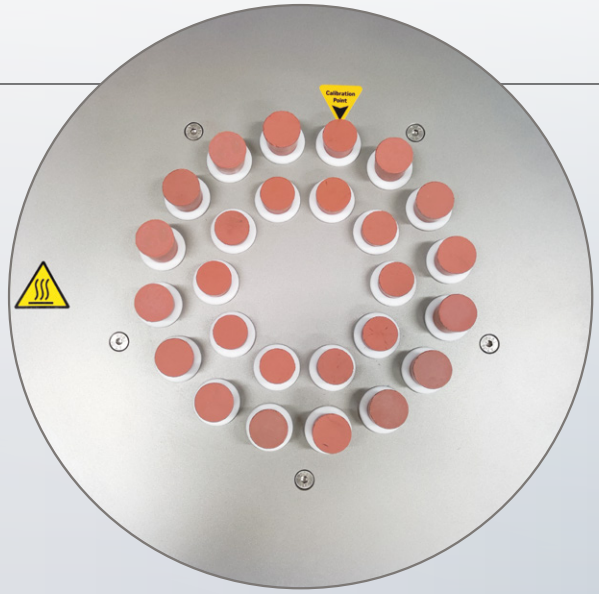
HEATING BLOCKS

FOR DETERMINATION OF THERMAL STABILITY



Thermal and chemical stability is crucial for the safe manufacture, storage, transportation and use of energetic materials. OZM Research provides a comprehensive selection of instruments designed to accurately determine the thermal and chemical stability for all types of energetic materials. Whether concerning quality control testing, hazardous materials evaluation, or in-service surveillance, OZM Research offers the most reliable and highest quality thermal stability testing equipment.

APPLICATIONS

Traditional tests for the determination of the thermal stability of energetic materials (mainly propellants) are based on heating samples at elevated temperatures and detecting their reactive decomposition products (NO_x). Detection can be based on the visual identification of colored gases above the sample (Heat Storage Test at 100 °C), a color change of indicator papers (Abel Test, Methyl Violet Test), the quantitative determination of the amount of gaseous decomposition products by analysis of the acidity of the water extract (Bergmann-Junk Test), or the determination of weight loss (Holland Test). Heating samples at elevated temperatures is also used to determine the shelf life of propellants using artificial ageing according to STANAG 4117, AOP-48 (HBA heating blocks).

All testing devices for thermal stability consist of temperature controllers and heating blocks (each containing from 4 to 45 appropriately sized holder holes). Customized glass test tubes are supplied with each instrument.

ADVANTAGES & FEATURES

- Customized heating blocks available upon request
- High precision and accuracy of the heating block temperature
- Fast operation time and proven testing procedures
- Independent alarm circuit (limit controller) for additional temperature control

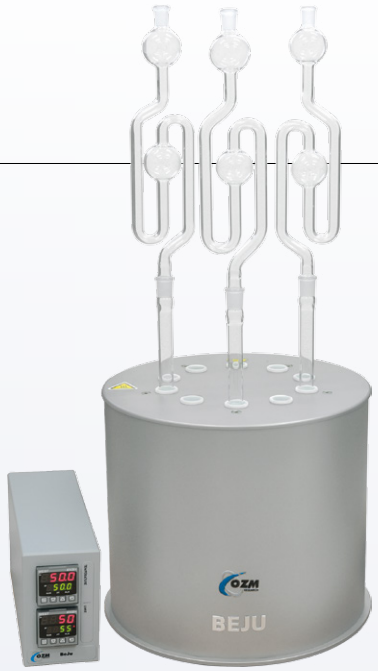
Typical experiment conditions

Heating Block	Temperature	Sample Mass	Test Duration	Observed Parameter
BEJU	120 and 132 °C	1–5 g	2–5 hours	Amount of NO_x
ABT	65–85 °C	1 g	max 60 min	Color change of indicator paper
MVT	120 and 134.5 °C	2.5 g	max 30 min	Color change of indicator paper
CH 100	100 °C	10 g	max 7 days	Appearance of NO_x
HBA	50–90 °C	20 g	120 days	N/A
HT	90–110 °C	4 g	3–7 days	Amount of decomposition gases

BEJU

BERGMANN-JUNK TESTER

The instrument for the determination of thermal stability according to the Bergmann-Junk procedure at 120 and 132 °C is designed for the evaluation of the thermal stability of nitrocellulose, smokeless powders, or propellants. This test is based on the quantitative determination of the amount of gaseous products evolved during the thermal decomposition of the sample in a glass adapter filled with water. The amount of gaseous products is estimated by volumetric analysis of the acidity of the water extract.



COMPLIANCE

- **MIL-DTL-244C**
- **STANAG 4178**
- **TL 1376-0589** and **TL 1376-0600**
- **UK M28/89**

ABT

ABEL HEAT TESTER

MVT

METHYL VIOLET TESTER

The **ABT** (Abel Heat Test) and **MVT** (Methyl Violet Test) instruments are designed to evaluate the thermal stability of nitrocellulose, nitroglycerine and nitroglycol using the Abel Test and Methyl Violet Test procedures. Both instruments are also well suited for testing propellant stability. These tests are based on the fact that nitrate esters decompose to produce NO_2, and the rate of decomposition increases rapidly at elevated temperatures, leading to the production of “red fumes.” The presence of gaseous decomposition products is determined by a color change of the Iodide-Starch (ABT) or Methyl Violet indicator paper. The result of these tests is the time period from inserting a sample into a preheated heating block to the change of color of the indicator paper.

ABT COMPLIANCE

- **AOP 7**
- **DEFSTAN 13-189/1**
- **MIL-DTL-244B**
- **STANAG 4178**

MVT COMPLIANCE

- **MIL-DTL-244C**
- **MIL-STD-286C**
- **STANAG 4118**

CH 100

HEAT STORAGE TEST AT 100 °C

The **CH 100** instrument is specifically designed to determine the thermal stability of smokeless powders and propellants through long-term isothermal heating. Thermal stability is evaluated by visually inspecting the appearance of the red fumes, which indicates the presence of decomposition gases (oxides of nitrogen).

HBA

HEATING BLOCKS FOR ARTIFICIAL AGEING

During the lifetime of an explosive sample, exothermal decomposition occurs. The rate of this exothermal reaction is proportional to temperature. Under normal conditions, the rate of decomposition is small (the lifetime of propellants or explosives is usually many years). Therefore, accelerated ageing is used to predict the lifetime of an explosive sample. The simplest method of accelerated ageing is long-time storage of explosive samples at elevated temperatures (usually 50 °C to 90 °C). During the time of the test, changes in sensitivity, stability, chemical composition, ballistic or mechanical properties are assessed.

COMPLIANCE

- **AOP 48**
- **STANAG 4117, 4527, 4541, 4620**

HT

HOLLAND TEST APPARATUS

The **HT**™ (Holland Test or Dutch Weight Loss Test) apparatus is used to determine the thermal stability of energetic materials by measuring the mass loss of a sample during isothermal heating, which is caused by the decomposition of the solid sample into gaseous products. The sample is subjected to a long-term (3 days or more) isothermal heating and its weight is monitored throughout the testing period using external balances. The weight loss percentage versus time is reported.

COMPLIANCE

- **TL 1376-0600**

OZM RESEARCH

OZM Research s.r.o.
Bliznovice 32, 538 62 Hrochuv Tynec
CZECH REPUBLIC / European Union
Tel.: +420 469 692 341
Mobile: +420 608 742 777
E-mail: ozm@ozm.cz
www.ozm.cz

VER.2023