

Did komatiite lavas behave differently from normal (basalt) lavas?

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The physical principles controlling the emplacement, flow behaviour, and formation of textures of komatiites were the same as for other lava types. All preserved Archaean komatiites were emplaced subaqueously.

During rise to the seafloor high density komatiite magmas were very prone to intrude at mid to upper crustal levels, especially into seafloor sediment and volcanoclastic horizons. Cross-cutting planar to irregular contacts, peperitic at sediment contacts, should be diagnostic. Thick intrusions could develop adcumulate texture. Adcumulate is almost always a plutonic texture.

Komatiite lavas may have been turbulent near vent and probably laminar away from vent. Spinifex textured crust would have formed rapidly facilitating tube formation, and progressive flow thickening or inflation. Advancing flow fronts would rarely have exceeded 1m in thickness. Excessively thick komatiites are likely to be intrusions. Tops are either coherent or locally quench fragmented, marked by hyaloclastite. Anatectic bases have rarely been documented. No komatiites of clearly pyroclastic origin are known to us.

Rates of Oxygen-Isotope Exchange in Al(III) Polyoxocations

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These polyoxocations [Figure 1] are nearly colloidal in size and one of them (Al₁₃) is probably the precursor of the Al(OH)₃ floc in aluminum-rich streamwaters. Using ¹⁷O-NMR, we measure rates of exchange of oxygens within a single ε-Keggin (differing by a factor of 10⁷), among the set of metal-substituted but largely isostructural polyoxocations (10⁵ for bridging hydroxyls in the Al₁₃, GaAl₁₂ and GeAl₁₂), and between the various Al(III) monomers (10⁴). We are now determining the rates by which other ligands, such as fluoride, replace these oxygens and are studying a new larger polyoxocation (Al₃₀).

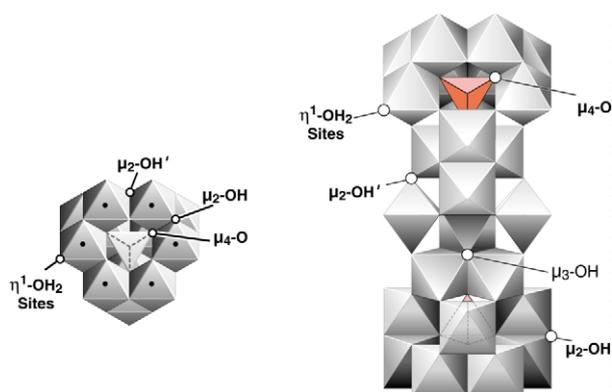


Figure 1: The ε-Keggin structures (left) have the stoichiometry: $MO_4Al_{12}(OH)_{24}(H_2O)_{12}^{7+/8+}(aq)$ with M=Al(III) (Al₁₃), Ga(III) (GaAl₁₂) or Ge(IV) (GeAl₁₂). The larger Al₃₀ molecule (right) is a dimer variant with the stoichiometry: $Al_2O_8Al_{28}(OH)_{56}(H_2O)_{26}^{18+}(aq)$.

References

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