THE OXIDATION OF MAGNETIC MINERALS

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Magnetic minerals that are largely responsible for the magnetic properties of igneous rocks are within Titanomagnetite (Magnetite-Ulvospunel) series, and these magnetic minerals usually undergo high temperature oxidation (above 600°C). The present study involves a method of identifying the oxidation state of the magnetic mineralogy of rocks by optical microscopic observations. A large number of thin polished sections, prepared from young tertiary basalt samples, were examined under a reflected light microscope at a magnification of x 1200 in oil. These observations revealed that more than 95% samples investigated could be grouped into three categories, each group representing a different oxidation state. Samples of group 1, to which more than 50% samples belonged, consisted of brownish yellow, optically homogeneous, coarse grains (the average size 30-40 μm) of titanomagnetites. The magnetic mineralogy of group 2 samples composed of bright, gray magnetic grains with varying degree of ilmenite lamellae, showed the deutric oxidation of homogeneous titanomagnetites to magnetite and ilmenite. Group 3 samples, less than 5% of the samples investigated, were characterised by the presence of pseudobrookite and hematite in the magnetic mineralogy. The group 3 characteristics, due to further oxidation of magnetite-ilmenite lamellae, represented the highest oxidation state.