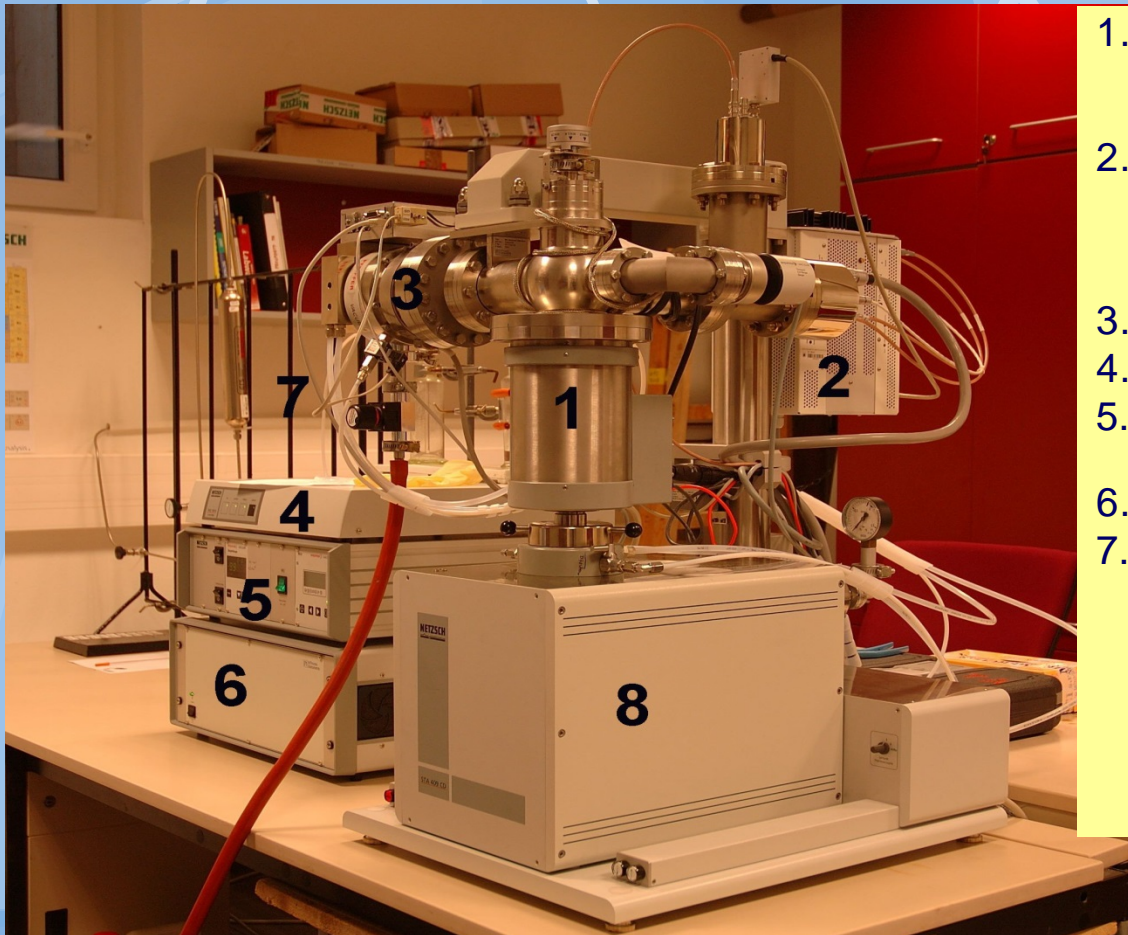
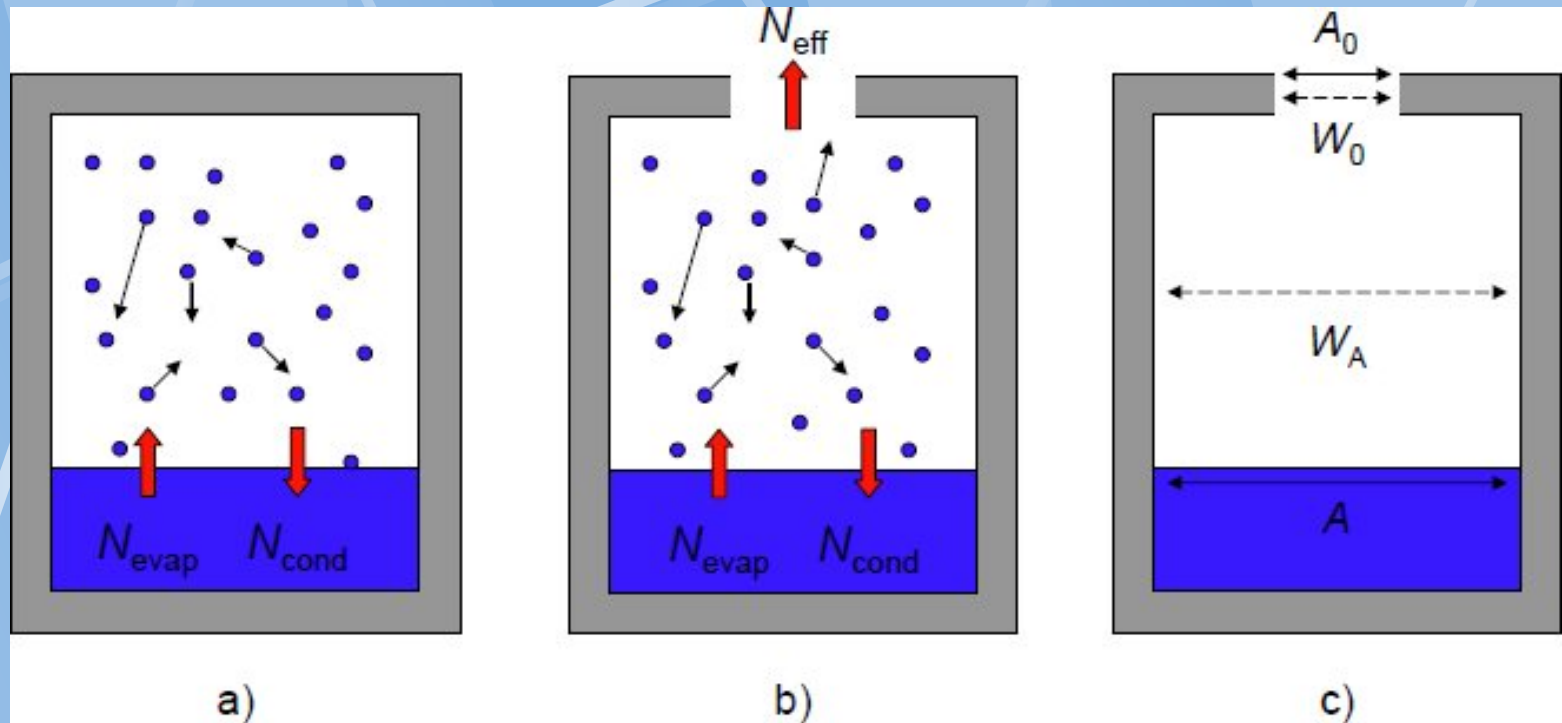


Měření aktivit - KEMS



- 1...Furnace
(0.1 – 20 K min⁻¹,
25-1450°C)
- 2...QMS
range 1-512 amu
resolution 0,5amu
IE = 25 -100 eV
- 3...Turbomolecular Pump
- 4...TA System Controller (TASC)
- 5..Vacuum Controller, (cca 9·10⁻⁶
mbar)
- 6...QMS Controller
- 7..Purification Column (oxygen)
(Argon 99,999)
Mass Flow Controller
(MFC)

