Characterization of Explosives

Lead: James Smith URI

Explosive Properties

Precursor Identification

Explosive Denaturation

Precursor Control

Intrinsic Detonability Determinations

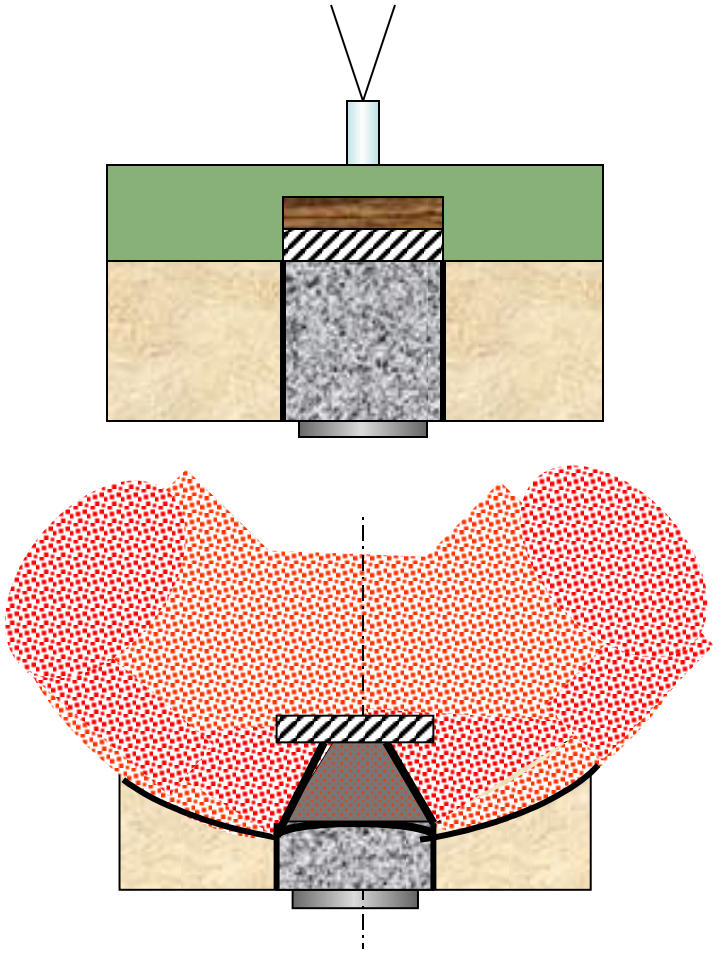
J Oxley, J Smith, J Kennedy, P. Bowden; L. Steinkamp URI; S Stewart UIL

Purpose: Identify potential explosive chemicals/precursors.

Innovation: Presently no test which positively determines detonability. Critical diameter is an issue.

Long-range impact: Revolutionary way to evaluate materials for detonability as well as hazards.

First-year outcome: 1) examination of RDX-spiked chemicals using exising SSED; 2) design & testing of shock-focusing fixture.



Denaturing of Explosive Precursors

J Smith, J Oxley, J. Brady, S. Vadlammanati; URI

Purpose: To identify safe additives which can be added to explosive precursors, e.g. H_2O_2, AN, urea, chlorates, nitrates, and thus prevent their use or make them less effect in illicit bombs.

Innovation: Denaturing, itself, is not innovative, e.g. EtOH, but for some explosive precursor this appears to be the only solution to the threat. (Part of the study will identify cases where administrative controls could be effect, i.e. denaturing not required.)

Long-range impact: To identify potential denaturing ingredients, the fundamental nature of the materials & detonability will be studied.

First-year outcome: H_2O_2 will be focus, identifying its uses in society; literature available; reactivity with a number of ingredients; reaction mechanisms.

Vapor/liquid equilibria & phase behavior of H_2O_2 systems

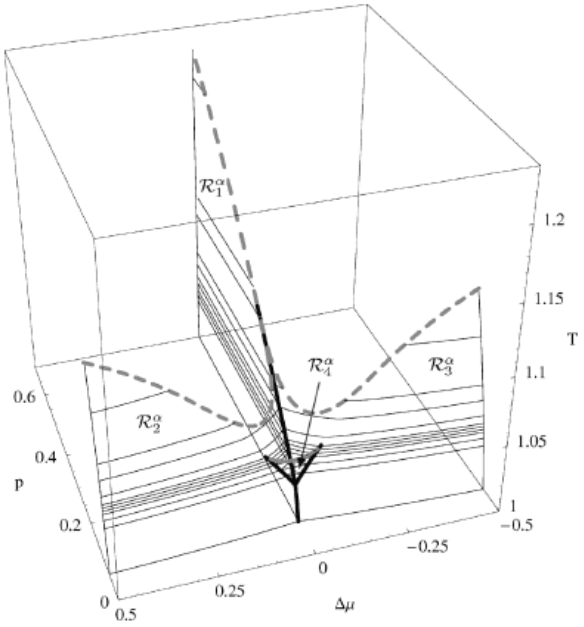
BL Weeks, Texas Tech; CS Yoo, Washington State

Purpose/ Relevance: To determine vapor liquid equilibria (VLE) of $H_2O+H_2O_2$ binary system & $_2O+H_2O_2$+adulterant ternary system.

Innovation: Study on 3-phase VLE & phase transitions to determine adulterants to limit hydrogen peroxide distillation.

Long-range impact: Discovery of adulterants which make distillation of H_2O_2 difficult. Study will contribute to the understanding of fundamental properties.

First year outcome: Develop capability for VLE measurements (TTU) & systems for phase identification (WSU). Currently VLE is based on 1952 study with misused thermodynamic model.



Typical 3D phase diagram for a binary mixture P, pressure, T, temperature, $\Delta\mu$, % of each component. Each dashed line represents a triple line. The $\Re$1-4 are equimolar planes of similar composition.