

The Transition Method of Plastic Temperature Measurement

- According to JIS K 7121-1987 -

Heat characteristics of high polymers, such as transition and decomposition, are measured by thermal analysis. However, measuring conditions such as sample shapes and filling methods may influence analytical results. For correct comparison, therefore, it is necessary to standardize measuring conditions. In October 1987, based on this, the Japanese Industrial Standards Committee standardized methods to measure transition heat and transition temperature of plastics.

Reported herein is how to know a transition temperature (melting temperature, crystallization temperature or glass transition temperature) of plastic, and the results of temperature measurements of several types of plastics per JIS K 7121-1987 "Testing Methods for Transition Temperature of Plastics".

According to JIS, there are two methods to measure a glass transition temperature: one is a method to take measurement after heat treatment, and the other stipulates that no heat treatment is conducted before measurement.

How to know the transition temperature

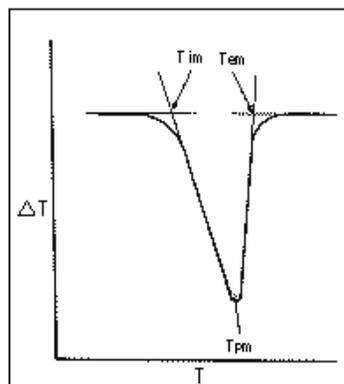


Fig. 1 Measuring method of melting temperature

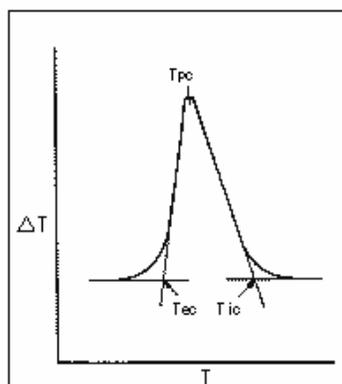


Fig. 2 Measuring method of crystallization temperature

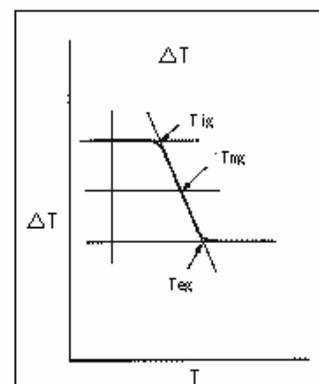


Fig. 3 Measuring method of glass transition temperature

Polypropylene (PP)

A melting temperature was measured.

T_{im}: 140.7° C

T_{pm}: 158.9° C

T_{em}: 166.5° C

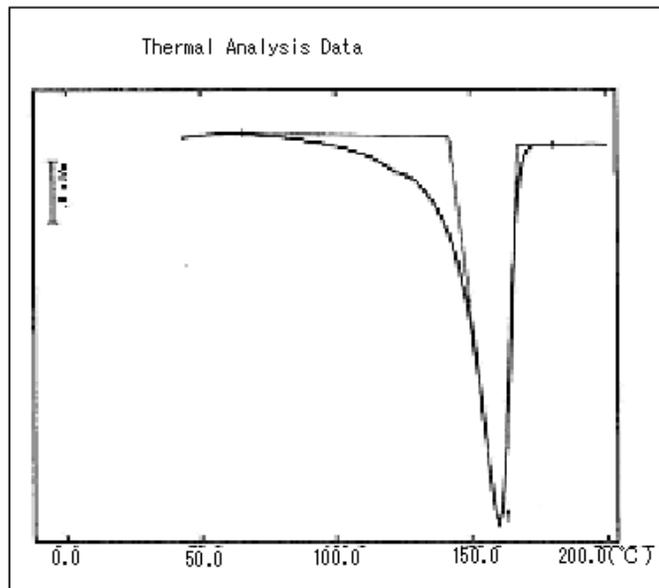


Fig. 4 Melting temperature of PP

Polybutylene terephthalate (PBT)

A crystallization temperature was measured based on a DSC curve when a sample was heated to a temperature 30° C higher than that at the end of the melting peak, retained for ten minutes, and cooled at 10° C/min.