Princip



Kinetická teorie plynů:

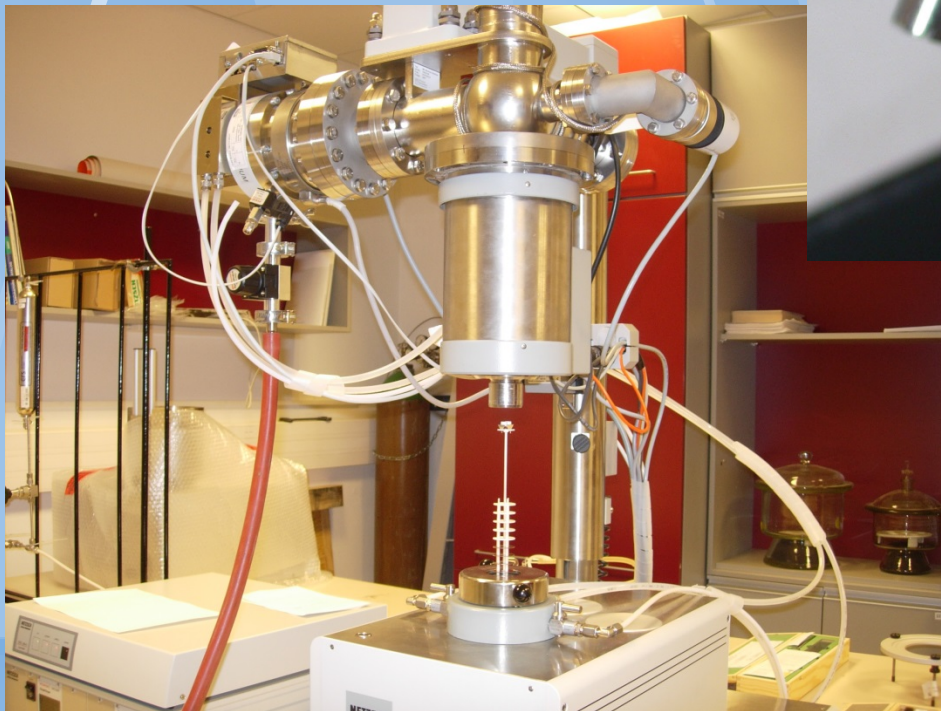
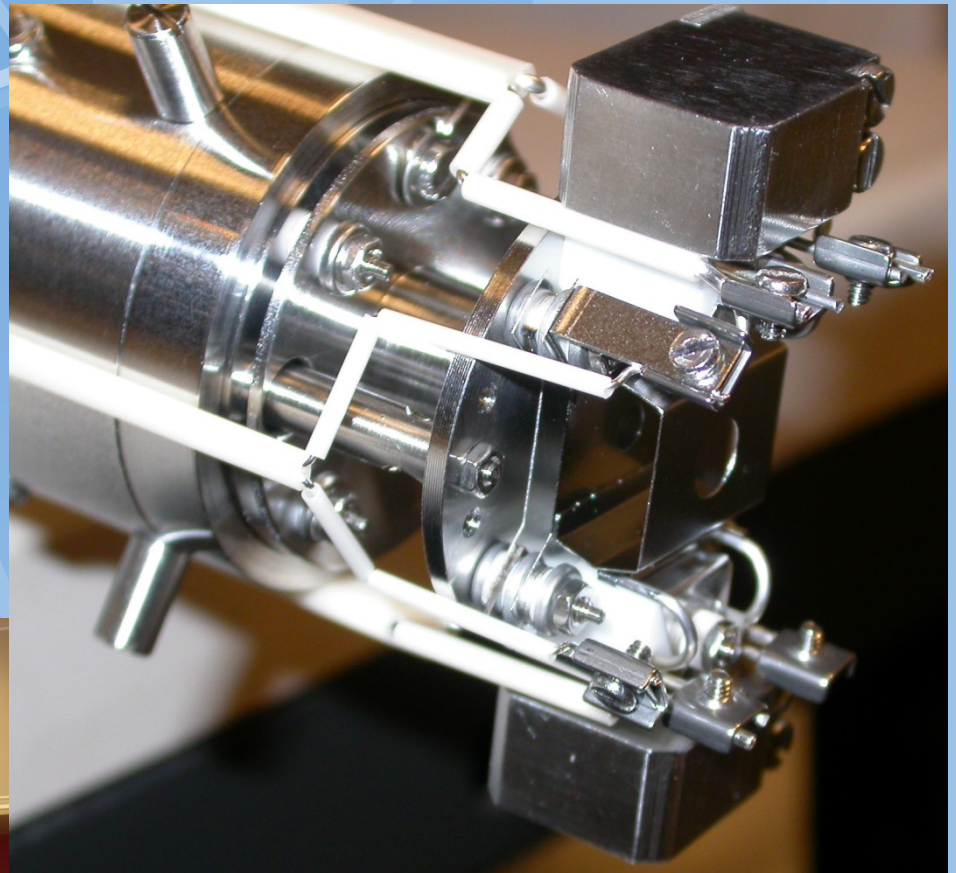
$$p_{\text{meas}} = \frac{1}{W_0 A_0} \frac{dm}{dt} \sqrt{\frac{2\pi k_B T}{M}}$$

Whitman-Motzfeld equation

$$p_{\text{eq}} = \left[1 + \frac{W_0 A_0}{A} \left(\frac{1}{\alpha} + \frac{1}{W_A} - 2 \right) \right] p_{\text{meas}}$$

W_0 ...Clausiusův pravděpod. faktor (0-1)
 projití otvorem, α ...pravděp.
 Kondenzace (pro kovy=1)

