OZM RESEARCH

Instruments & Technologies for Energetic Materials

EXPLO-5

PRODUCT DATASHEET

EXPLO5 is a thermo-chemical computer code that predicts detonation properties (such as composition of detonation products, detonation velocity, pressure, temperature, heat, etc.) of high explosives, and combustion properties of propellants under constant volume or constant pressure conditions (such as composition of combustion products, pressure in closed vessel, heat and temperature of combustion, specific impulse, force, etc.). As such, **EXPLO5** is important tool in synthesis, formulation, and numerical modelling of energetic materials.

The calculation of detonation parameters in **EXPLO5** is based on the chemical equilibrium, steady-state model of detonation. The equilibrium composition of detonation products is calculated applying free energy minimisation technique.

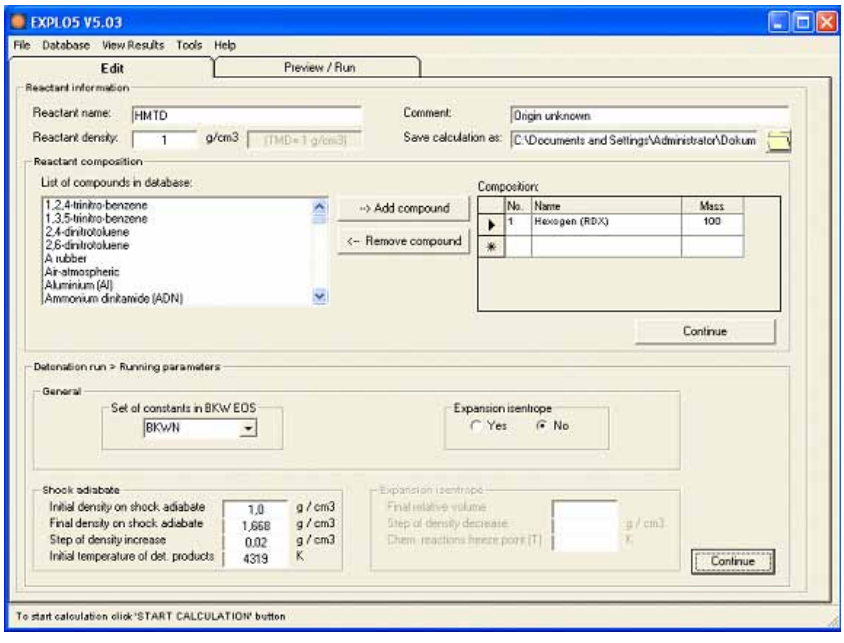
The program uses Becker-Kistiakowsky-Wilson (BKW) equation of state for gaseous detonation products and Murnaghan or Cowan-Fickett's equation of state for solids products. The program is designed so that it enables the calculation of chemical equilibrium composition and thermodynamic parameters of state along shock adiabate of detonation products, the CJ state and detonation parameters at the CJ state, as well as parameters of state along the expansion isentrope.

It uses non-linear curve fitting subroutine to fit relative volume-pressure data along expansion isentrope according to Jones-Wilkins-Lee (JWL) model, enabling the calculation of detonation energy available for performing mechanical work.

For the calculation of combustion performances under constant pressure or under constant volume conditions, the program uses the ideal gas or the virial equation of state. The virial coefficients of individual gaseous species are calculated from the intermolecular potential equations.

The version v5.05 can calculate detonation properties of CHNO, CNO, HNO, CHN, CHNO-Al, HNO-Al, CNO-Al, CHNO-Si, CHN-Si, N-Si compositions, and combustion properties of CHNO, CNO, HNO, HO, CHNO-Al, CHNO-Cl, CHNO-Cl-Al, CHNO-Si-Cl-Al compositions.

Operation of **EXPLO5** is simple and the program run starts with only one edit window. The easy and intuitive program operation can be viewed via the screenshot of the **EXPLO5's** edit window on the left.



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*Due to the continuous development policy of OZM Research, changes may be introduced without prior notice.

