

Chromium mineral ecology

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ABSTRACT

Minerals containing chromium (Cr) as an essential element display systematic trends in their diversity and distribution. We employ data for 72 approved terrestrial Cr mineral species (<http://rruff.info/ima>, as of 15 April 2016), representing 4089 mineral species-locality pairs (<http://mindat.org> and other sources, as of 15 April 2016). We find that Cr-containing mineral species, for which 30% are known at only one locality and more than half are known from three or fewer localities, conform to a Large Number of Rare Events (LNRE) distribution. Our model predicts that at least 100 ± 13 (1σ) Cr minerals exist in Earth's crust today, indicating that 28 ± 13 (1σ) species have yet to be discovered—a minimum estimate because our model assumes that new minerals will be found only using the same methods as in the past. Numerous additional Cr minerals likely await discovery using micro-analytical methods.

We propose 117 compounds as plausible Cr minerals to be discovered, including 7 oxides, 11 sulfides, 7 silicates, 7 sulfates, and 82 chromates. Depending on their compositions and crystal structures, new Cr minerals are likely to be discovered in various environments, including meteorites, basalt, evaporites, and oxidized Pb ore deposits.

Keywords: Chromium, mineral ecology, new minerals, statistical mineralogy