STA 409 CD/3/403/5/G - detaily



MS detekce více složek

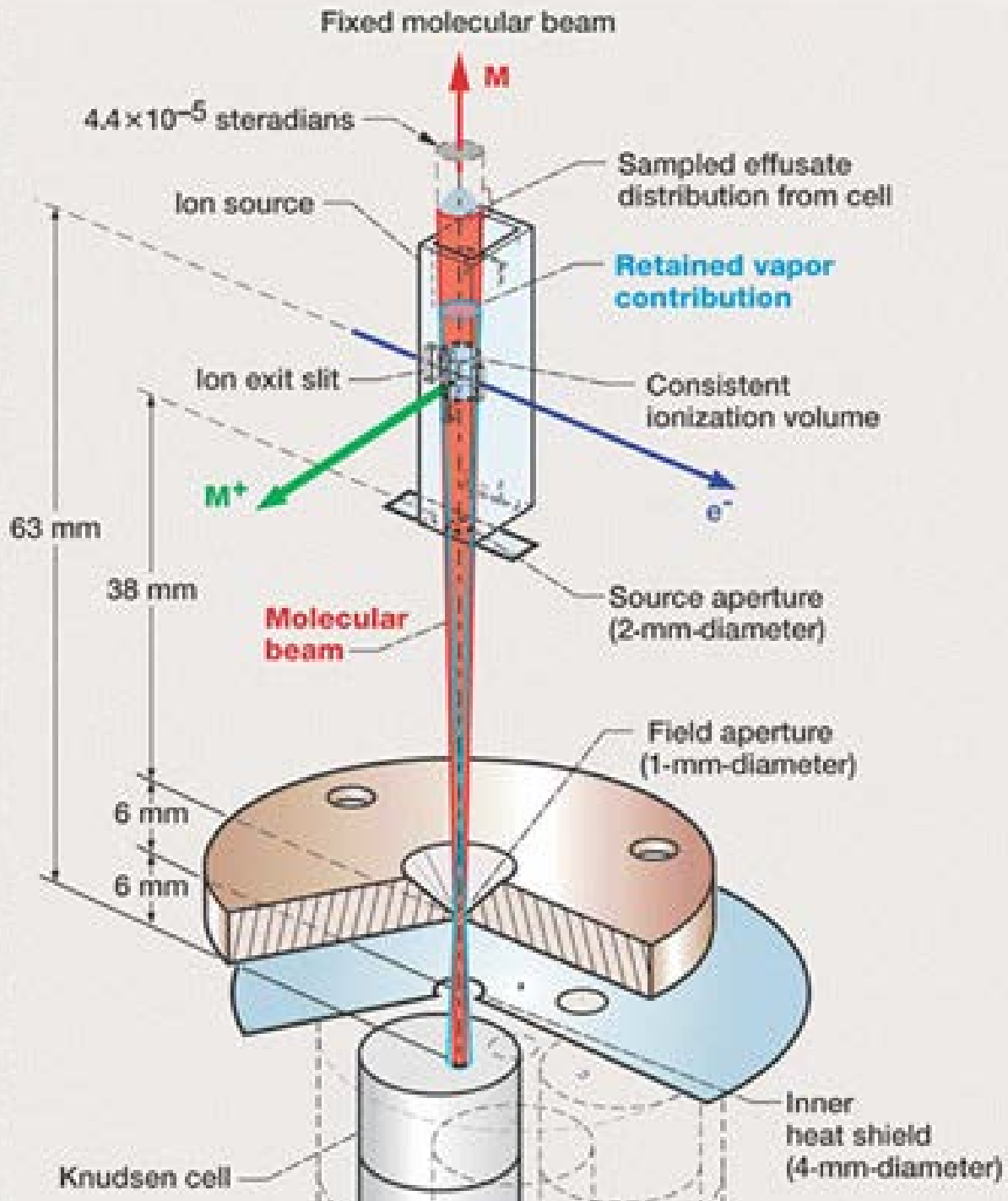
Parciální tlak:

$$p_j = (I_{jk}^+ T) / S_{jk}$$

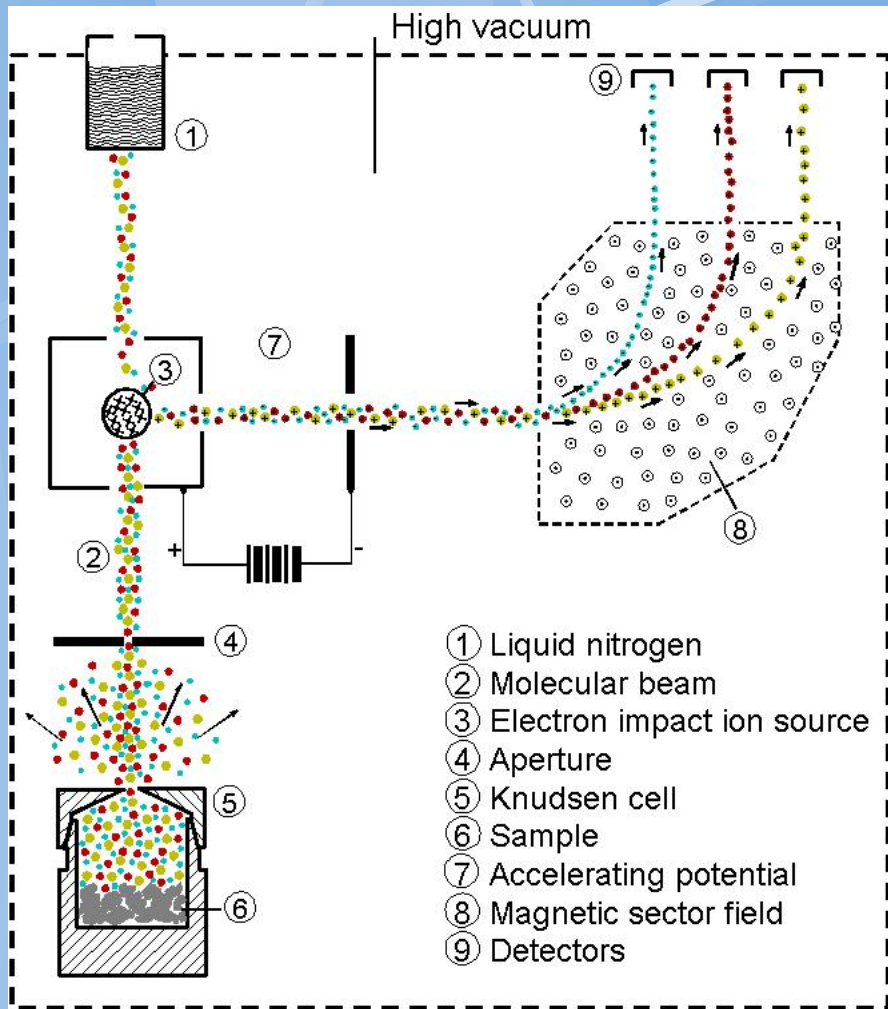
Aktivita

složky:

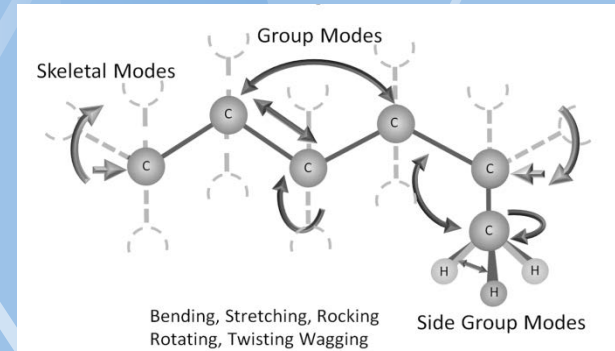
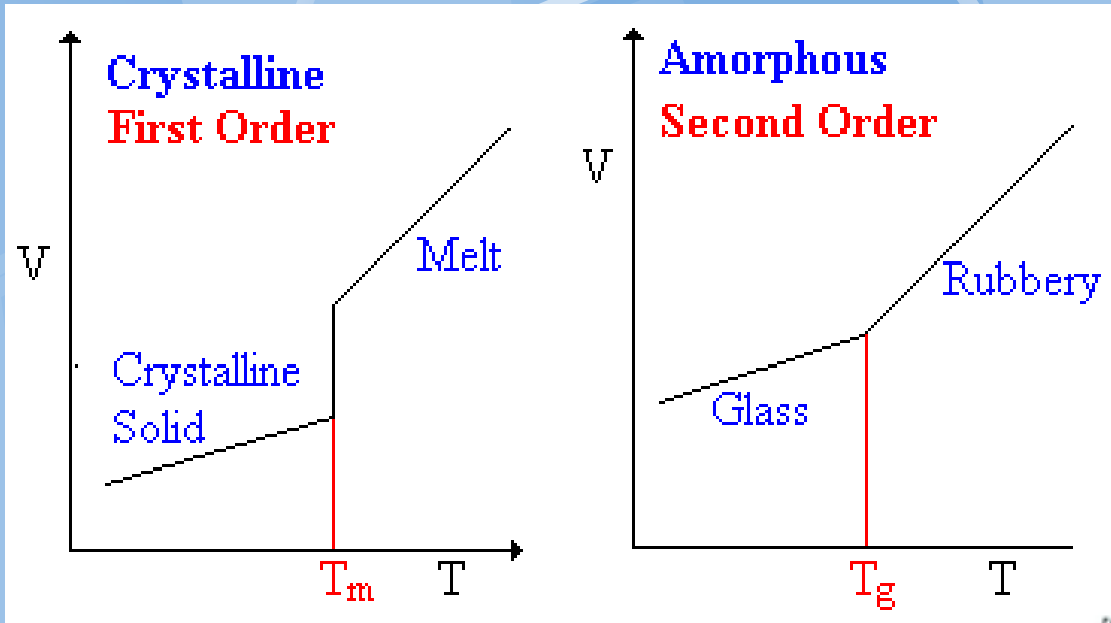
$$a_j = P_j(A) / P_j(R) = \frac{[I_{jk}^+(A) \cdot T]}{[I_{jk}^+(R) \cdot T]} \cdot [S_{jk}(R)] / [S_{jk}(A)] = [I_{jk}^+(A)] / [I_{jk}^+(R)]$$



