

Isothermal decomposition of hydroxylamine and hydroxylamine nitrate in aqueous solutions in the temperature range 80-160 degrees C.

Liu L, Papadaki M, Pontiki E, Stathi P, Rogers WJ, Mannan MS.

Chemical Engineering Department, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX 77843-3122, United States.

ABSTRACT

Hydroxylamine (HA) and hydroxylamine nitrate (HAN) have been involved independently in several tragic accidents, which incurred numerous fatalities and injuries. Following these incidents, adiabatic calorimetry and computational chemistry research was conducted on those compounds, suggesting potential reaction pathways of their decomposition, but the mechanism of their unstable behavior, still have not been completely understood. In the present work, isothermal decomposition tests were performed accompanied with HPLC, ion chromatography and UV analyses in the temperature range 80-160 degrees C. Condition-dependent autocatalytic decompositions were demonstrated for HA and HAN, and an intermediate formation has been observed that is most likely responsible for their autocatalytic behavior. These findings corroborate previously reported computational chemistry results.