The gene encoding Amy 34, a maltohexaose-forming α-amylase from Bacillus halodurans LBK 34 isolated from Lake Bogoria, Kenya, was cloned and sequenced. The mature peptide consists of 958 amino acids with a theoretical molecular weight of 107.2 kDa and pl 4.41, respectively. The gene was expressed in Escherichia coli and the recombinant enzyme purified to homogeneity by a combination of metal chelate affinity and size exclusion chromatography. The pure enzyme exhibited optimum activity at 60 °C and pH 10.5–11.5. The enzyme retained over 60% activity after incubation at 55 °C for 4 h and was most stable at pH 9.0. Complete inhibition of enzyme activity was observed in presence of 5 mM Cu²⁺, Fe²⁺, Fe³⁺, Mn²⁺ and 5 mM EDTA. The enzyme displayed 80% of its original activity in presence of 1% (w/v) SDS and was stable in presence of up to 5 mM DTT. Maltohexaose (G6) was the main initial product of starch hydrolysis while other products formed were G4 &gt; G2 &gt; G5 &gt; G3 and G1. The main end product of the enzyme’s action on amylose, amylpectin and maltodextrin is maltotetraose. Amy 34 could not hydrolyse pullulan, α and β-cyclodextrin but could hydrolyse γ-cyclodextrin to produce glucose, maltose and maltotetraose. Maltotetraose was the smallest α-(1–4) linked maltooligosaccharide that could be hydrolysed by the enzyme. Subject Chemistry Keywords alkaliphile, B. halodurans, maltohexaose, amylase ISBN/ISSN/Other ISSN: 0141-0229