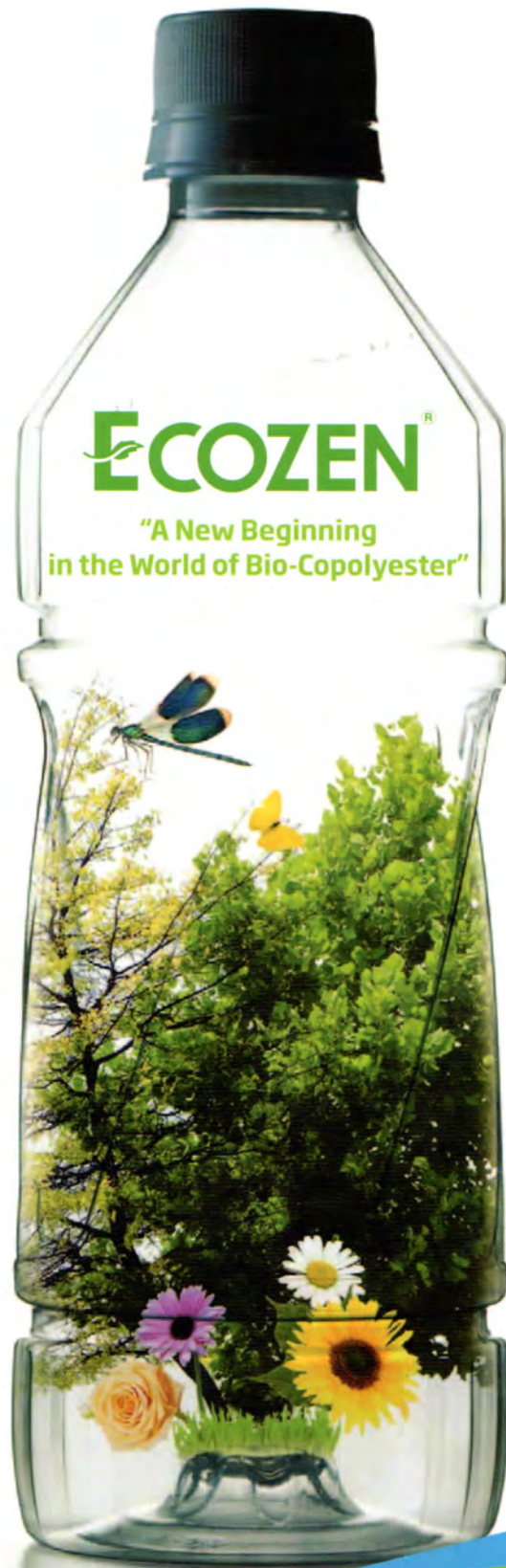


COPOLYESTER
Global No.1

SK chemicals




Etymology of **ECOZEN**[®]

ECO
[Eco-Friendly]

+ **ZEN**
[Zenith]

ECOZEN[®]



**“ECOZEN® reaches the zenith of Eco-friendly elements”
“The best value of ECOZEN® is its Eco-friendliness.”**

ECOZEN® enables the “Health Care, Earth Care” mission of SK Chemicals.

ECOZEN
Bio-copolyester

- High HDT Copolyester (80°C~110°C)
- Excellent Chemical Resistance

OVERVIEW

ECOZEN® Introduction



Functional

- Excellent Physical Properties
- Good Chemical Resistance
 - Easy to Process
- Outstanding Printability
 - Good Adhesion

Environmental

- Renewable Material - Uses biomass
- Recyclable
- Reduces CO₂.
- No BPA & No Phthalate
- Non-toxic - Suitable for food contact
- Energy Efficient - Low processing temperature

Optical

- High Transparency
- High Gloss



Bio-based Copolyester

Physical

- Excellent Impact Strength
- High Flexural Strength

Processing

- Low Processing Temperatures
 - Reduced Cycle Time
 - Less Residual Stress

ECOZEN® Grades

Depending on glass transition temperature (Tg)

