

## Petrographic characteristics and aggregate properties of the dacite porphyry intrusives of the Kuching area, Sarawak

YEAP, E.B., MOHD. TARMIZI, M.Z. & JOHN, J.

Department of Geology, University of Malaya

The rock types exposed around Kuching and areas stretching southwards until Bau include the following: 1. Sheared and brecciated volcanics (Serian Volcanics); 2. Sandstone and conglomerate (Kedadam Formation); 3. Limestone and marble (Bau Limestone); 4. Sandstone and shale (Pedawan Formation); 5. Meta-argillites and chert (Tuang Formation); and 6. Dacite Porphyry (Mid. Miocene Hypabyssal Intrusives). The chief source of aggregates which supply the urban centre of Kuching and areas south of it are derived from quarries operating on several dacite porphyry intrusives. Field mapping and petrogenetic evidence indicate that in the Kuching area, the older Late Triassic to Late Cretaceous sedimentary rocks and volcanics were intruded by dacite porphyry which took the form of small stocks, dikes and sills. Petrographically, the dacite porphyry contains phenocrysts of plagioclase, hornblende and quartz set in an aphanitic groundmass of quartz and feldspars. Locally, glassy groundmass has been observed and zeolites have been identified.

The intrusives are observed to be affected by late phase magmatic/hydrothermal activities which had caused alterations to the dacite porphyry which can be visually observed on the quarry faces. The alterations identified, often occurring in different degrees of intensities at specific parts of the quarry faces include: 1. Chloritization, 2. Pyritization, 3. Calcitization, 4. Hematization and 5. Kaolinization. Based on the present petrographic study, identification and recognition of various types of alterations in the field are possible.

Fresh dacitic porphyry rocks and their altered phases in all the quarries around Kuching were sampled from the quarry faces and tested for their physical and aggregate properties in the Geological Survey of Malaysia Laboratories in Ipoh. Physical and aggregate properties determined include S.G., Water Absorption, Aggregate Crushing Value, Aggregate Impact Value, 10% Fine (all according to BS 812) and Los Angeles Abrasion Value (ASTM 131).

Fresh dacite porphyry rocks show excellent physical and aggregate properties. On the other hand, altered phases invariably show poorer physical and aggregate properties with some dipping below the requirements or specifications of aggregate properties set by the Jabatan Kerja Raya, Malaysia, for various construction purposes. In the day-to-day operation of the quarries usually, the unaltered dacite porphyries are mixed with the altered phases, thus the properties for the commercially available aggregates are somewhere between the two values.

Petrographic evidence indicates the presence of micro-crystalline and crypto-crystalline quartz (which are potentially alkali-silica reactive) in all the thin sections of the dacite porphyries. Zeolites and glassy matrix are present locally. It is recommended that if the dacite porphyry aggregates are to be used in concrete in which the alkali content in the cement portion is high (<0.6 % NaOH equiv.) the mortar bar tests (ASTM 227) be carried out to assess the alkali-silica and alkali-zeolite reactivities.