

Carius Tube Apparatus



The Carius Tube test (often referred to as the 10g Tube Screening Test) is used for the screening of materials or mixtures for thermal hazards. It is generally employed for the preliminary identification of exothermic reactions or gas generation that occur when a sample or mixture is exposed to elevated temperatures. The Carius apparatus can also determine other physical properties of materials e.g. glass transition temperature, melting point, etc.

DEVELOPMENT OF THE CARIUS APPARATUS

Chilworth Technology have continued to develop the Carius tube apparatus and now provide multiple data logging rates (e.g. 30 sec's, 1 sec, 0.1 sec and 1msec) which activate automatically depending upon the speed of the chemical reaction (slope of the exotherm).

STANDARD SPECIFICATION

- 10 x 35cm³ glass Carius tubes
- 1 x electrically heated furnace (100-120V or 220-240V 50/60Hz 1KW)
- 1 x temperature control unit with digital trip comms (100-120V or 220-240V versions)
- 1 x data acquisition hardware (10khz/channel acquisition optional): sample temp, oven temp and sample pressure
- 1 x data acquisition custom written software (user adjustable log rates, furnace trip pressure/temperature settings, data entry fields e.g. company name, batch number etc)
- 1 x pressure transducer 0-100 Barg (5khz response time) + hydraulic pressure link
- 1 x Carius tube holder and support arm
- 1 x transducer retort clamp
- 1 x set of k-type thermocouples
- 1 x set various pressure linkage fittings
- 1 x PC of current up to data specification with LCD display
- 1 x comprehensive test/operation instruction manual.

The above system now comes with standard multiple data logging rates. An optional Carius data analysis Excel spreadsheet is also available.

Detection: The apparatus is capable of detecting changes in the sample ramp rate of between 5 and 10 K.hr⁻¹ above that of the furnace rate. Sensitivity = 3 - 10 W.kg⁻¹.

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THE BENEFITS

- Simple to use and robust
- Competitively priced
- Identification of Exothermic activity – semi-quantitative assessment of onset temperatures and their magnitudes. Identification of samples undergoing extremely rapid deflagrations / detonations for exclusion from further testing (i.e. screening prior to scale up in the laboratory using Adiabatic Calorimeters such as the Chilworth ADCII).
- Identification of Other Energetic Events - the onset temperatures of other physical changes can be measured (i.e. melting, glass transition temperatures, etc.).
- Identification of Pressure Effects - The Carius tube apparatus is unique in that the sealed nature of tests allows the collection of pressure data coincident with the measurement of temperature (there are no reflux problems with this system). This allows an identification of the onset of permanent gas generation and, ultimately, a knowledge of the quantity of gas generated during the test. Rates of pressure rise can also be ascertained from the test data.
- Gas generation - Permanent gas generation effects may also be analysed.
- 12 month warranty covering all parts excluding sensors and consumables such as glassware and pressure fittings.



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CHILWORTH SERVICES IN PROCESS SAFETY

As well as equipment supply we also offer a range of testing and consultancy services to the process industry, covering:-

- Dust/Gas/Vapour Explosion
- Electrostatic Hazards
- Hazardous Area Classification
- Chemical Reaction Hazards
- Chemical Process Optimisation
- Regulatory Testing (NONS, SDS, CHIP, CPL, UN)
- ATEX / DSEAR Audits
- IEC61508/11 Functional Safety & SIL Determination
- Major Hazards (Seveso II / COMAH)
- Incident Investigation / Expert Witness
- Training

For further information and a comprehensive list of the services available, please contact one of our offices detailed below.

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