

2004 KIChE Spring Meeting

*Carbon Dioxide Induced Crystallization
of PET (Polyethylene terephthalate)*

Kongju National University, Kongju City, Korea
15:00~17:00
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Objective

■ In order to understand,

The temperature of crystallization behavior of PET

The heat of crystallization behavior of PET

By high-pressure carbon dioxide treatment on.



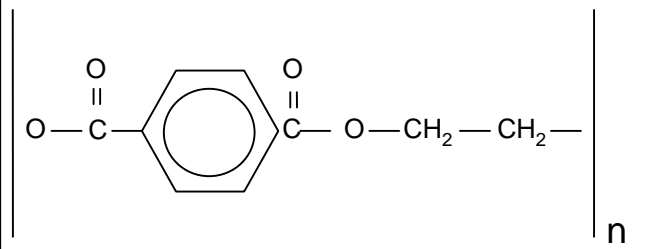
Theory

**PET is made from Condensation Polymerization of TPA and EG.
PET is used to various kinds of type, as method of manufacturing.**

EX) Blow molding →bottles, Melt spinning →vessel

Termo forming →nursing bottle ...

**For the reason, its environmentally-benign Characteristics,
Supercritical CO₂ has been used.**

| | Formula | Tg | Tc | Tm |
|------------|--|-----------|------------|------------|
| PET |  | 72 | 130 | 258 |



