

SOLID STATE PHASE TRANSITIONS OF NH₄NO₃-KNO₃ BINARY SYSTEM

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Solid-state phase transitions in ammonium nitrate (NH₄NO₃) - potassium nitrate (KNO₃) solid solutions have been determined by using high temperature X-ray diffractometry and differential scanning calorimetry. Ammonium nitrate (AN) is of great interest for use in gas generators for automobile air bag systems. In the important temperature range of the gas generators for automobile air bag, -40°C to +110°C, three phase transitions cause abrupt changes in specific volume for NH₄NO₃, leading to irreversible growth of cast charges. Solid solutions of NH₄NO₃-KNO₃ have been used such that there are no solid-state transitions between -100°C to +120°C. For compositions between 5 - 25 wt% KNO₃ in NH₄NO₃, there are no solid-state phase transitions between 22 to 80°C in the single (AN) phase III region. There are the new solid-state phases in the mid-composition range of NH₄NO₃-KNO₃ solid solutions. Above ambient temperature X-ray diffractometry and differential scanning calorimetric data the allowed construction of NH₄NO₃-KNO₃ temperature-composition phase diagram. Details of phase equilibria, and lattice expansions during heating will be presented.

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