TA Instruments

Thermal Analysis & Rheology

# THERMAL APPLICATIONS NOTE

## GUIDE FOR CHOOSING DSC PANS

In DSC, the sample of interest and a reference (if required) are placed in pans which sit on raised platforms on the constantan disc inside the DSC cell. Heat is transferred through the disc up into the sample and reference via the sample pans. A variety of sample pans are available from TA Instruments which provide good thermal conductance to the sample and enable a wide variety of sample materials to be studied. These include:

| SAMPLE PAN TYPE | USABLE TEMPERATURE RANGE (°C) | INTERNAL PRESSURE | PART NUMBER pans/lids |
|---|---|---|---|
| Standard | | | |
| Aluminum | -180 to 600 | | 900786-901/900779-901 |
| Copper | -180 to 725 | | 900867-901/900869-901 |
| Gold | -180 to 725 | | 900866-901/900868-901 |
| Platinum | -180 to 725 | | 900578-901/NA |
| Graphite | -180 to 725 | | 900874-901/900873-901 |
| SFI | | | |
| Aluminum | -180 to 600 | | 900870-901/NA |
| Hermetic | | | |
| Aluminum | -180 to 600 | to 300 kPa | 900793-901/900794-901 |
| AL Pin hole lids | -180 to 600 | to 300 kPa | NA /900860-901 |
| Alodined Aluminum | -180 to 600 | to 300 kPa | 900796-901/900790-901 |
| Gold | -180 to 725 | to 600 kPa | 900871-901/900872-901 |

Standard Pans

Most samples can be run in non-hermetic pans either uncovered, or crimped with an aligned or inverted cover. Atmospheric interaction is optimized using an open (uncovered) pan. Crimped pans improve the thermal contact between the sample, pan and disc, reduce thermal gradients in the sample, minimize spillage, and enable retention of the sample for further study. The crimped aluminum pans are most widely used. However, there are applications where the other non-hermetic pans are used.

- Platinum, copper, or gold pans are commonly used when the sample of interest reacts with aluminum or the sample has a transition in the 600-725°C region.
- Copper pans are also used in thermal oxidative stability studies of polymeric materials used for coating copper wires and cables.
- In cases where alloying or other undesirable metal-sample interactions occur, graphite pans are the method of choice.

**NOTE:** When analyzing films, a 1/4" hole punch can be used to obtain sample sizes which will fit perfectly into the standard aluminum pans. [Source: Rostra, Branford, CT, (302) 488-8665 - PN 1406S 1/4.]

SFI

Specially modified aluminum pans are available for performing solid fat index (SFI) determinations. A recessed rim around the bottom of the pan prevents wicking due to surface tension which might influence the run or contaminate the cell disc.

Hermetic Pans

Hermetic pans, which are normally used only for special applications, are almost always used with the cover on and sealed using the sample encapsulation press. Representative applications of the hermetic pans include: studies of volatile liquids including specific heat, studies of materials that sublime, studies of aqueous solutions above 100°C, examinations of materials generating corrosive or condensable gases, and examinations of materials in self-generating atmospheres. Hermetic pans, however, do provide a poorer thermal contact between the sample, pan and disc. This fact, plus the added mass of the hermetic pans and covers, leads to a slight loss of resolution compared to the crimped pans. The calorimetric accuracy is not affected, only the time constant of the system.

- The plain aluminum hermetic pans are used for most applications.
- The alodined aluminum pans and gold pans are used for samples which react with aluminum (e.g. biological samples).
- Gold pans are also used where high internal pressures or high temperatures (600-725°C) are required, being particularly useful in the specific heat capacity determination of liquids.
- Hermetic lids with a pinhole are useful in vapor pressure studies (see TN-5).

For more information or to place an order, contact:
**TA Instruments, Inc.**, 109 Lukens Drive, New Castle, DE 19720, Telephone: (302) 427-4000, Fax: (302) 427-4001
**TA Instruments S.A.R.L.**, Paris, France, Telephone: 33-01-30489460, Fax: 33-01-30489451
**TA Instruments N.V./S.A.**, Gent, Belgium, Telephone: 32-9-220-79-89, Fax: 32-9-220-83-21
**TA Instruments GmbH**, Alzenau, Germany, Telephone: 49-6023-30044, Fax: 49-6023-30823
**TA Instruments, Ltd.**, Leatherhead, England, Telephone: 44-1-372-360363, Fax: 44-1-372-360135
**TA Instruments Japan K.K.**, Tokyo, Japan, Telephone: 813-5434-2771, Fax: 813-5434-2770

**Internet: http://www.tainst.com**



TA Instruments
**Thermal Analysis & Rheology**
A SUBSIDIARY OF WATERS CORPORATION