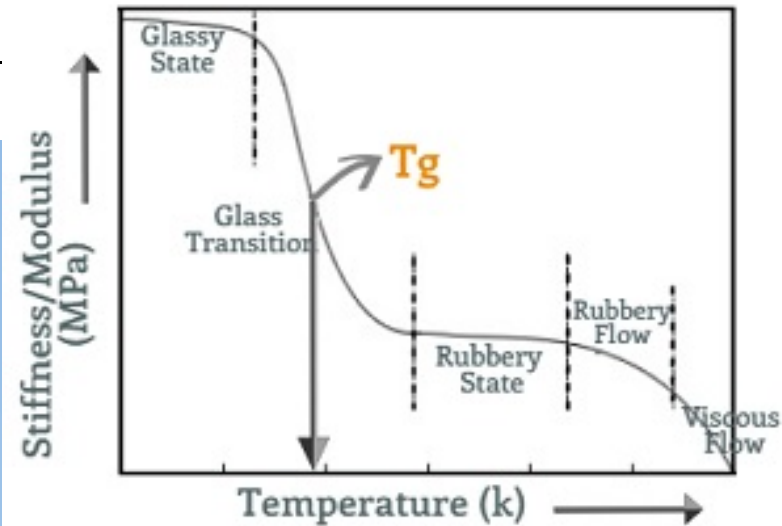
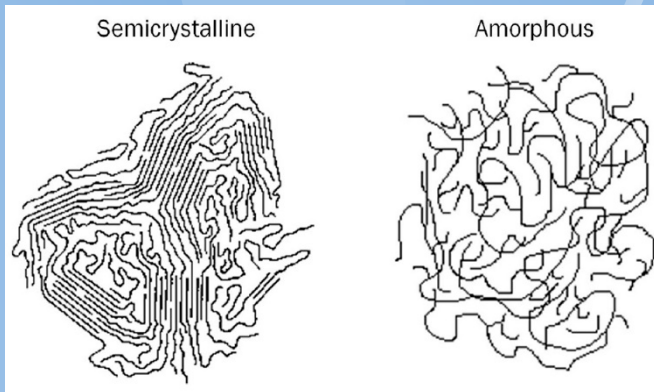
Praktické provedení



Skelný přechod (glass transition)



