Mineralogy and geochemistry of the volcanic rocks of gabal el ghorfa, south eastern desert,egypt

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The present work deals with mineralogical and geochemical studies of the Lower Nubia sandstones and the volcanic rocks of Gabal El Ghorfa area, Wadi Natash, south Eastern Desert, Egypt. During the field trips, the author discovered visible mineralization by necked eyes in Lower Nubia sandstones (LNSS) for the first time. So, the mineralogy and geochemistry of the LNSS are studied in details to give a complete picture on Gabal El Ghorfa ring dyke.The studied area covers about (130) km² of the exposed volcanic rocks at Gabal El Ghorfa area. It is delineated by longitudes 34° 07′ 03″ to 34° 17 31″ E, and latitudes 24° 26¯30¯to 24° 32¯20″ N.from the geological and petrographical studies, we concluded these main rock types:Alluvium (recent) ..... (Youngest).....Upper Nubia sandstones (UNSS)Volcaniclastic sedimentsVolcanic flowsLower Nubia sandstones (LNSS)Metamorphic rocks .... (Oldest)…1-Geologic setting:-The Natash volcanic sequence is represented by three distinct flow units, separated by sequences of volcaniclastic sediments. Each of the three flow units shows a gradual change in composition upwards from alkali olivine basalt through trachybasalt, trachyandesite, to trachytes. The lowest flow unit rests on basal part of Nubia Sandstone, while the upper Nubia Sandston overlies the upper volcanic flows and volcaniclastic sediments. The volcaniclastic sediments comprise agglomerates, pumice, scoria and lithc tuffs and tuffs. The latter contain leaf imprints of Cenomanian age (Crawford et al., 1984), which are in good agreements with a 90Ma K-Ar age for the lavas determined by Ressetar et al., (1981).The volcanic sequences -and their intercalated volcaniclastic sediments dip 5o westwards. Erosion has re moved the upper flow and the upper volcaniclastic sequence from most locations in the east.Two ring structures (Gaziret Khashm Natash and Western Ghorfa) and one ring dyke (Gabal El Ghorfa) have extruded through the three volcanic flows, particularly in the eastern area. The three rings range in composition from volcanic flows (represented by trachybasalt, trachyandesite, normal and alkaline trachyte) to volcaniclastic sediments (tuffs and agglomerates). They extruded into Lower Nubia sandstones (LNSS), which represented by conglomerate (at the base) followed by greywacke, quartz arenite and calcareous sandstone (at the top).Gabal El Ghorfa forms a ring dyke with a diameter of 1.0 km and is situated in the southern part of Wadi Natash. Gabal El Ghorfa can be classified into:-a) lower Nubia sandstones and -b) normal and alkaline trachyte, while Gaziret Khashm Natash forms a horse shoe

ring structure, 0.5 km in diameter and is dominated by a) lower Nubia sandstones, b) trachybasalt and trachyandesite and c) tuffs and agglomerates and Western Ghorfa constitutes a small ring structure consisting of a) lower Nubia sandstones and b) trachybasalt, trachyandesite and trachyte.2-Petrographically:-The volcanic rocks are characterized by very fine grain size and include; alkali olivine basalt. The rock is fine-grained holocrystalline, compact, and black to dark grey in color with aphyric to porphyritic texture. The essential minerals are olivine, plagioclase, pyroxene and K-feldspars. Epidote carbonate, iron oxides and clays are the secondary minerals. Trachybasalt is pale brown in color and composed mainly of sub-equal amounts of plagioclase (An50-55), alkali feldspars and olivine. Apatite and opaque are accessories. . The fine columnar laths of plagioclase are following the flow (trachytic) texture of alkali feldspars. Trachyandesite are composed of feldspars plagioclase (An40-43) and K-feldspars (orthoclase and sanadine) about (62-70 in vol. %), and hornblende (22-30 in vol. %). Accessory minerals are represented mainly by apatite and opaques. The dominant textures are trachytic and subtrachytic. Trachyte is characterized by buff to reddish brown in color according to the intensity of iron oxide stained alteration, mottled by pale green patches. Trachyte could be extinguished into two types according to the presences or absences of alkaline minerals; a) normal trachyte is composed mainly of sanadine (80-90 in vol. %), plagioclase (An14). Carbonate and quartz are secondary minerals. Autunite and opaques are accessory minerals, and b) alkaline trachyte composed of sanadine (75 in vol. %), alkaline pyroxenes (aegirine and aegirine augite) and minor amount of secondary quartz and carbonates. This type of trachyte is characterized by absences of plagioclase.Pyroclastic rocks comprise; a) Trachytic lapilli tuffs, these rocks are white, grey, red and maroon in color. They are composed of secondary quartz, fine euhedral to sub-hedral crystals of sanidine, and mafic minerals as well as lithic fragments of trachyte, b) Pumice, the rock is characterized by cavernous appearance, have rough surface and the average of porosity about 70%; some vugs are occupied by carbonates. The rock is trachytic in composition, composed of K-feldspars (sanadine and anorthoclase) (50 in vol. %), plagioclase and opaque. carbonate and muscovite is secondary minerals and c) Scoria is deep black in color, porous, and basaltic in composition. The dominant texture is glomeroporphyritic texture. The main components of the rock are plagioclase (An55-68) represents about (30 in vol. %) of the rock, pyroxene, hornblende, actinolite and olivine.The lower member of Nubia sandstones are well to badly sorted and contains amount of clay matrix