Tic: 193.5° C Tpc: 185.8° C Tec: 178.5° C

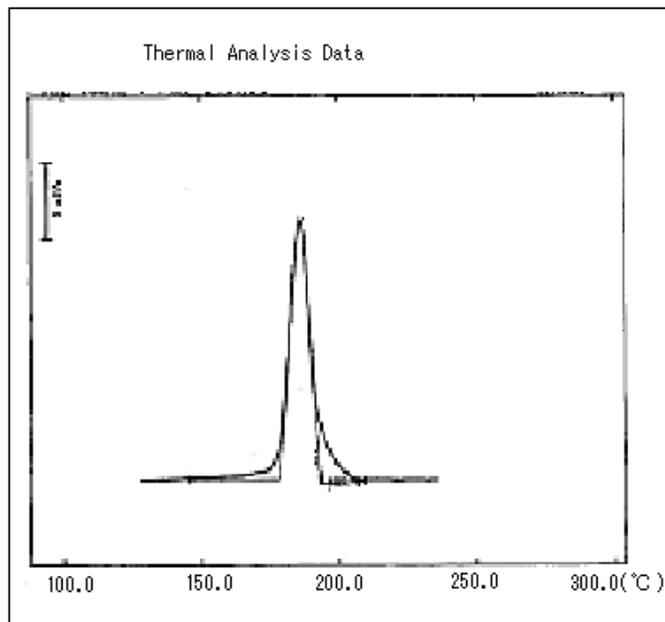


Fig. 5 Crystallization temperature of PBT

Polyethylene terephthalate (PET)

Crystallization and melting temperatures were measured.

Tic (extrapolative crystallization start temperature)	: 123.3° C
Tpc (crystallization peak temperature)	: 129.8° C
Tec (extrapolative crystallization end temperature)	: 135.4° C
Tim	: 241.8° C
Tpm	: 257.3° C
Tem	: 265.2° C

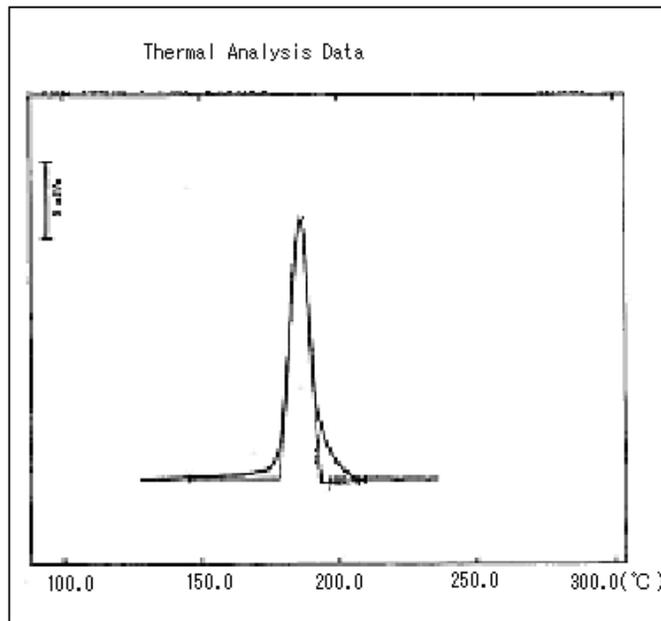


Fig. 5 Crystallization temperature of PBT

Polyethylene terephthalate (PET)

A glass transition temperature was measured.

Tig (extrapolative glass transition start temperature) : 74.5° C

Tmg (intermediate glass transition temperature) : 77.3° C

Teg (extrapolative glass transition end temperature) : 79.9° C

* Please be advised that data obtained before the implementation of the current Weights and Measures Law may be presented in terms of gravimetric unit.



SHIMADZU CORPORATION International Marketing Division
3,Kanda-Nishikicho 1-chome, Chiyoda-ku,Tokyo 101-8448,
JapanPhone: 81(3)3219-5641 Fax: 81(3)3219-5710
Cable Add,;SHIMADZU TOKYO

SHIMADZU SCIENTIFIC INSTRUMENTS, INC.
7102, Riverwood Drive, Columbia, Maryland 21046, U.S.A.
Phone: 1(410)381-1227 Fax: 1(410)381-1222 Toll Free:1(800)477-1227

SHIMADZU DEUTSCHLAND GmbH
Albert-Hahn-Strasse 6-10, D-47269 Duisburg, F.R. Germany
Phone: 49(203)7687-0 Fax: 49(203)7666-25

SHIMADZU (ASIA PACIFIC) PTE LTD.

16 Science Park Drive #01-01, Singapore Science Park, Singapore 118227, Republic of Singapore

Phone: 65-778-6280 Fax: 65-779-2935

SHIMADZU SCIENTIFIC INSTRUMENTS(OCEANIA)PTY. LTD.

Rydalmere Business Park, Unit T, 10-16, South Street Rydalmere, N.S.W. 2116, Australia

Phone: 61(2)9684-4200 Fax: 61(2)9684-4055

SHIMADZU DO BRASIL COMERCIO LTDA.

Rua Cenzo Sbrighi, 25 CEP 05036-010 Agua Branca, Sao Paulo, BRAZIL

Phone: 55(11)3611-1688 Fax: 55(11)3611-2209

SHIMADZU (HONG KONG) LIMITED.

Suite 1028, Ocean Centre, Harbour City, Tsim Sha tsui, Kowloon, HONG KONG

Phone: 852(2375)4979 Fax: 852(2199)7438

Overseas Office

Istanbul, Beijing, Shanghai, Guangzhou, Shenyang, Chengdu, Moscow