

Pedo-Chemical Studies on Saline Playas in the Arabian Shelf

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ABSTRACT: This research was undertaken to study the pedo-chemical characteristics of selected playas (sabhahs) in the Arabian Shelf. Results indicated that most of the sabkhahs are that to almost flat having salt crusts with variable thickness. Profiles representing the sabkhah surface are extremely saline compared with that of the surrounding landscapes. The dominant soluble salts are Cl⁻ and SO₄²⁻ of Na⁺ followed by Ca²⁺ or Mg²⁺. The compositions of the coastal sabkhahs profile layers are closely related to the Gulf water composition while the inland playas are more associated with local conditions. This was confirmed from the similarity in salt levels, ion molar ratios and relatively high correlation coefficients between the electrical conductivity of soluble salts (EC_s) and either soluble B₁ (r₁=0.80) or soluble Mg₁ (r₁=0.60) in coastal compared with that of the inland sabkhahs (r₁=0.17) and (r₁=0.37), respectively. The main pedological process affecting the formation of coastal sabkhahs is the upward movement of the water table which is rich in salts originating from the Gulf waters either directly or through wind action. Leaching, accumulation of sediments and evaporative concentrations of the solutes are the processes prevailing in the inland sabkhahs. Salt crusts are dominated by Cl⁻ and SO₄²⁻ of Na⁺, Mg²⁺ and Ca²⁺ salts while K⁺ salts are relatively low. X-ray diffraction patterns confirm the presence of halite, gypsum and carbonate minerals. Epsomite and bloedite minerals were identified in both coastal and inland sabkhahs. Specific minerals and relative abundance was quite variable between the salt crusts due to the characteristic conditions of each sabkhah. The major differences between the inland and coastal sabkhahs are related to the source, composition and depth of the water table and consequently the composition and mineralogy of the surface salt crusts.