Reactivity of Ethylene Oxide in Contact with Basic Contaminants

Linh T.T. Dinh, William J. Rogers and M. Sam Mannan

Mary Kay O'Connor Process Safety Center
Artie McFerrin Department of Chemical Engineering
Texas A&M University System
College Station, TX 77843-3122, USA

ABSTRACT

The reactivity of ethylene oxide (EO) with contaminants such as potassium hydroxide (KOH), sodium hydroxide (NaOH), and ammonium hydroxide (NH4OH) was measured in this work using the automatic pressure tracking adiabatic calorimeter (APTAC). Each contaminant was investigated using three different concentration levels of around 0.10 g, 0.50 g, and 1.0 g in roughly 14 g EO. The research results show that KOH, NaOH, and NH4OH have significant effects on EO thermal stability. Reductions of onset temperatures were measured as the contaminant concentrations were increased. NH4OH caused the highest reactivity compared to the other contaminants. KOH is a contaminant that reduced the onset temperature of pure EO to near room temperature even at a low concentration. The key exotherm parameters and profiles that are critical to the design and operation of safer chemical plant processes are also provided in detail.