	Tg	HDT (Heat Distortion Temp.)
· ECOZEN® T90	90°C	~ 80°C
· ECOZEN® T95	95°C	~ 85°C
· ECOZEN® T110	110°C	~ 100°C
· ECOZEN® T120	120°C	~ 110°C

BIO-Copolyester

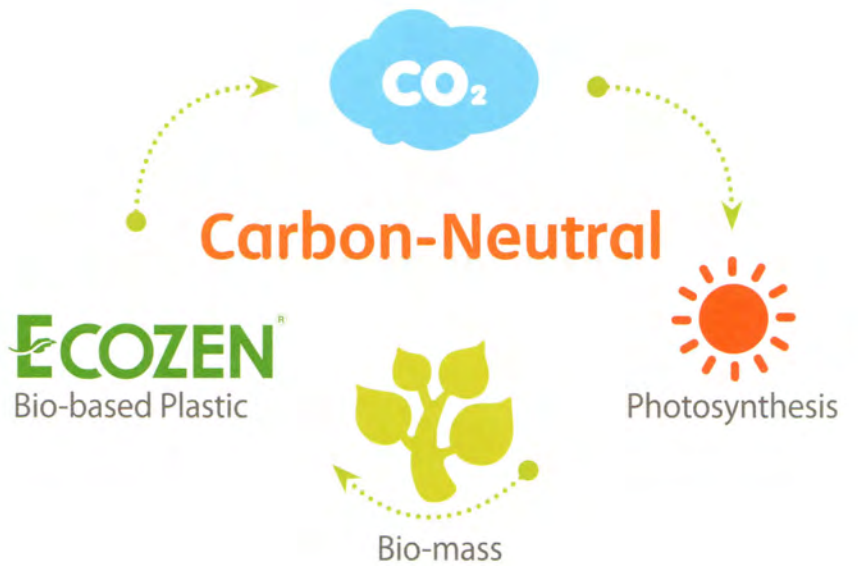
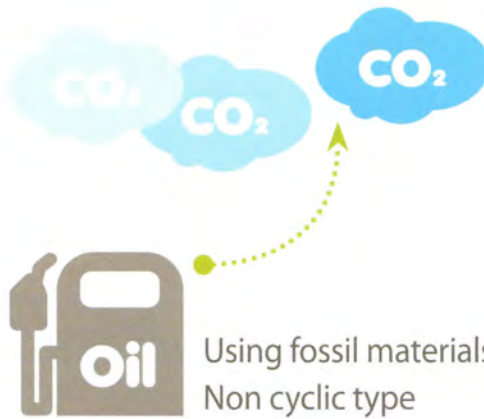
▾ Bio-copolyester / Bio-mass

- **Bio-copolyester**

Bio-mass or modified and transformed bio-mass is used as raw material of plastic with all or a part of it