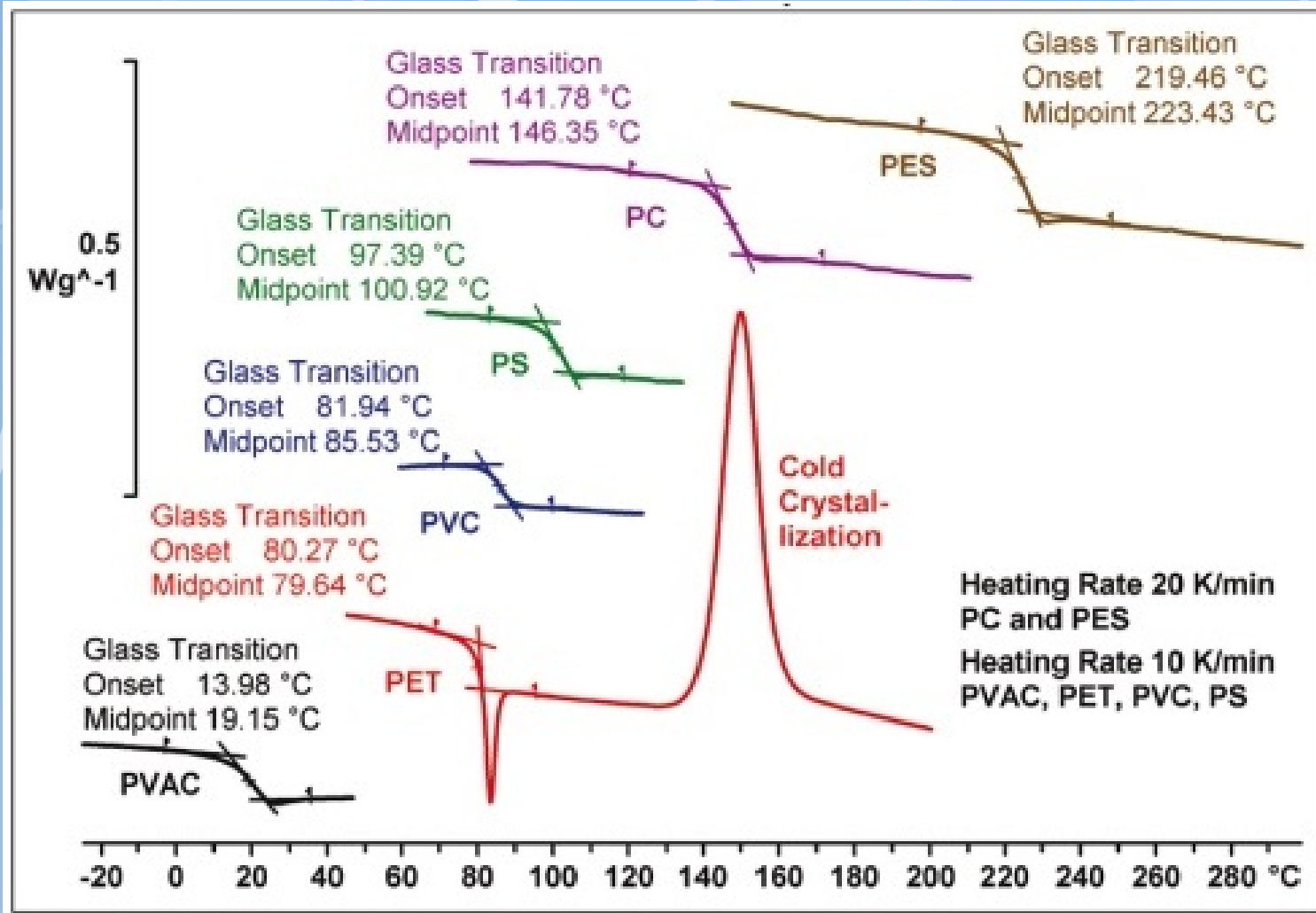
Postupné uvolňování stavebních jednotek



<https://polymerdatabase.com/polymer%20physics/GlassTransition.html>

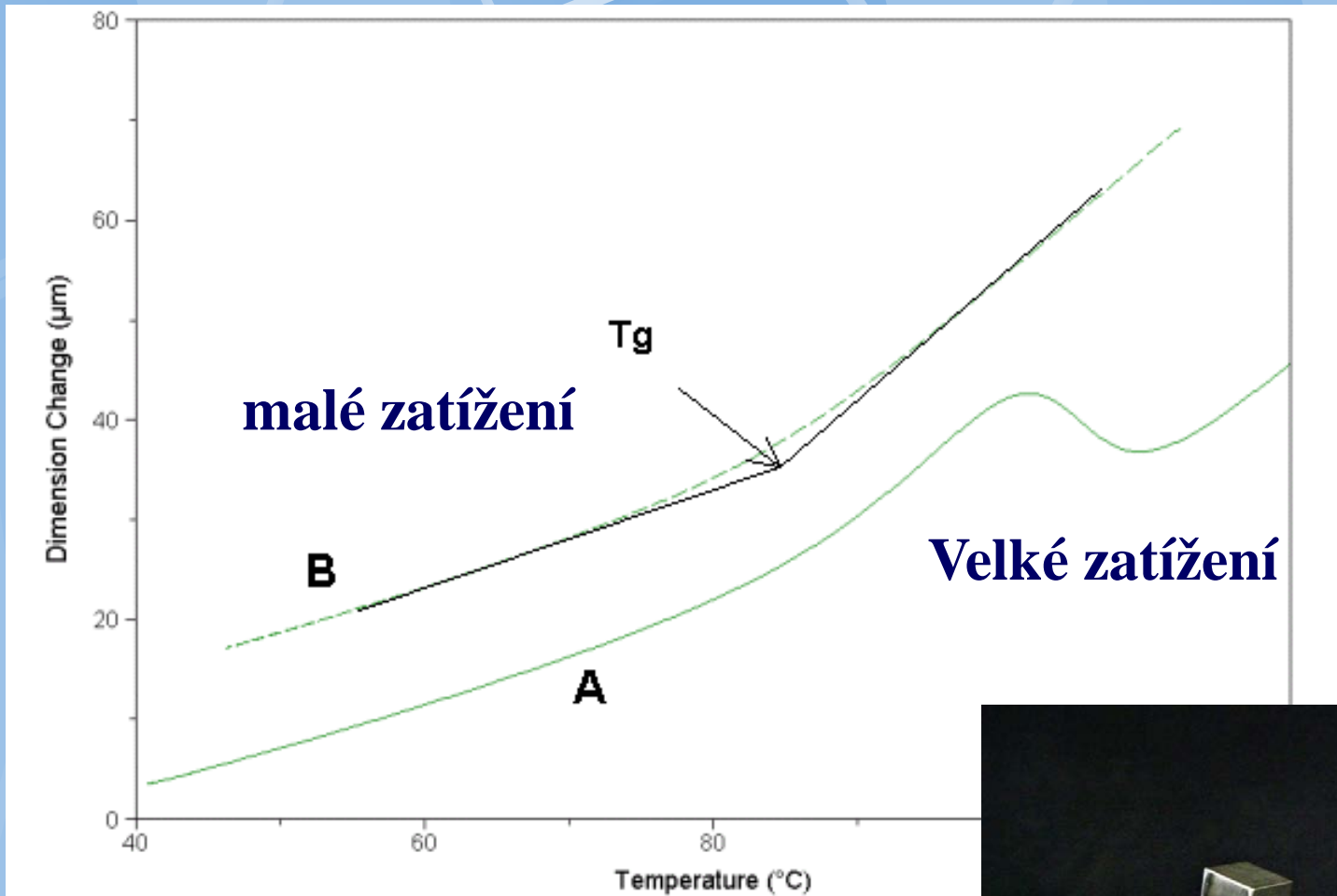
<https://omnexus.specialchem.com/polymer-properties/properties/glass-transition-temperature>

DSC measurement



Glass Transition Temp. Measurements of Different Polymers Using DSC (Source: Mettler-Toledo Analytical)

Example

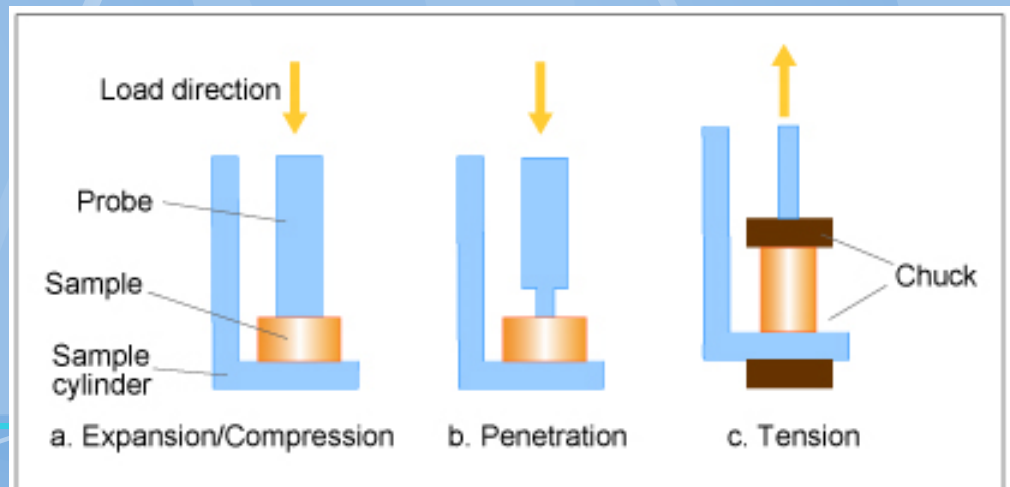
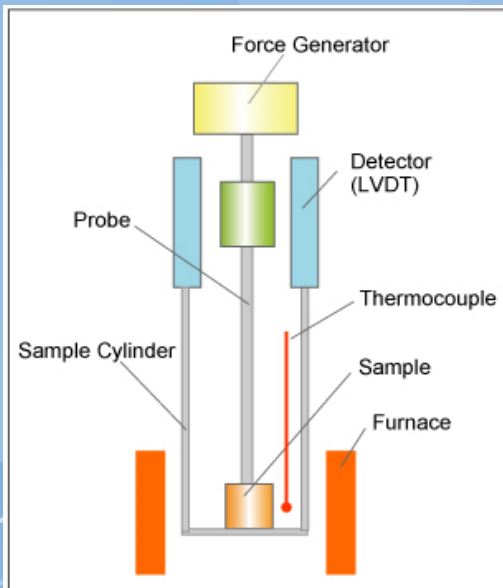


**Určení teploty skelného přechodu
T_g PTFE z mechanické zkoušky**

Figure 6 - Deflection under 0.31lb at 160°F

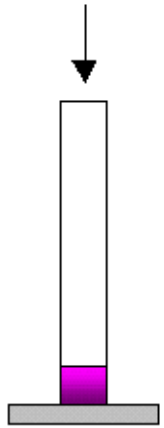
Termomechanická analýza (TMA)

ICTAC: A technique in which a deformation of the sample under non-oscillating stress is monitored against time or temperature while the temperature of the sample, in a specified atmosphere, is programmed. The stress may be compression, tension, flexure or torsion.

