

VAPOR PRESSURE OF RDX - EXPERIMENTAL AND CORRELATION

Michael L. Reinig Jr.

Dr. Dabir S. Viswanath, Thesis Supervisor

ABSTRACT

Explosive devices are one of the most well known tools used by terrorists and those wishing to cause mass destruction. Current technology cannot detect hidden explosive materials such as RDX, TNT, TATB, and others well enough to protect civilian and military personnel from being harmed by explosive devices designed with the purpose to kill. The poor detection limits by many of these devices stem from inaccurate experimental property data, such as vapor pressure.

The current work has expanded the vapor pressure versus temperature data for RDX, a well known explosive material. The data should be useful in building sensors for detecting RDX. The completed vapor pressure versus temperature data was fitted to Antoine's equation resulting in the constants $A = 47.676$, $B = 54523.699$ and $C = 688.593$. Additionally, two correlations have been developed that predict the vapor pressure of nitro group containing compounds, including explosive nitro group containing compounds. The first correlation is useful for order of magnitude estimation and relates vapor pressure to molecular mass. The second correlation is more accurate and contains more explosive compounds. The more accurate correlation contains equations that predict the constants of the Clausius-Clapeyron equation fit to various nitro compounds. Large deviations exist, but this originates from inconsistent and inherently low vapor pressure data for many of the nitro group containing compounds.