

A New Method for Determining the Vapour Pressure of Nitroglycerine above Solid Rocket Propellants

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***Abstract:** The determination of precise vapour pressures for explosive compounds is considered to be an important challenge for a number of reasons. Amongst these is the need to design instruments for the accurate detection of energetic materials and in order to understand the likelihood of a compound to persist in the environment.*

Away from such applications, the ability of a compound contained within a solid rocket motor propellant to migrate and evaporate and therefore cause changes to the material's properties with time is also influenced by its vapour pressure. To make predictions about the long term ageing behaviour of a propellant, it is necessary to estimate the vapour pressure of key compounds considered to be thermally liable and likely to readily migrate.

QinetiQ has a requirement to model the migration of nitroglycerine (NG) from a complex propellant formulation. To do this, we need to measure the vapour pressure above the solid propellant across a wide temperature range. However, it is known from the literature that this is not a straightforward task. In addition, there are a wide range of values reported for this nitrate ester which have been determined using a number of different methods.

It has therefore been necessary to develop a new method which can be used to measure the vapour pressure of NG above solid propellants across a wide temperature range. The validity of this method has been assessed by measuring the vapour pressure of pure NG liquid at ambient temperatures.

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