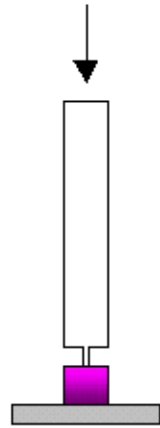


Variace mechanického namáhání

**Hlavní použití:
Polymery**



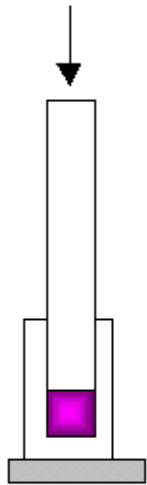
compression



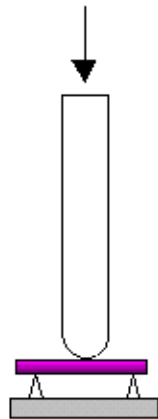
penetration



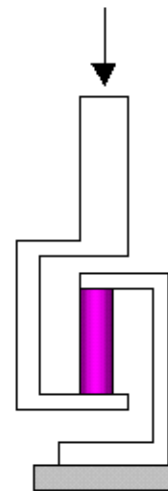
Hemispherical
indenter



dilatometer



flexure

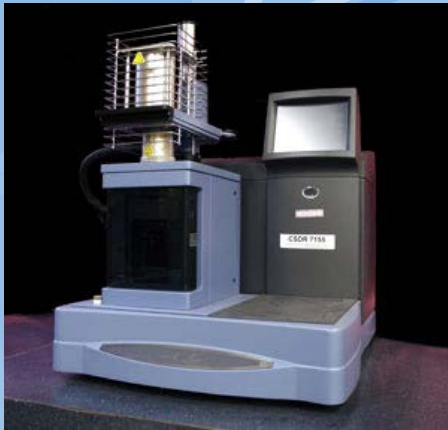


tension

Použití termomechanické analýzy

Method	Mode	Measured Quantity	As a function of	Information Obtained
Bulk sample	Flat probe/light load	expansion	Temperature	Coefficient of Expansion and Tg
Divided sample	Dilatometer	Volumetric changes	Temperature	Coefficient of expansion and Tg
Thin film	Penetration probe/ Significant load	Depth of penetration	Force	Modulus, Cross-link density Creep behaviour Cure behaviour
			Time	
			Temperature	Softening (Tg) Melting
Film or fibre	Tension accessory	Uniaxial extension or shrinkage	Force	Modulus, Cross-link density Creep behaviour, Cure behaviour
			Time	
			Temperature	Tg, melting, Cure behaviour, Prepn. History
Fluid	Parallel plates	Distance	Time	Viscosity, Gelation
			Temperature	Melting, Viscosity,
Bulk or supported	Flexure accessory	Bending	Time	Gelation Creep behaviour
			Temperature	Softening (Tg) Melting

