The Pliocene-Pleistocene Carcar Formation and the Quaternary Alluvium are two major lithologies that rim the entire island province of Cebu. The Carcar Formation is predominantly limestone rock mass characterized by rolling to hilly topography while the Quaternary Alluvium is generally unconsolidated sedimentary deposit on coastal plain marked by low relief and flat landscape. Mineralogical examinations of the soil horizons that mantle these two rock formations were conducted to identify and characterize the nature of clay minerals using x-ray diffraction (XRD), differential thermal analysis (DTA), thermogravimetric analysis (TGA), infrared spectroscopy (IR), scanning electron microscopy (SEM), and energy dispersive x-ray (EDX). Analytical qualitative results show that the clays derived from the Carcar Formation are chiefly smectite-rich assemblage with supplemental association of kaolinite/smectite mixed-layer. Clays from the Quaternary Alluvium however, appear relatively richer in kaolinite/smectite mixed-layer than independent smectite phase. Initial quantitative estimates by computer simulation yield slight variations in the proportions of kaolinite and smectite in the mixed-layer phase, and correlative, the degree of ordering is determined to be random. Kaolinite content participating in the interstratified phase is discerned to be diagnostically higher in the alluvium than in the limestone. Calcite impurities occur greater in clays sourced from the Carcar Formation and are found comparatively rarer in the Quaternary Alluvium. Quartz is noted to be frequently present in minor amounts in both lithologies. Figure 1 shows examples of XRD patterns of < 2 μm fraction of soil clays derived from the limestone and the alluvium.
Figure 1. X-ray diffraction patterns of untreated < 2 μm fraction of soil clay samples from Consolacion-Liloan, Cebu Province, Philippines. Top diagram shows XRD trace of sample derived from surface soil of Plio-Pleistocene, Carcar Formation. Bottom diagram shows XRD trace of sample obtained from surface soil of Quaternary Alluvium. S=smectite, K/S=interstratified kaolinite/smectite, C=calcite, Q=quartz. CuKα radiation.