

Teijin Teonex Resin

TEIJIN CHEMICALS LTD.

High Performance Resin Sales Department

High Performance Resin Business Division

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 **TEIJIN CHEMICALS LTD.**

Outline of Teijin Chemicals Ltd.

Established	August 2, 1947
Capital	2,149 Million Yen
Amount of Sales	58,240 Million Yen (in 2003)
Number of employees	700
Business area	<ol style="list-style-type: none">1) Manufacturing & sales of PC resin, Composites resin2) Manufacturing & sales of Resin products; PC sheet and other products3) Manufacturing & sales of Chemicals ; fumigrants and flame retardants4) Sales of Polyester resin (PET, PEN, Elastomer) and A-PET sheet
Head Office	Tokyo Japan
Overseas Locations	U.S.A., Netherlands, Taiwan, Hong Kong, China, Singapore

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PEN in Teijin Group



PEN Resin
Teijin Chemicals Ltd



No.1 Supplier

PEN Film
Teijin DuPont Films



PEN Fiber
Teijin Techno products

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History of PEN Development in Teijin

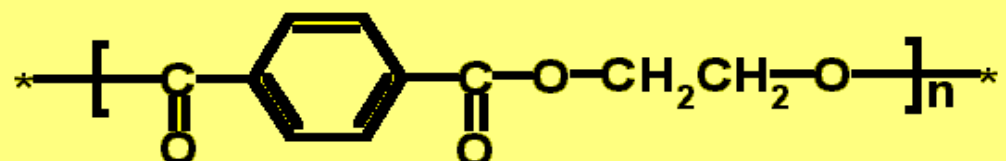
- 1964 Started study for fiber application for industrial use
- 1967 Started study for film application (i.e. electric insulation film)
- 1970 Started study for synthesis and oxidation of 2,6-DMN
- 1971-1974 Commercialization of PEN film
- 1987 Completion of PEN chemical recycle plant
- 1990 Commercialization of PEN film (Trade name; TEONEX[®])
- 1995&1997 Introduced R/R mineral water bottles in Uruguay and Germany
- 1997 “Naris” cosmetics bottle
- 1998 “Fancl” cosmetics bottle
- 1999,2001,2003 Introduced R/R beer bottle in Denmark, Norway and Brazil
- 2000 “Pola” and “Genome” cosmetics bottle
- 2001 “Kanebo” nail color bottle
- 2002 “Shiseido” trial sample cosmetics bottle
- 2004 “Kao” lip gross bottle
- 2004 Introduced R/R beer and juice bottle in Denmark and Germany

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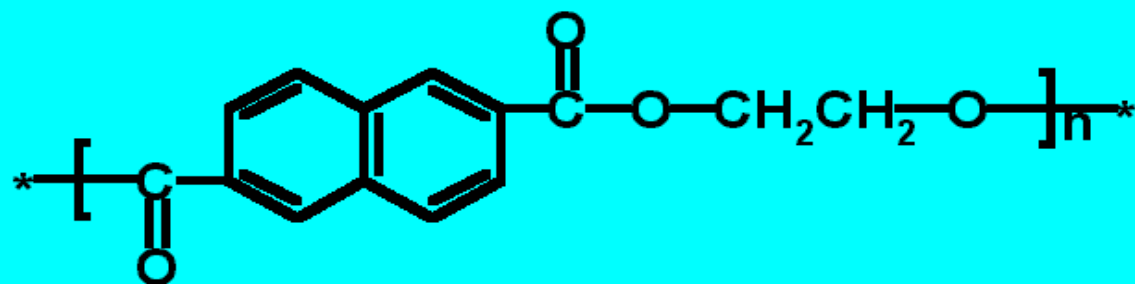
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Chemical Structure of PEN