Přístroje



ASTM E831

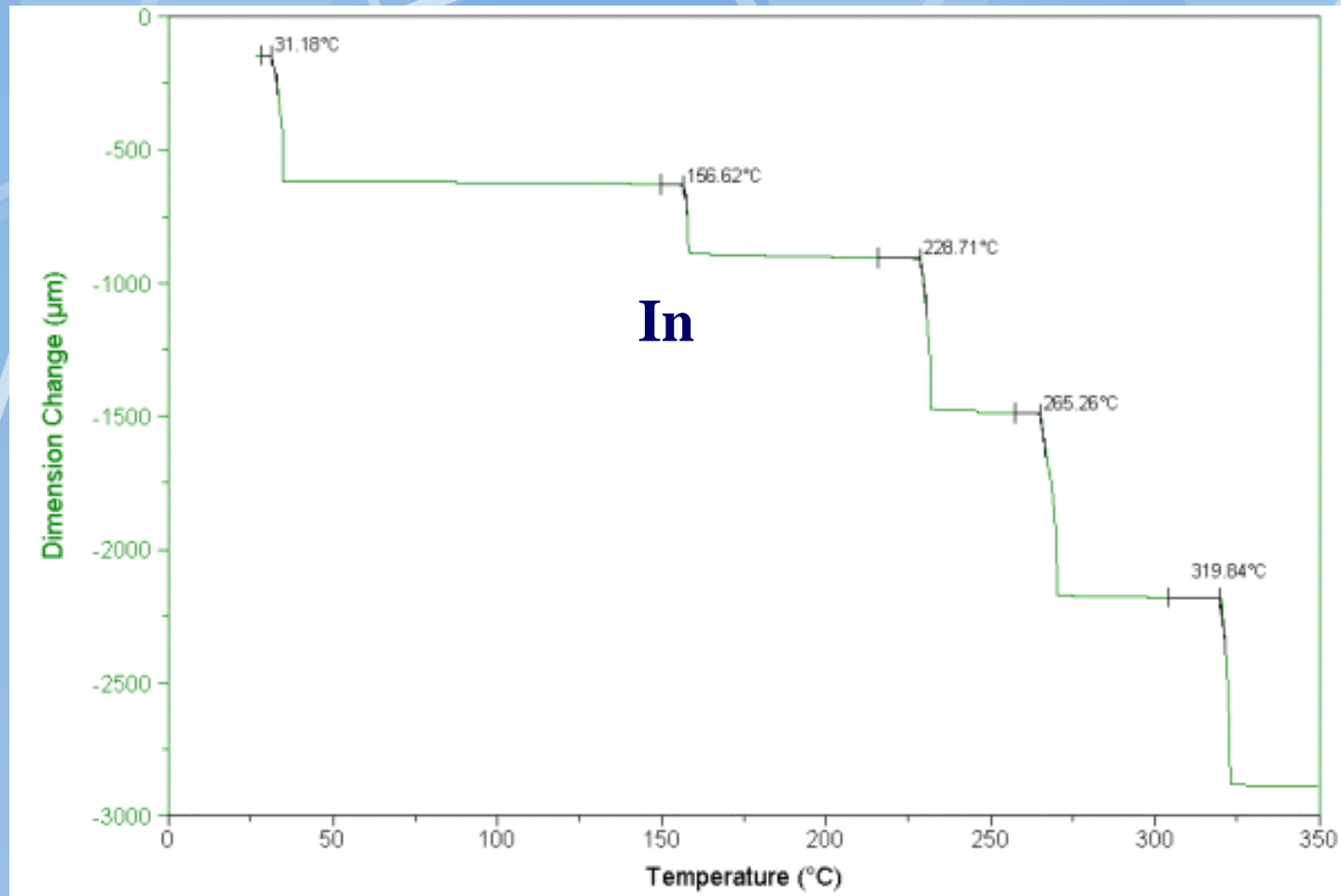


Linseis



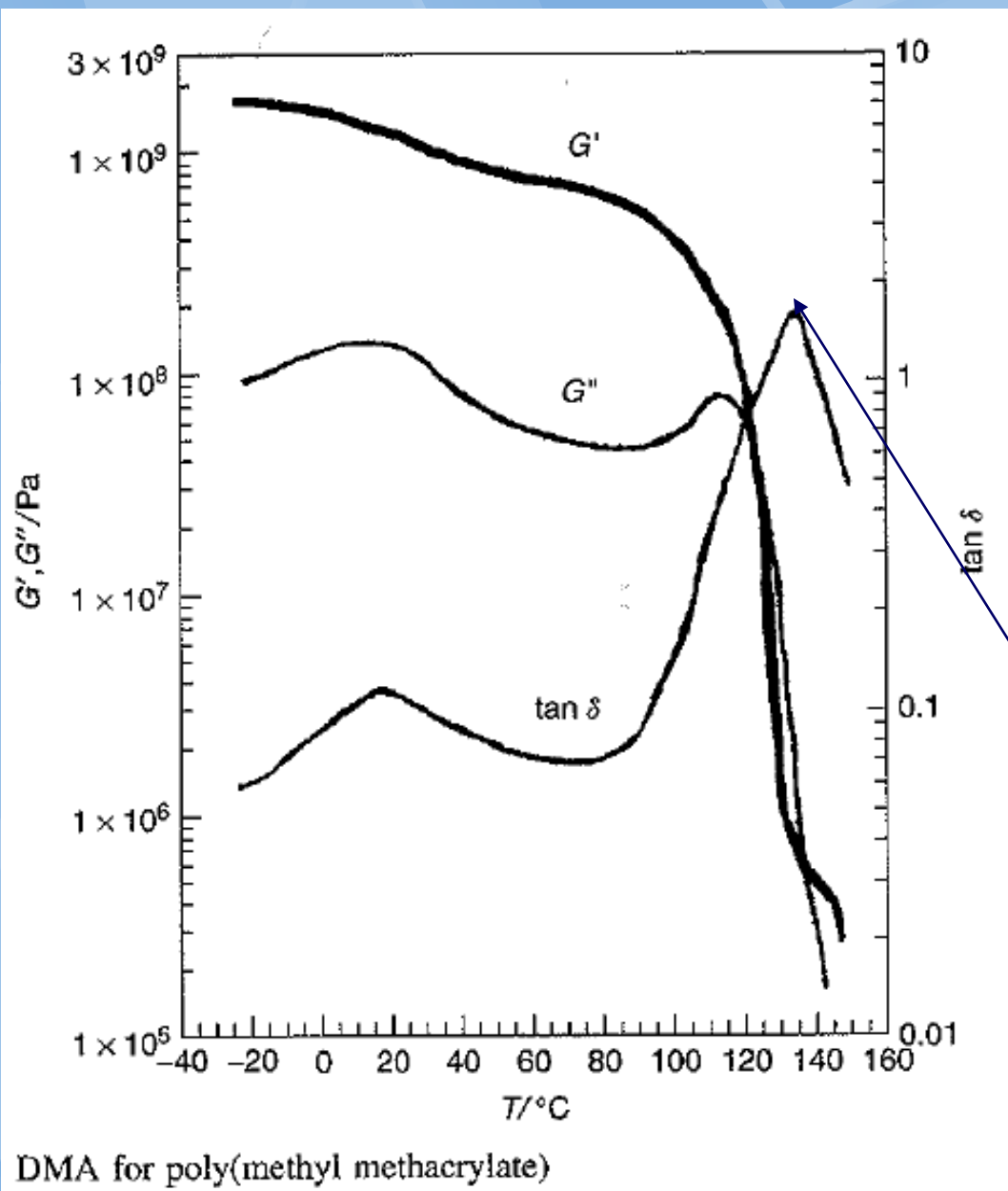
Dilatometer Netzsch 402

Kalibrace na teplotu



Mnohonásobný sendvič z čistých kovů

Reaktivita



G^I Storage modulus

G^{II} Loss modulus

Uvolnění -
_COOCH3
ramen

TBA torsional braid analysis

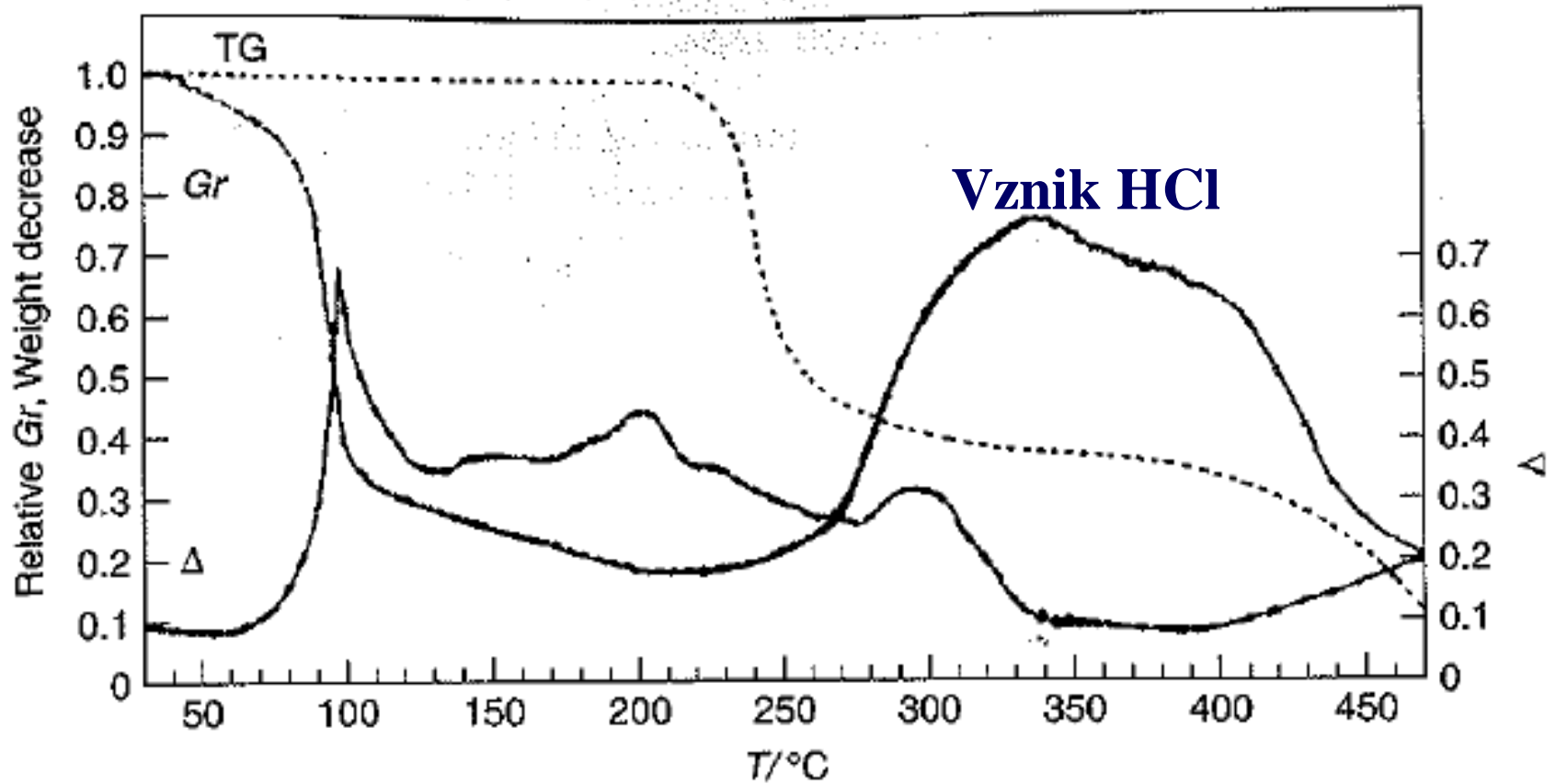
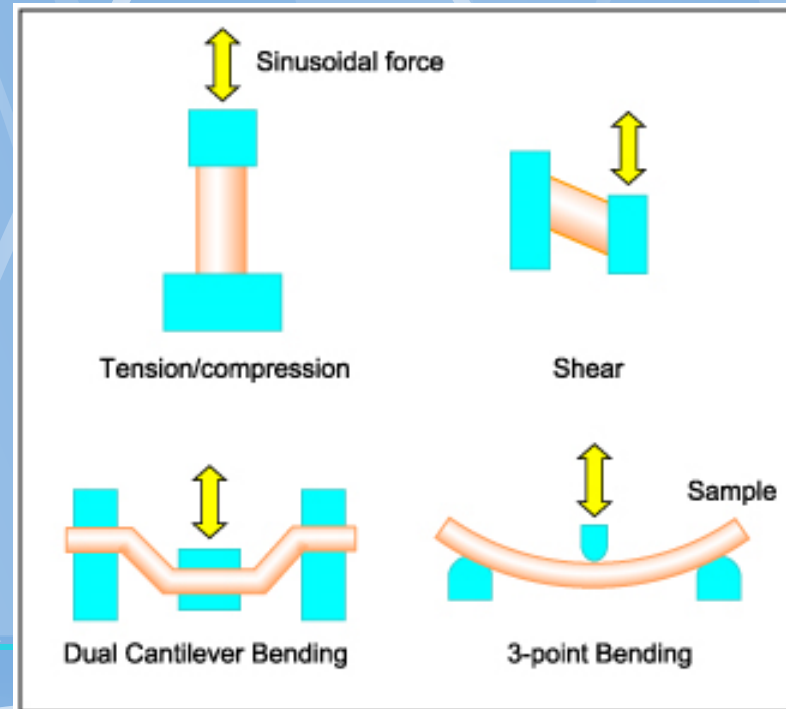
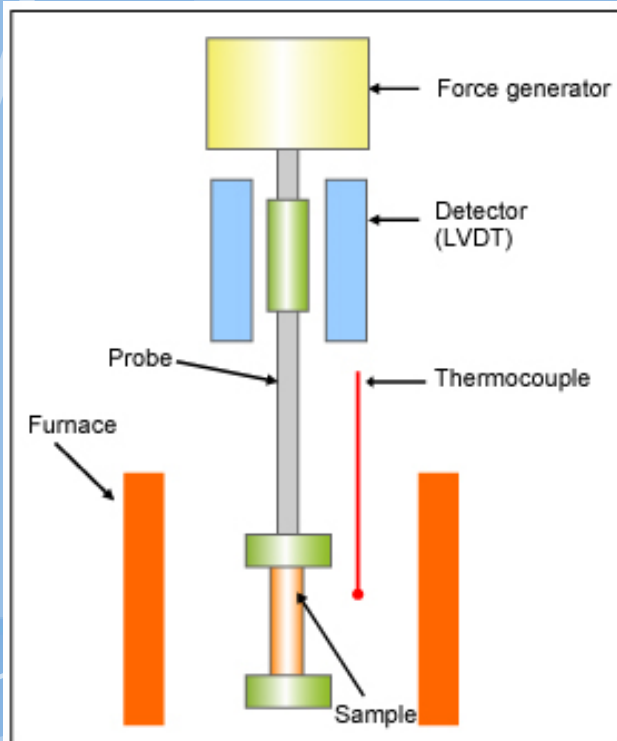