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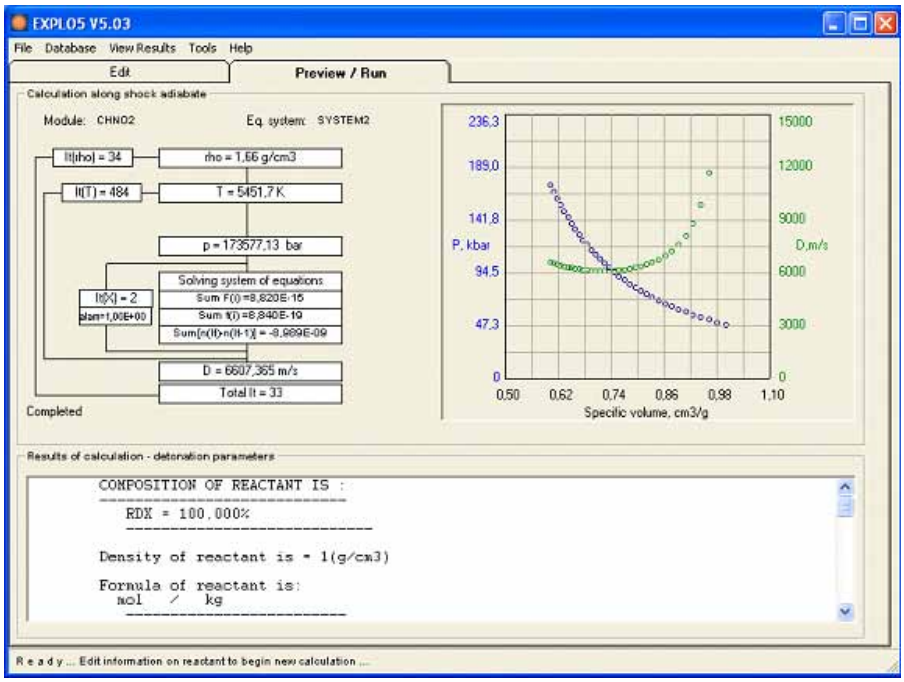
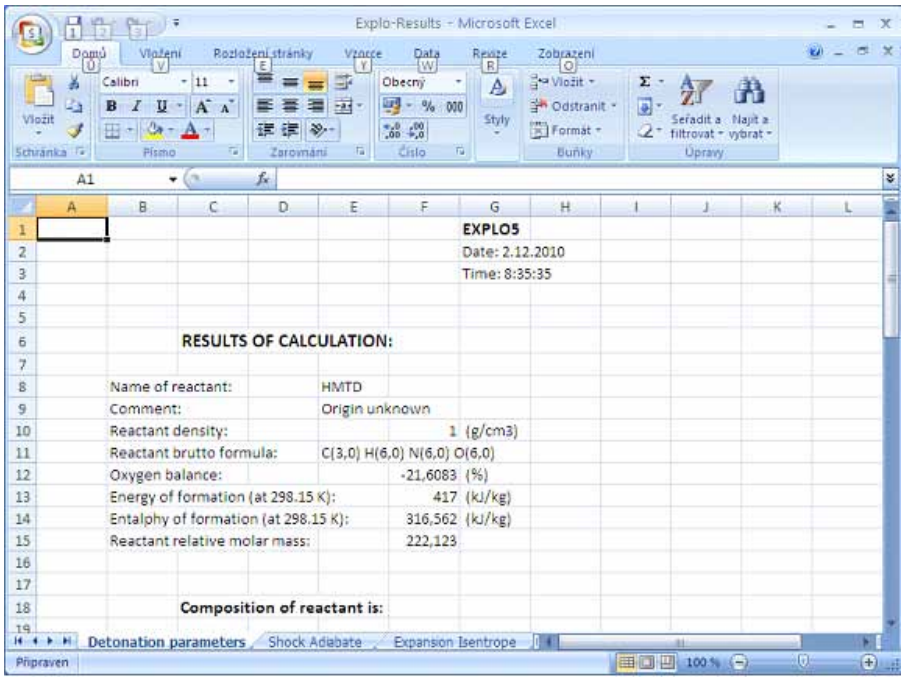
Together with the calculation results the running calculation are displayed in the Preview / Run window. An example of the calculation results is shown in the screenshot on the left.



The calculation results are automatically stored in MS Excel format so as to allow the user to evaluate and manipulate the data by the MS Excel program.



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