- **Bio-copolyester**

Organic material from plants and animals

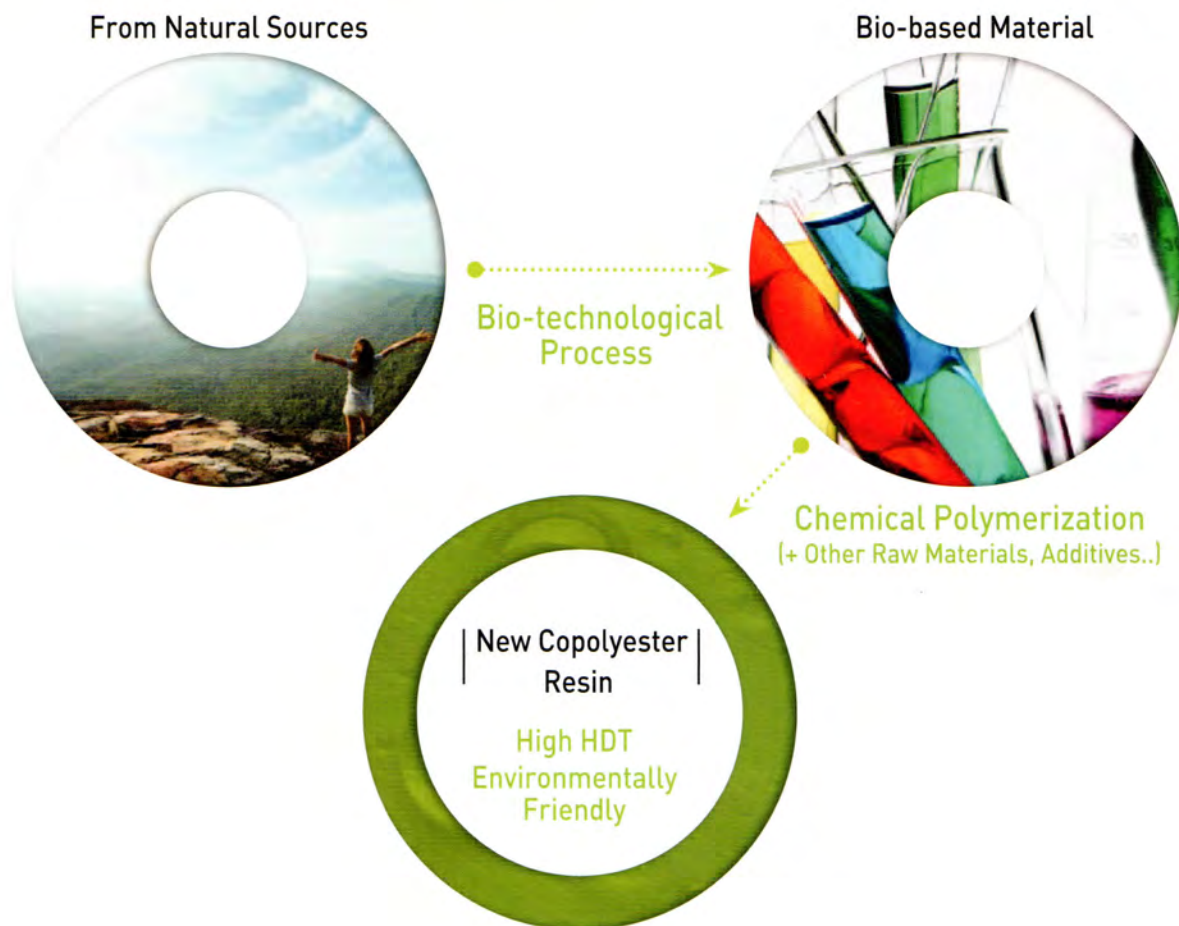


ECOZEN

TPA
CHDM
EG or
Bio-EG

Transformed
bio-mass
based raw
material

The bio-based ingredient of ECOZEN®



Test report on the bio-content of ECOZEN®



ISO-17025 Accredited Testing Laboratory

P.J.LA ISO/IEC 17025:2005 Testing Accreditation # 09423

Beta Analytic Inc.
4985 SW 74 Court
Miami, Florida 33155 USA
Tel: 305-467-5167
Fax: 305-463-0964
info@betalabservices.com
www.betalabservices.com

Summary of Results : Biobased Determination using ASTM-D6866-11

Submitter: Dr. Ji Hwan Bang	Date Received	April 7, 2011
Company: SK Chemicals	Date Reported	April 13, 2011

Laboratory Number	Submitter Label	Material	ASTM-D6866 Method	Mean Biobased Result*
Beta-297091	ECOZEN T-95	Biobased Solid	METHOD-B	9%
Beta-297093	ECOZEN T-110	Biobased Solid	METHOD-B	12%
Beta-297095	ECOZEN T-120	Biobased Solid	METHOD-B	15%
Beta-303628	ECOZEN T-120*	Biobased Solid	METHOD-B	28%

"We hereby certify that resin and products comply with the criteria of KBMP and are granted to use the Bio-based Eco Label"
Korea Bio Material Packaging Association

"This Certificate of Distinction is awarded to SK Chemicals in recognition of its having developed one of Korea's ten best new technologies of 2010, thereby making an important contribution to the nation's economic growth and development."

