

Geological, Mineralogical and Petrographical Investigation of Yukarıkaraçay (Honaz) Dolomitic Clays in Denizli Region (Southwestern Anatolia, In Turkey)

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The study area covers Yukarıkaraçay (Honaz) district and its surrounding area, in Denizli region. The rock sequence commences at the base with the Upper Cretaceous-Paleocene autochthonous flysch overlain by a neritic limestone of the Mesozoic and by an ophiolitic series with tectonic contacts in the investigated area. All of these formations are overlain by fluvial and lacustrine sediments of the Late Miocene-Lower Pliocene. Neogene sedimentary sequence commences at the base with red claystone and sandstone and continues upwards alternating marl, clayey conglomerate-sandstone and limestone. Kocapınar (Denizli) volcanics are mainly composed of basaltic lavas and tuffites. Basalt and synsedimentary vitric tuffites cut and drag dolomitic claystone. The age of Denizli lavas have been obtained and ranged from 6.00 to 4.88 Ma using $^{40}\text{Ar}^{39}\text{Ar}$ age method (Paton, 1992). In the thin tuffite layers within the dolomitic claystone are found dolomite and claystone pebbles. Shoshonitic basalt, latite and trachyte lavas outcrops indicate the last presence phase of volcanism.

Claystone specimens were examined by XRD, DTA and SEM. They contain mostly smectite, illite, montmorillonite and palygorskite. In the claystone, the average of sandy and silty particles larger than 0.074 mm are 4.85%. Silt and sand size particles comprise of dolomite, calcite quartz and albite. The average of chemical analyses of red and brown color clay specimens which particles smaller than 0.074 mm are SiO_2 : 44.74%, Al_2O_3 : 7.5 %, Fe_2O_3 : 7.95 %, CaO : 9.11%, MgO : 10.7 %, SO_3 : 0.07 %, Na_2O : 0.22 %, K_2O : 1.14 % and LOI: 16.67%. In addition, the average chemical analyses of white color clay specimens which particles smaller than 0.074 mm are SiO_2 : 32.44 %, Al_2O_3 : 2.86 %, Fe_2O_3 : 5.67 %, CaO : 16.92%, MgO : 15.51 %, SO_3 : 0.064 %, Na_2O : 0.23 %, K_2O : 0.20 % and LOI: 25.197 %.

The average of liquid (LL), plastic limit (PL) and shrinkage limit (RL) of red and brown color clay specimens are 72, 52, 20.11 and the average of liquid (LL), plastic limit (PL) and shrinkage limit (RL) of white color clay specimens are 74.8, 50.2, 17.50. The averages of unit weights of red color clay and white color clay are 2.43 grf/cm^3 and 2.40 grf/cm^3 and the values of water absorption as volume and weights on the clays are determined. For red color clays, the values of water absorption as volume and weight are 63.0 %, 38.43 % and for the white color clays are 69.25 % and 46.62 %, respectively. According to laboratory tests soil classification was defined as MH (plastic clay). According to USCS soil classification system. White clays are in active clay class. Red color clays are normal clay in point of activity.

According to Akbulut and Kadir (2001), some volcanic springs in the basin gushed out and formed oncolitic algal accumulations. Since the spring water was in iron, the synsedimentary material was red colored due to the oxidation. Spiolite was precipitated in local platy hollows at the bottom of lake where Mg, Si content and pH were high. However, formation of palygorskite and smectite was controlled by Al concentration and pH. Thus, in an environment with higher Al and pH smectite and relatively lower Al and pH palygorskite were formed.