

Petrochemical investigation of the rocks of Bubin (Astor) and surrounding areas, Gilgit-Baltistan, Pakistan

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Abstract

Gilgit-Baltistan region is covering the northern most part of Pakistan, where the rocks of the Kohistan-Ladakh island arc and Karakoram plate are exposed. Detailed geological work of these rocks has already been done in the context of their mineralogy, geochemistry and genesis. However, there is a great need to explore the economic potential of the region through advanced level geochemical, spectroscopic and remote sensing techniques. This research work is aimed to explore the study area economically. Geologically the study area Bubin (Astor) lies at the western part of the Ladakh Island Arc. Rocks of the study area are mainly comprised of stage-2 fine to coarse grained granitoids of Ladakh Batholith. The dioritic rocks present in the study area are hornblende bearing having high concentration of plagioclase. Whole rock major, trace and rare-earth elements geochemistry of 24 selected rock samples were carried out to understand the tectonic and petrogenetic behavior of these rocks. The spider variation diagrams for granites, granodiorites, diorites and gabbroic diorites show slope of the data from LILE towards HFSE and depletion of Nb which are the characteristic features of their calc-alkaline nature related to island arc setup. Enrichment of Rb and Th in granitic rocks present in the research area indicates their calc-alkaline nature. Rare earth elements geochemistry shows high values of LREE, low values of HREE suggesting the calc-alkaline nature of these rocks. Negative Eu anomaly can be very clearly noticed in the diorites which suggest plagioclase fractionation in these rocks as the plagioclase has high D's value for Eu than other REE. For identifying the tectonic nature of the studied rocks these samples were plotted on various tectonic discrimination diagrams that suggesting the calc-alkaline character of these rocks which have been formed from the magma generated during the subduction of Indian plate underneath the Eurasian plate with the development of Kohistan-Ladakh island arc.