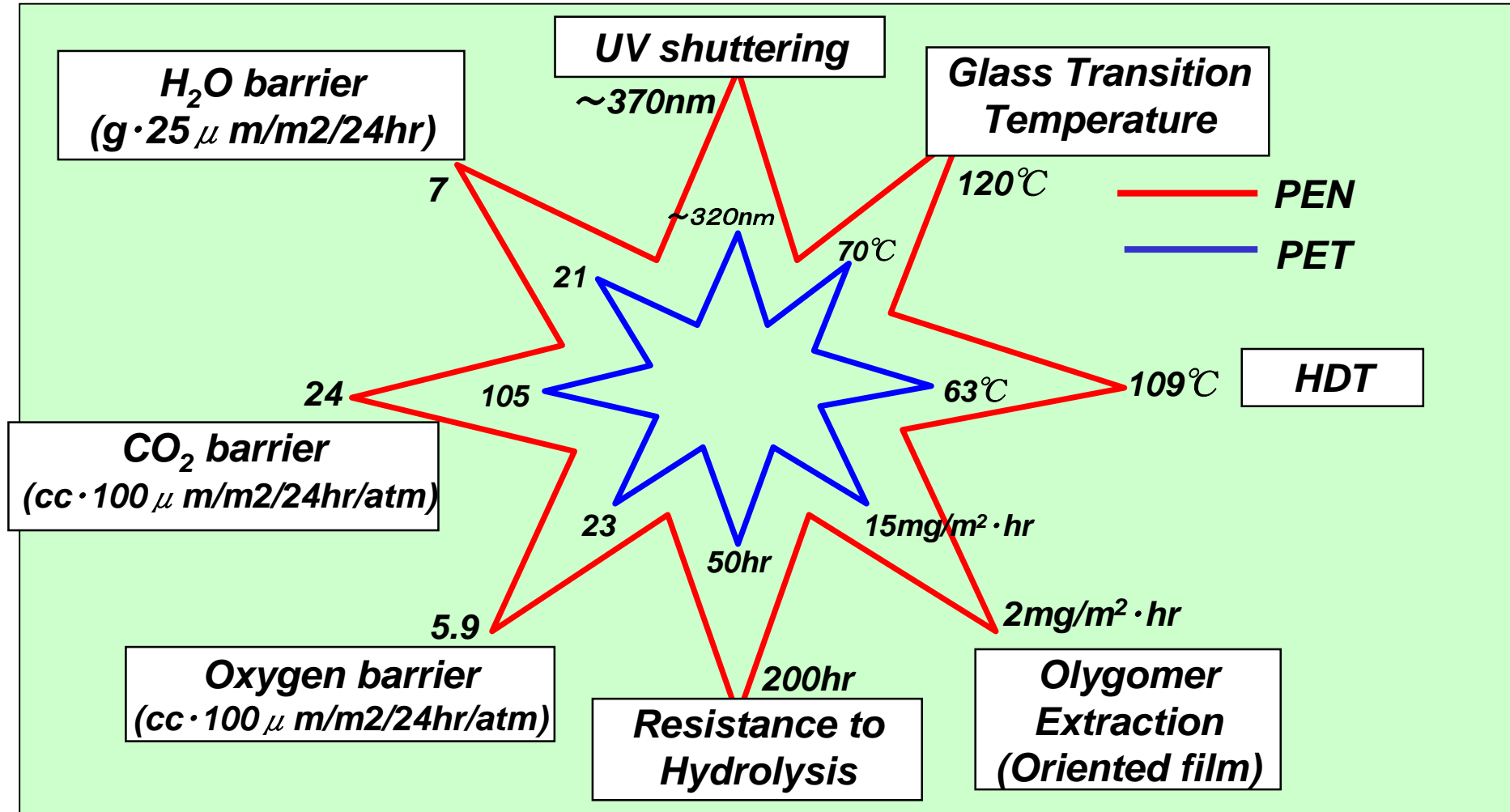
PET (Poly Ethylene Terephthalate)



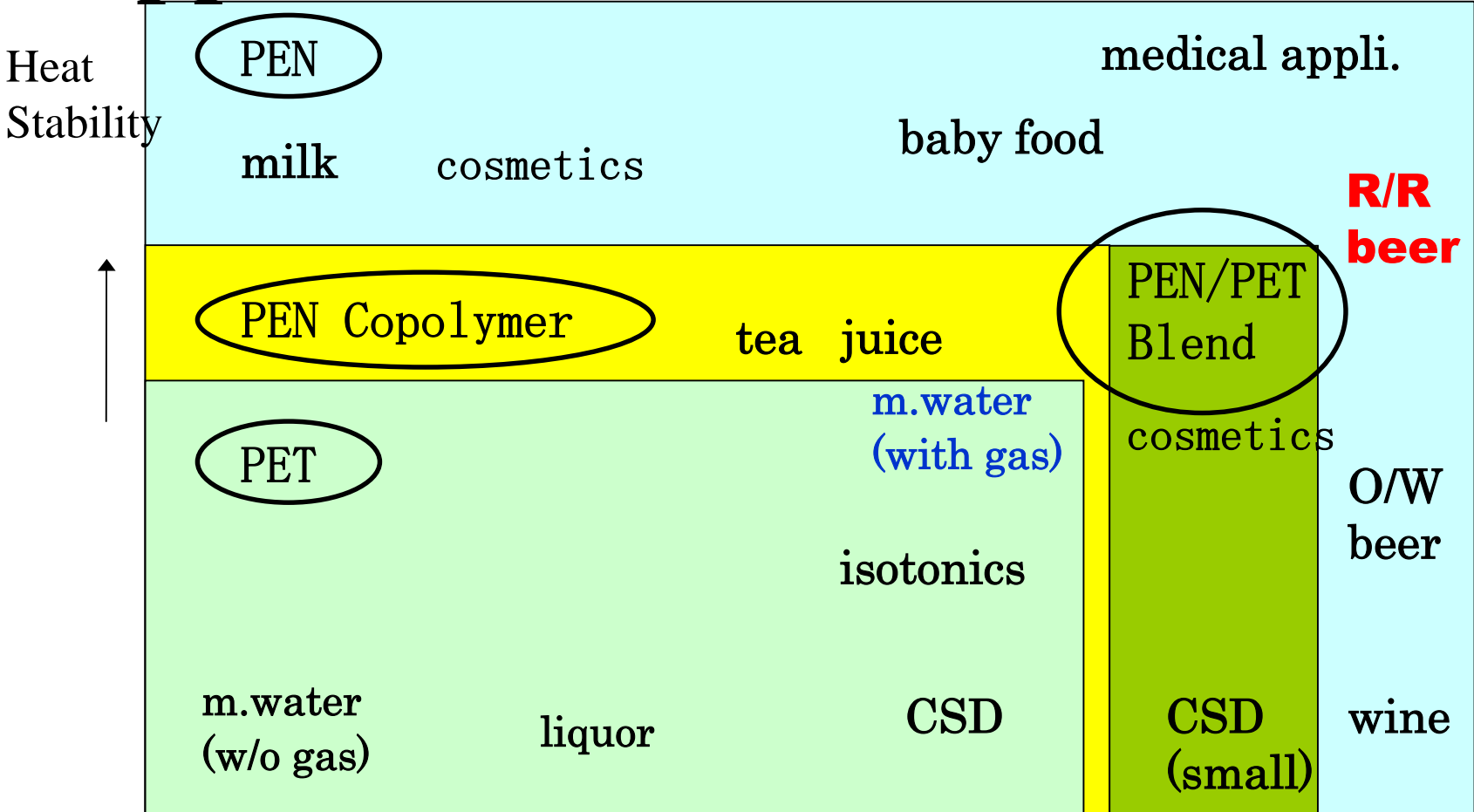
PEN (Poly Ethylene 2,6-Naphthalate)



