PHASE-STABILIZED AMMONIUM NITRATE EXPLOSIVES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Australian Provisional Patent Application No. 2020902693, entitled PHASE-STABILIZED AMMONIUM NITRATE EXPLOSIVES, filed July 31, 2020, which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates generally to explosives. More specifically, the present disclosure relates to phase-stabilized ammonium nitrate (PSAN) explosives.

SUMMARY

[0002a] In one aspect, the present disclosure relates to a phase-stabilized ammonium nitrate (PSAN) explosive comprising: a PSAN prill comprising: ammonium nitrate; a potassium salt, wherein the PSAN prill comprises from 0.5 mole percent (mol%) to 5 mol% potassium ions of the potassium salt based on the ammonium ions of the ammonium nitrate; and an inorganic porosity enhancing agent; and a fuel.

[0002b] In another aspect, the present disclosure relates to a method of increasing the hardness of a phase-stabilized ammonium nitrate (PSAN) explosive, the method comprising: providing the PSAN explosive as defined herein, and thermal cycling the PSAN explosive 20 times or more.

[0002c] In another aspect, the present disclosure relates to a method of preparing a phase-stabilized ammonium nitrate (PSAN) prill, the method comprising: forming a

PSAN solution comprising a potassium salt and ammonium nitrate; and crystallizing the PSAN solution to form a PSAN prill by dropping liquid droplets of the PSAN solution within a prill tower, wherein a temperature limit for the PSAN prill at a bottom of the prill tower is at least 85 °C.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] The embodiments disclosed herein will become more fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings.

[0004] FIG. 1 is a graph showing the crush strength versus thermal cycles of ammonium nitrate fuel oil (ANFO) made with conventional ammonium nitrate (AN) prills and ANFO made with exemplary PSAN prills.

[0005] FIG. 2 is a graph showing the temperature of PSAN prills compared to conventional LOAN prills when cycled in an oven.

[0006] FIG. 3 is a graph showing the time taken to heat PSAN prills to 50 °C compared to conventional LOAN prills.