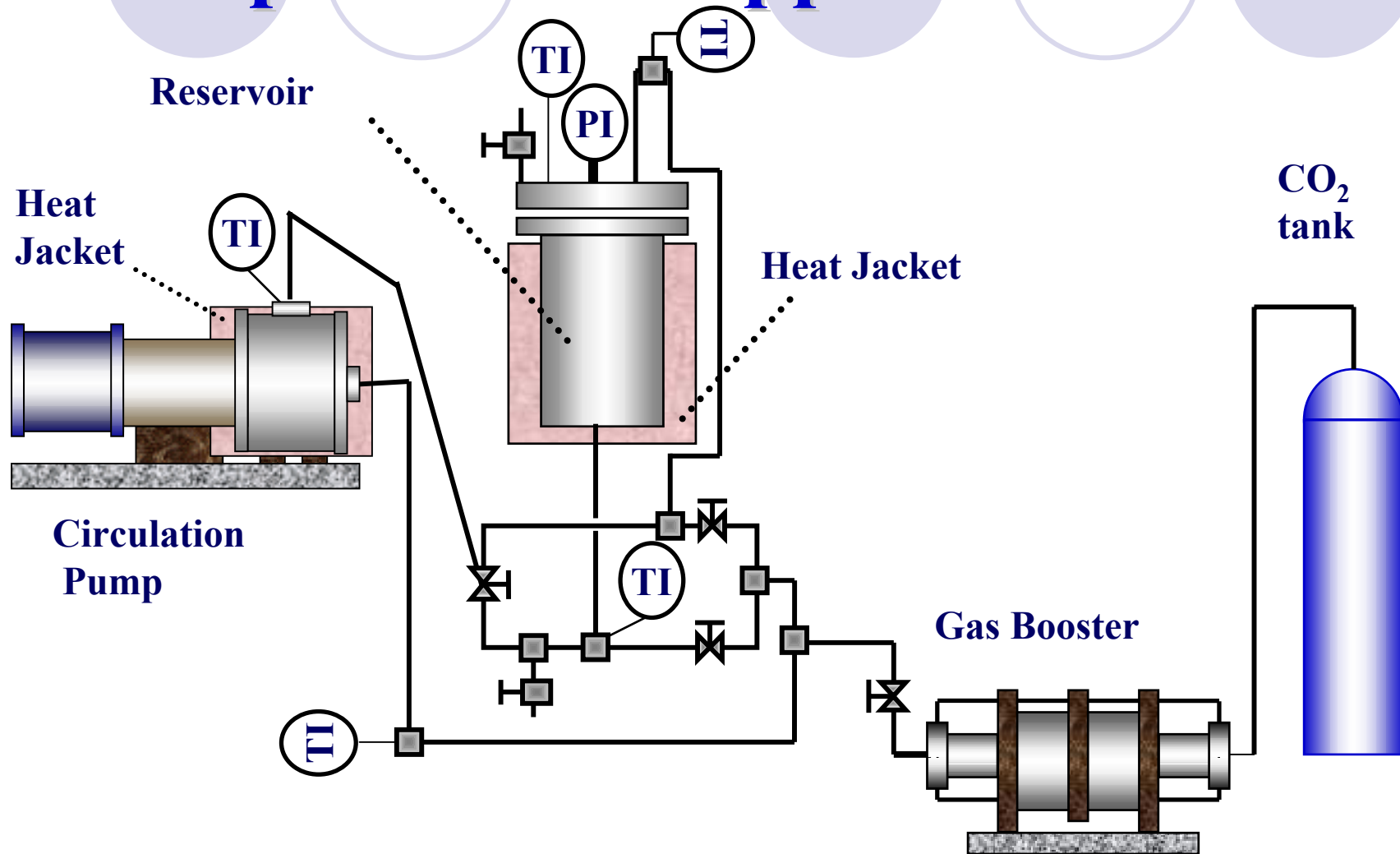
Experimental

■ Treatment Condition with SC-CO₂

| Treatment Medium | Pressure | Temperature() |
|------------------|----------------|----------------|
| Carbon Dioxide | 10, 20, 30 MPa | 30, 50, 60, 70 |
| Air(Oven) | atmosphere | 30, 50, 60, 70 |

