

Mineral chemistry of Apollo-12 igneous rocks and comparisons with

Apollo-11

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G.M. Brown, C.H. Emeleus, J. G. Holland, A. Peckett and R. Phillips

Department of Geology, Durham University, England.

Mineral analyses by electron probe (over 400) and rock or fines analyses by X-ray fluorescence are used in conjunction with textural studies to show marked variations between basaltic rocks within the Apollo 12 suite, and differences from Apollo 11. Overall similarities, such as depletion in volatile elements and mineralogical associations now characteristic of all the lunar basalts, are equally evident. Apollo-12 rocks show some crystal-cumulate features, partly reflected in the diversity of Mg, Cr, Al, Ti, Fe and K distribution between crystalline phases. Ni and Co in irons, Mg and Cr in spinels and ilmenites, Al and Ti in pyroxenes, and Ca in olivines show complex variation within each rock. Interstitial glasses are of potassic granite and common residual phases are apatite, fayalite and pyroxferroite, with rare baddelyite, K-feldspar, and an Fe-Zr-Ti silicate. The mineral chemistries suggest chrome-spinel and pigeonite as the early liquidus phases. Solid-solution trends favour titaniferous (Apollo-11) liquids as intermediate fractions. Re-heating may be responsible for subsolidus cation ordering and redox reactions in some chrome-ulvöspinel^s. The fines are strongly enriched in Ni, Zn, Ba, Nb, Zr, Y and Rb relative to the studied basalts, partly attributable to meteoritic and anorthositic fragments but also to enrichment in granitic residua.