Ministry of Knowledge Economy The Republic of Korea



The European Food Safety Authority (EFSA) is the keystone of European Union (EU) risk assessment regarding food and feed safety. In close collaboration with national authorities and in open consultation with its stakeholders, EFSA provides independent scientific advice and clear communication on existing and emerging risks.



Food Contact Notification No. 1075

Intended Use: As a component of articles used in contact with food.
 Effective Date: 08/23/2011



JHOSPA

The purpose of the Japan Hygienic Olefin and Styrene Plastics Association (JHOSPA) is to contribute to the people's life and to encourage the sound development of the plastics-related industry by spreading the use of hygienically appropriate material for food utensils, containers and packaging materials using the thermoplastic resin listed on the preceding page.



Certifications

Korea		U.S.A		EU		Japan		Harmful Material test			
KFDA	KBMP Bioplastic Certi	FDA Certi. FCN No. 1075	FDA Standard FDA Standard FDA 21 CFR 177.2420	REACH	EFSA	JHOSPA	J-REACH	Heavy Metal Cd, Pb, Hg, Cr VI	Flame Retardant PBBs / PBDEs	BPA	Harmful Plasticiser
○	○	○	○	○	○	○	○	N.D.	N.D.	N.D.	N.D.

- Harmful Plasticizers : DEHA, Phthalate (DEHP, DINP, DIDP, DBP, BBP, DnOP, DIBP)
- N.D. : Not Detected
- KBMP : Korea Bio Material Packaging Association

APPLICATION-FOOD CONTACT

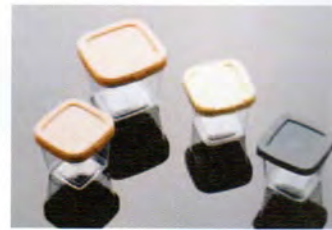


Food Contact Notification No. 1075

- FOOD CONTAINER
- BABY FOOD CONTAINER
- WATER BOTTLE
- SPORTS BOTTLE
- FOOD BOWL
- JUICE BOTTLE
- MIXER

Safety bio-copolyester: Non-phthalate, Non-BPA

U.S.A. FDA certification / KBMP bio plastic certification



APPLICATION-COSMETIC



Food Contact Notification No. 1075

- JAR
- COSMETIC BOTTLE
- PERFUME BOTTLE
- CAP
- SKIN CARE BOTTLE

High-end Product Applied

U.S.A. FDA certification / KBMP bio plastic certification



COSMETIC

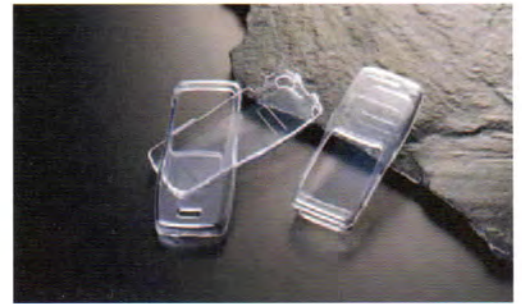
- Enable Variety Colour Pattern
- Chemical Resistance
- Transparency
- Heat Resistance
- Anti-contaminant
- Glass Colour

APPLICATION-HOME ELECTRONIC

- Washing Machine (Safety door)
- Cellular Phone (Body&protection case)
- Refrigerator (Ice bank)
- Laptop
- Computer
- TV Neck & Housing

Helpful to EPEAT certification (by Bio-copolyester)

Excellent chemical resistance, transparent and safe bio-copolyester
Good impact strength, High gloss, RoHS