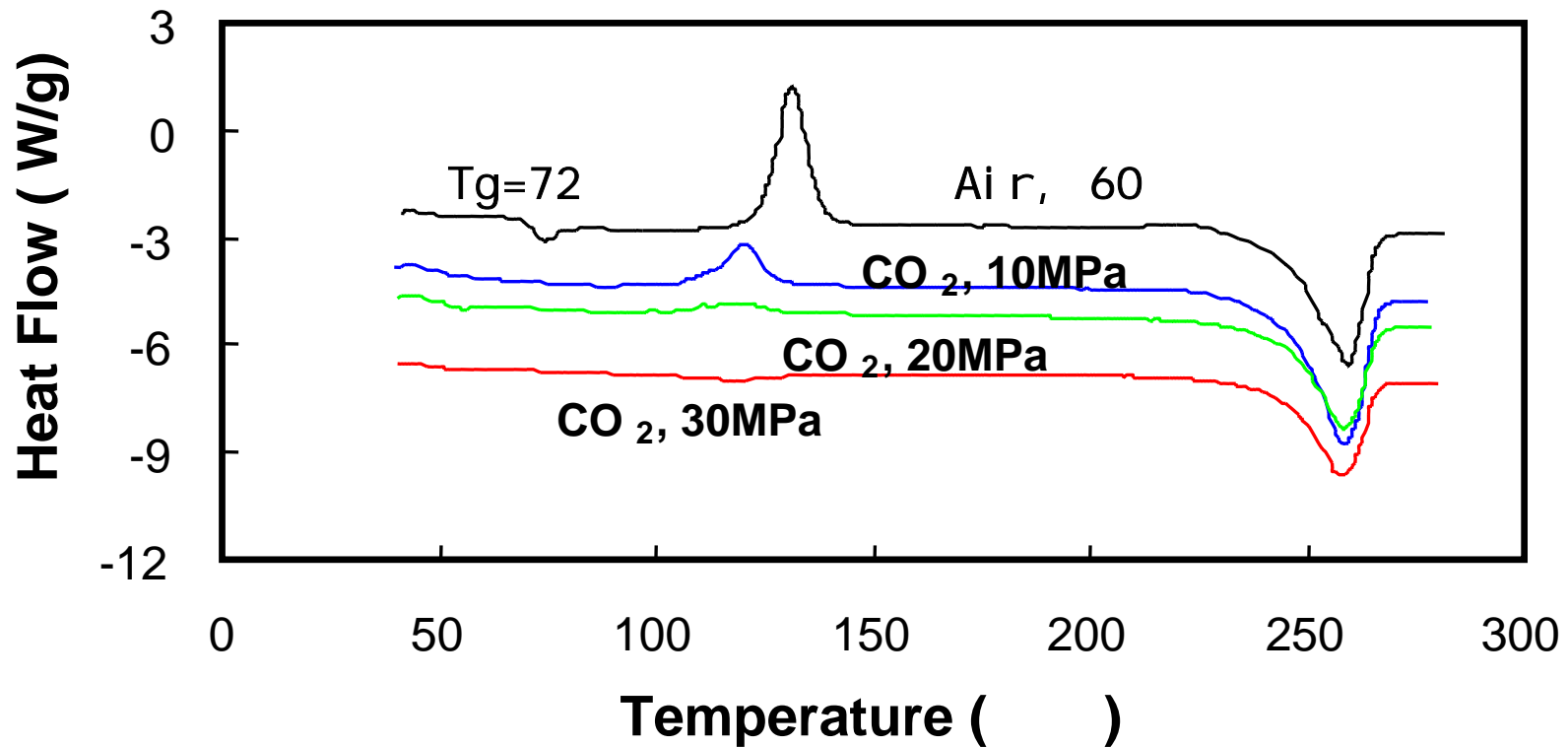


Experimental Apparatus

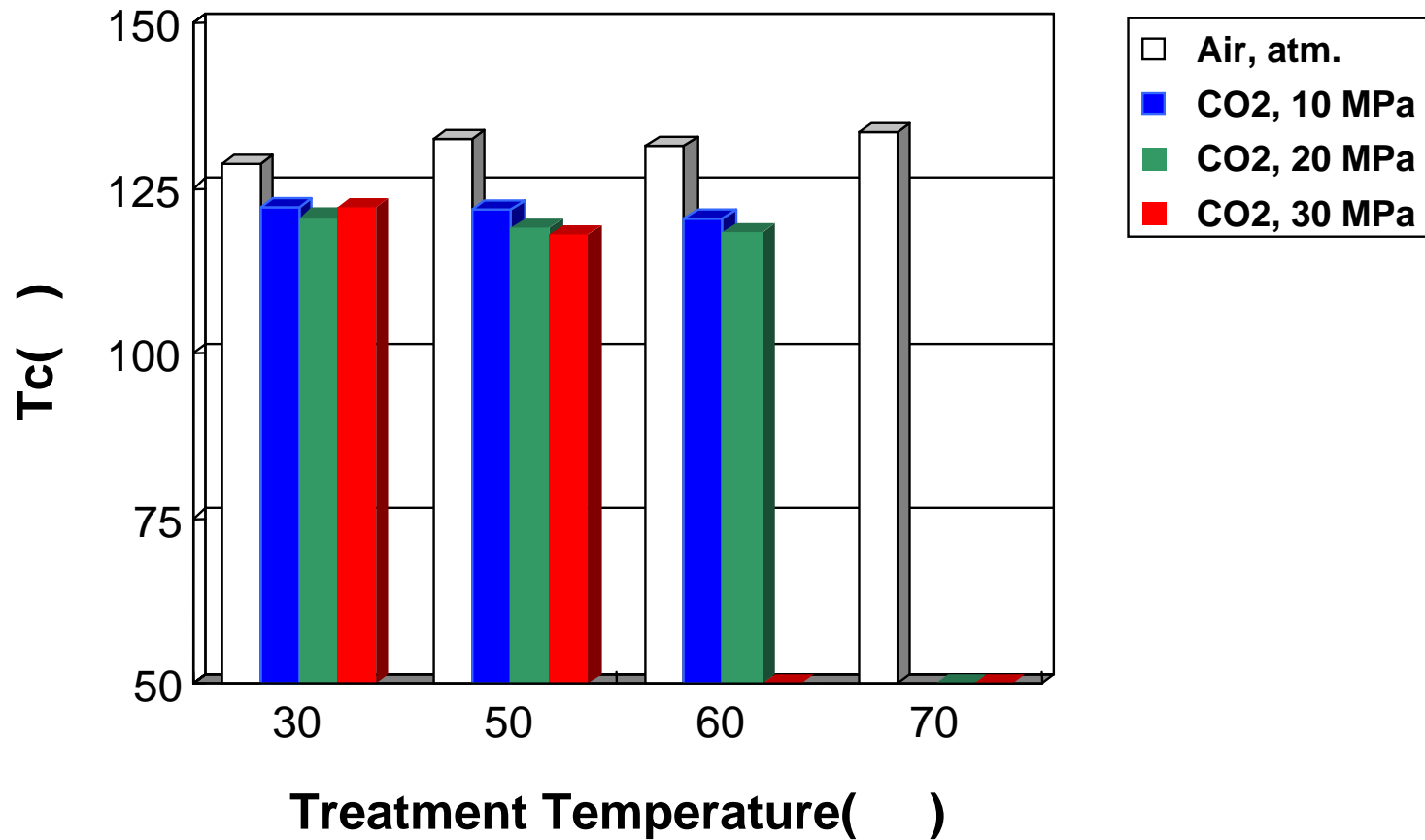