Properties of PEN



Application of PEN



—————> Gas barrier

Characteristics of PEN resin

- **Transparency**
- **High Heat Resistance(50°C higher than PET)**
- **Superior Gas & Vapor Barrier (4 times of PET)**
- **Excellent Chemical & Hydrolysis Resistance**
- **Low Flavor Carry Over**
- **UV Shuttering (~383nm)**

Hygienic Safety

- 1) CAS No.24968-11-4
- 2) FDA § 177. 1637
- 3) EU Positive List(EU Directive90/128/EEC)
2,6-Naphthalenedicarboxylic acid, dimethyl ester
PM/REF No.22390, CAS No.000640-65-3
Ethylene Glycol
PM/REF No.16990, CAS No.00107-21-1
- 4) TSCA(Toxic Substances Control Act)
2,6-Naphthalenedicarboxylic acid dimethyl ester
840-65-3
1,2-ethanediol
107-21-1

Application of PEN resin

	Bottles		Injection Molding
	Cosmetic	Drink	
100% PEN	<ul style="list-style-type: none"> • Preservative free (Fancl, Genome) • Nail color sample (Shiseido) 	<ul style="list-style-type: none"> • R/R Beer Bottles (Carlsberg) (Norway Breweries (Cerpa) (Denish Brewery) • R/R Mineral Water Bottles (Uruguay, Germany) 	<ul style="list-style-type: none"> • Airless pump • School Lunch dishes • Table Ware • Reuse Cup • Washing Dryer Parts • Medical Parts • Car fragrance package • Vending machine parts
PEN / PET Blend	<ul style="list-style-type: none"> • Preservative free (Naris) • Lip gross (Kao) • Nail color (Kanebo) • UV shuttering (Kanebo, Pola) 		

PEN bottles for Preservative Free

1) Fancl (Japan)

Launched in 1998

Volume: 5ml, 10ml, 30ml

Bottle production process: Bi-axially stretching blow

Requirement:

A: Heat resistance

**This cosmetics are required to be pasteurized after filling
PET bottles does not withstand during those process**

B: Gas and vapor barrier

C: UV shuttering

D: Low migration

“Naris” and “Genome” also choose PEN by the same reason

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PEN bottles for Lip Gross

2) Lip Gross bottle in Kao

Launched in 2004

Volume: 10 ml

Production Process: Extrusion blow

Requirement:

A. Heat resistance

B. UV shuttering

C. Gas and vapor barrier

C. Clarity

PEN Bottles for nail color

3) Kanebo and Shiseido

Launched in 2001

Volume: Around 10ml

Production process: Extrusion blow

Requirement:

- A. Chemical Resistance**
- B. Gas and Vapor barrier**
- C. UV shuttering**
- D. Clarity**

Superior properties for cosmetics

Clarity

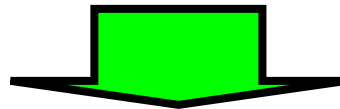
Rigid

Gas and Vapor barrier

UV shuttering

Chemical resistance

Low migration



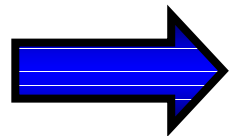
Substitution of Glass Bottles

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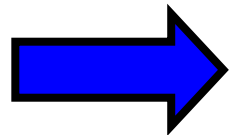
Superior point of Teonex

Various experience with cosmetic application



Easy to develop and commercialize

Teijin is the leading company of PEN application



Ensure your raw material supply