APPLIANCE

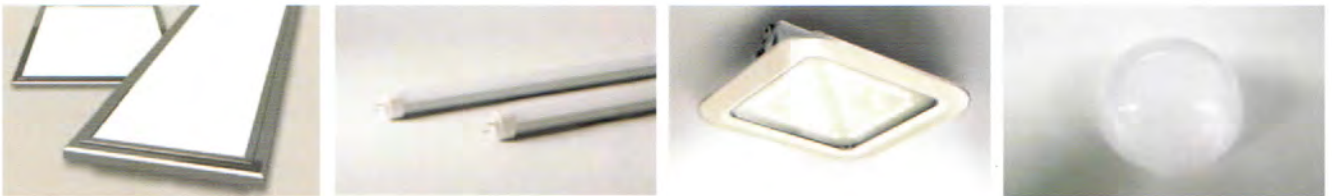
- Good Transparency
- Chemical Resistance
- Heat Resistance
- Strength
- Hardness
- Transparency
- BPA / Phthalate free
- Anti-contaminant
- Low process temperature
- Impact strength
- Gloss

APPLICATION-LED

- LED Indoor Luminaires (Diffusion sheet)
- LED Indoor Luminaires (Frame & Light cover)
- LED Indoor Luminaires
- LED Tube Lamp
- Light Diffusion Cover

New lighting material

Enable mood & natural light color, RoHS
Wide lighting distribution, High light diffusion



LED

- Heat Resistance
- Long Term Lighting Performance
- Chemical Resistance
- Mood Lighting
- Impact Strength
- RoHS
- ECO-Friendly



APPLICATION-FILM & SHEET

- Outdoor Sign
- Condenser shrink tube
- Optical Film
- Thin/Heavy Gauge Sheet
- Decoration or Interior
- Sheet for furniture, home appliances, etc.

Non glue lamination (Ultra sonic used): Paper, PET, PVC, etc.

High Glossy, Enable variety color pattern

FILM & SHEET

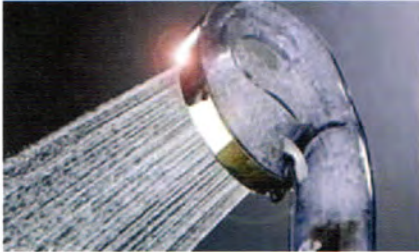
- Heat Resistance
- Gloss
- Fire Resistance
- Impact Strength
- Thermoforming
- Chemical Resistance
- Flexibility
- Transparency
- Excellent Optical Properties
- Good Hardness



APPLICATION-etc.

Shower Head

- High Temperature Resistance
- Chemical Resistance
- Stress-cracking Resistance



Ball packaging

- Glass Colour
- Transparency
- Flexural Modulus
- Dimensional Stability



Protection Case for Cellular Phone

»» For film insert injection

- Heat Resistance
- Transparency
- High Gloss
- Anti-Cracking
- Chemical Resistance
- Excellent Impact Strength



Extruded Profiles

- High Melt-strength
- Heat Resistance
- Chemical Resistance
- Impact Strength
- RoHS
- ECO-Friendly
- For Semi-conductor, Construction Material



etc.

Automobile

- Instrument Panel
- Headliner
- Package Tray
- Bumper



Base Resin

- To alloy with other resins
- Improvement of properties





ECOZEN[®]

www.skcozen.com

HEADQUARTERS

686 Sampyeong-dong, Bundang-gu, Seongnam-si, Gyeonggi-do 463-400 Korea
T. +82-2-2008-2008 F. +82-2-2008-2259

SK Chemicals America, Inc.

2 Park Plaza Suite 1250 Irvine CA. 92614
T. +1-949-336-8088 / 5100 ext. 117 F. +1-949-336-8089 / 5107
e-mail. mtae@sk.com Technical Support. +1-949-954-3006

SK U.S.A, Inc.

55 E 59th Street 10FL, New York, NY10022 T. +1-646-231-6800 F. +1-646-231-6881

SK Chemicals

Frankfurt Office, Germany

Topas 1, Mergenthalerallee 77, 65760 Eschborn Germany
T. +49-6196-470210~11 F. +49-6196-470219 e-mail. haaksu.kim@sk.com

SKY GREEN

SKY PET

