations for contact metamorphic rocks are: (1) They are distinctly less well equilibrated. Of 23 minerals analyzed, just 5 are statistically uniform in $\delta^{18}O$; only 1 of the 5 is a silicate (Kfs). (2) The range in $\delta^{18}O$ measured for all grains of the same mineral in a sample is up to 10.7‰ in carbonates (Dol) and 7.4‰ in silicates (Fo). (3) Individual mineral grains of carbonate and silicate can vary in $\delta^{18}O$ by up to 10.1‰ (Dol) and 3.1‰ (Fo). Inter- and intracrystalline variability in $\delta^{18}O$(Fo) scale with crystal number density and hence nucleation rate and overstepping of the Fo-forming reaction. (5) Grain-scale variability in $\delta^{18}O$ obviates meaningful determination of oxygen isotope fractionation between most mineral pairs. Generalizations for regional metamorphic rocks are: (1) They are better but not fully equilibrated. Of 43 minerals analyzed, 17 are uniform in $\delta^{18}O$, including Ky and most Grt. (2) The largest range in $\delta^{18}O$ for a given mineral in a sample is 1.5‰ (Di); the range for all but 2 analyzed minerals is ≤1.0‰. (3) The largest range in $\delta^{18}O$ of a single mineral grain is 1.5‰ (Di); the range for all other analyzed single grains is <1.0‰. (4) Despite a measured range in $\delta^{18}O$(Qtz) of 9.8-21.0‰ in the 13 samples, all mineral pairs in a given sample show consistent oxygen isotope fractionation with $\delta^{18}O$ decreasing in the same order as determined by laboratory experiment: Qtz>Cal>Kfs>Pl>Di>Ky>Grt.

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