Determination of gallium isotopic compositions in reference materials

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The interest in the study of gallium (Ga) stable isotope fractionation in low and high temperature environments has increased significantly in the last three years. Consequently, certification of Ga isotopic reference materials for interlaboratory comparison is of high priority. New Ga isotope ratio data for two pure Ga standard RMs including NIST SRM 994 and NIST SRM 3119a that used by three different groups and ten geological reference materials (RM) including silicates, shales and ferromanganese nodules were determined by MC-ICP-MS in this study. Sample matrices of geological RMs were separated by two-column separation method with use of AG MP-1M and AG 50-X8 resin, separately, and quantitative recoveries of > 99% Ga was obtained for all geological RMs. Instrumental mass bias was corrected by the combined standard-sample bracketing and internal normalization model. Validation of the proposed method was performed by analyzing synthetic solutions from collected matrix fractions of geological RMs which were spiked with 200 ng NIST SRM 994 with satisfying results. After normalized available δ⁷¹Ga data of geological RMs to a single Ga standard RM, In addition, results obtained in our study are in well agreement with previously reported results. Very small variation of Ga isotope ratios was found among igneous rocks and shales references, except two ferromanganese nodules which show a 0.32 ‰ Ga isotopic variation.