Result

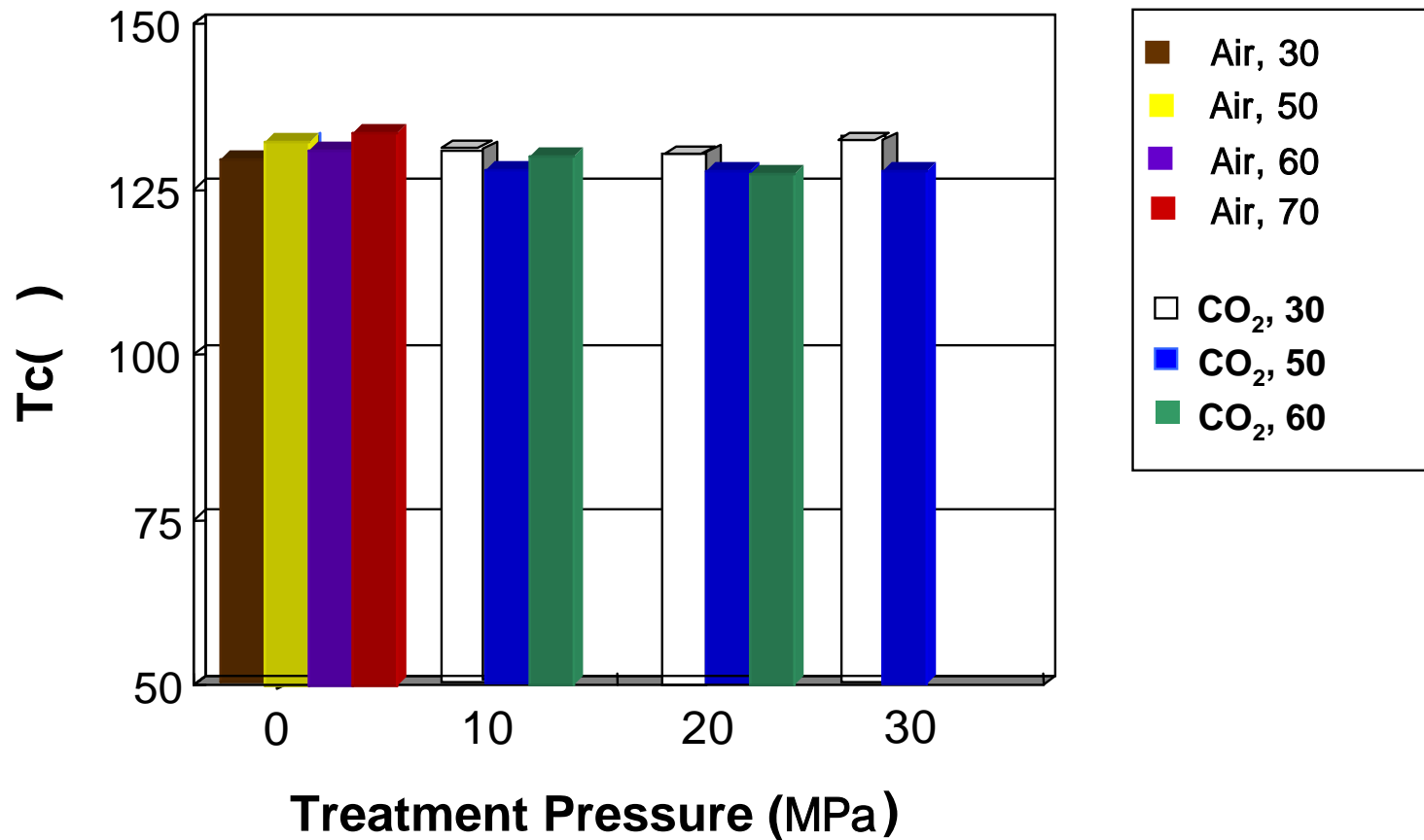
DSC Thermograms with Treatment Condition



