THE NANDEWAR VOLCANO

by

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ABSTRACT

The Miocene Nandewar Volcano in north-eastern New South Wales is composed of a suite of transitional alkaline eruptives and minor associated intrusives. The volcanics include minor hawaiites but are dominated by a mildly potassic lineage extending from *hy*-normative trachyandesites to comendites via tristanites and mafic to peralkaline trachytes. Although the trachyandesites, tristanites and trachytes (the main shield-forming sequence) are collectively the most abundant volcanics, alkali rhyolites comprise the most voluminous 'evolved' eruptive type. Peralkaline trachytes and comendites are relatively insignificant volumetrically.

Olivine, Ca-rich pyroxene and amphibole display marked decreases in their 100 Mg/(Mg+Fe) ratios in the transition from trachyandesite to comendite, reflecting variation in host-rock compositions. The presence of tschermakitic Ca-rich pyroxenes and aluminian bronzite megacrysts in several trachyandesites indicates that their hosts experienced intratelluric crystallization at elevated pressures (~6 to 8 kb). Some plagioclase, olivine and titanomagnetite phenocrysts may also represent moderate-pressure cognate precipitates. Groundmass pyroxenes in some trachytes and comendites may be strongly acmitic, and this reflects the peralkaline character of those melts. Titanomagnetite is the dominant Fe-Ti oxide phase throughout the series, and only occasionally does it coexist with ilmenite. Fe-Ti oxide compositional data indicate that magmas spanning the spectrum trachyandesite to comendite generally crystallized under conditions of decreasing T and fo_2 which were broadly parallel with the FMQ synthetic buffer curve. However, some alkali rhyolites appear to have crystallized under significantly more oxidizing conditions. Crystallization of aenigmatite in the groundmass of peralkaline trachytes and comendites also reflects relatively strongly reducing conditions in the more 'evolved' variants and *ns*-bearing melts. In several specimens the presence of aenigmatite rimming titanomagnetite and ilmenite microphenocrysts provides some support for the existence of a 'no-oxide' field in T-fo_2 space.

Major, trace element and isotopic data indicate that the Nandewar volcanics derived from a common upper mantle source with specific trace element and isotopic characteristics. Mass-balance calculations for

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