

Research on Thermal Runaway Reaction of Ammonium Nitrate with Incompatible Substances

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Abstract : Ammonium nitrate (AN) has caused many accidents in the world, which have caused a large number of people's life and serious economic losses. In this study, the safety of the AN production process was discussed deeply, and the influence of incompatible substances was estimated according to the change of their heat value by mixing them with incompatible substances by thermal analysis techniques, and their safety parameters were calculated according to their kinetic parameters. In this study, differential scanning calorimeters (DSC) were applied for the temperature rise test and adiabatic thermal analysis in combination with the Advanced Reactive System Screening Tool (ARSST). The research results could contribute to the safety of the ammonium nitrate production process. Manufacturers can better understand the possibility of chemical heat release and the operating conditions that will cause a chemical reaction to be out of control when storing or adding new substances, so safety parameters were researched for these complex reactions. The results of this study will benefit the process of AN and the relevant staff, which also have safety protection in the working environment.

Keywords : ammonium nitrate, incompatible substances, differential scanning calorimeters, advanced reactive system screening tool, safety parameters

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