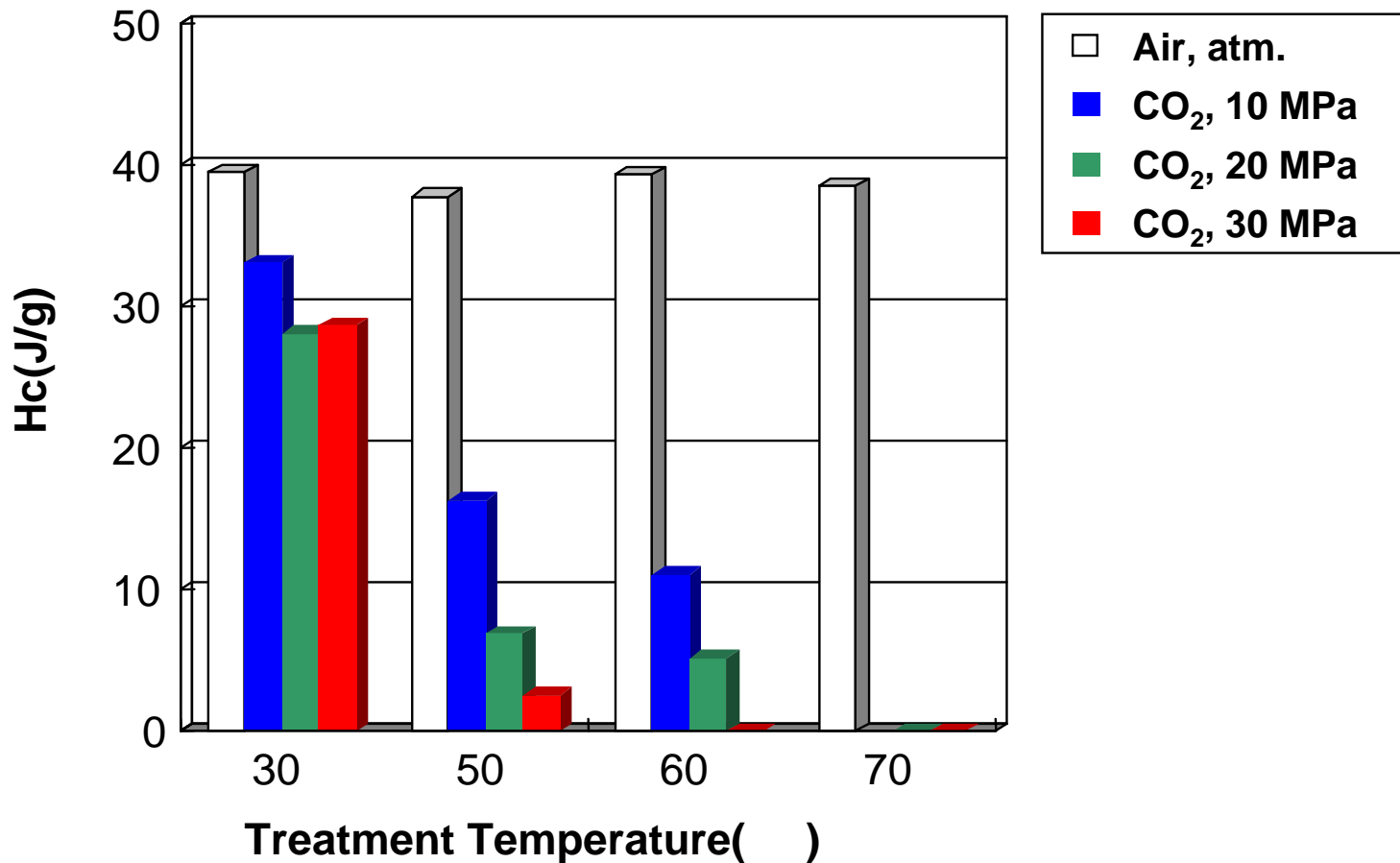
Change in Crystallization Temperature by Carbon Dioxide Treatment