Figure 4 TBA for poly(vinyl chloride)

Dynamická mechanická analýza

- A technique in which the sample's kinetic properties are analyzed by measuring the strain or stress that is generated as a result of strain or stress, varies (oscillate) with time, applied to the sample.

- **Static** **Viscoelasticity** **Measurement**
A technique in which the change in stress or strain is measured under uniform stress or strain that remains constant across time.

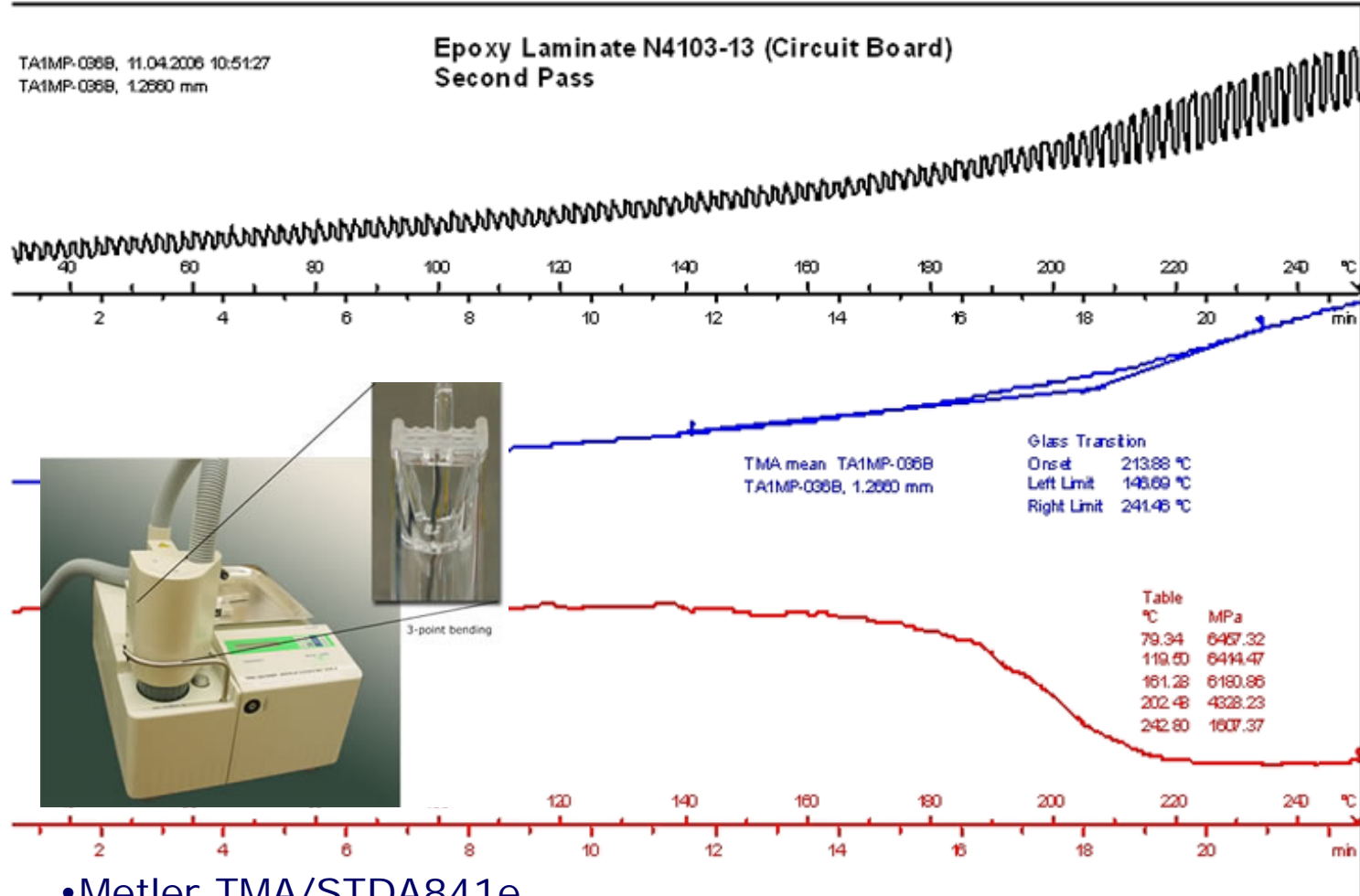


Cyklické zatížení (Tg)

Epoxy Circuit Board N4103-13 Second Pass 11.04.2006 10:59:22

TA1MP-036B, 11.04.2006 10:51:27
TA1MP-036B, 1.2680 mm

Epoxy Laminate N4103-13 (Circuit Board)
Second Pass



•Metler TMA/STDA841e

Diskuse