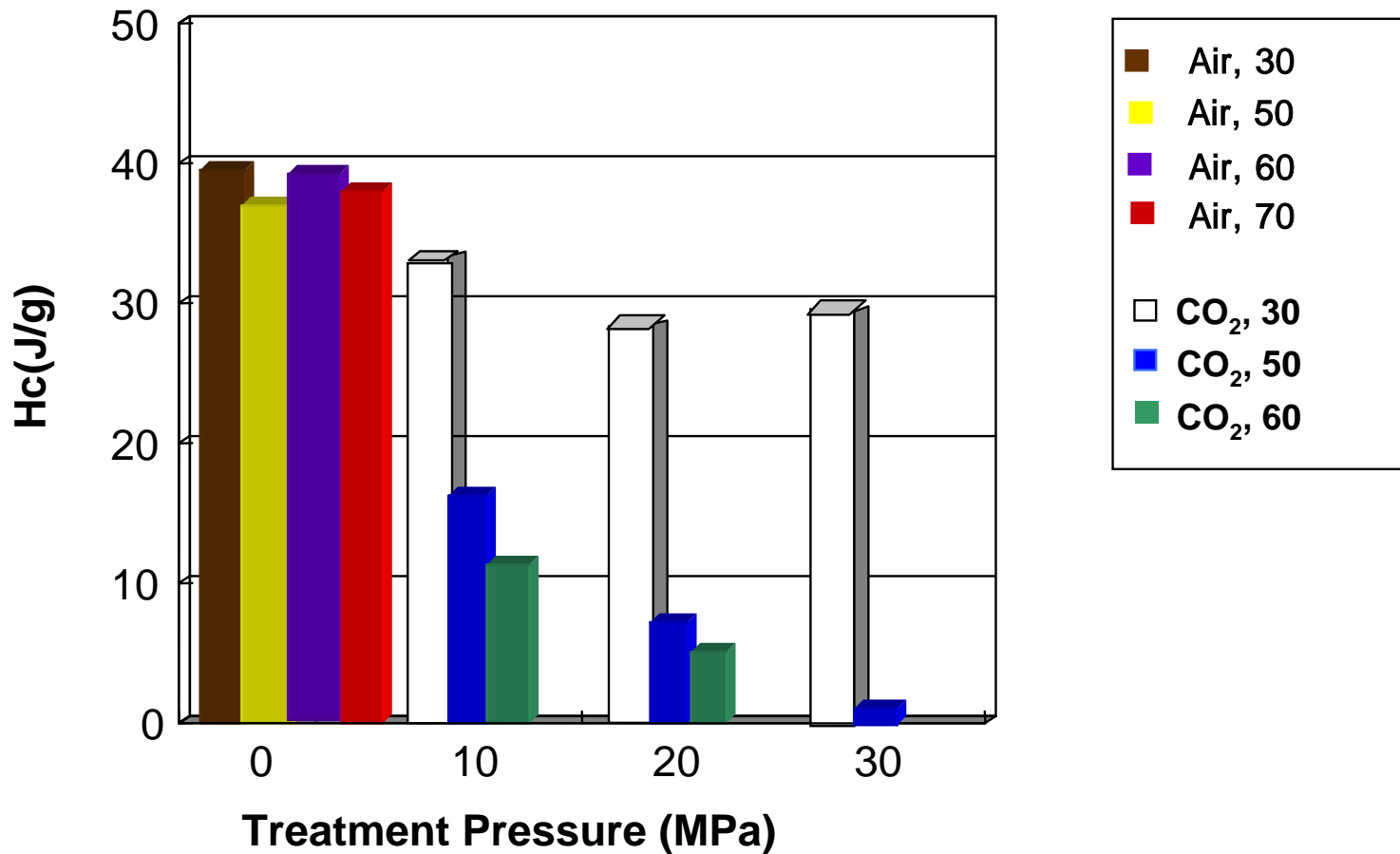
Change in Crystallization Pressure by Carbon Dioxide Treatment



Change in Heat of Crystallization by Carbon Dioxide Treatment



Change in Heat of Crystallization by Carbon Dioxide Treatment



Concluding Remarks

- **CO₂ treatment make PET crystallize below the intrinsic T_c.**
- **The H_c was reduced by CO₂ treatment**
- **PET crystallize more during the treatment, when treated with more pressure of CO₂.**
- **Crystallization can be accomplished by only high pressure of CO₂
Even below T_g.**

