Japan-UNIDO Multi-stakeholder Cooperation Dialogue

kaneka
The Dreamology Company
—Make your dreams come true—

"Partnering for Africa's Challenge on Plastic Litter"

KANEKA Biodegradable Polymer™ PHBH™ (Compostable & Marine Degradable)

Contributing to resolving growing plastic pollution issues by offering 100% plant-based biodegradable polymers

KANEKA CORPORATION

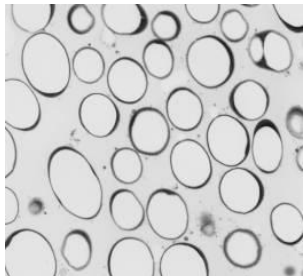
2019.10.7

Characteristics and Life Cycle of PHBH™

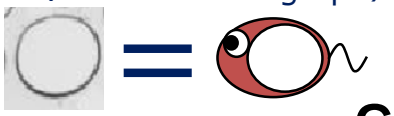
✓ PHBH™ produced by microbial fermentation from plant oils.

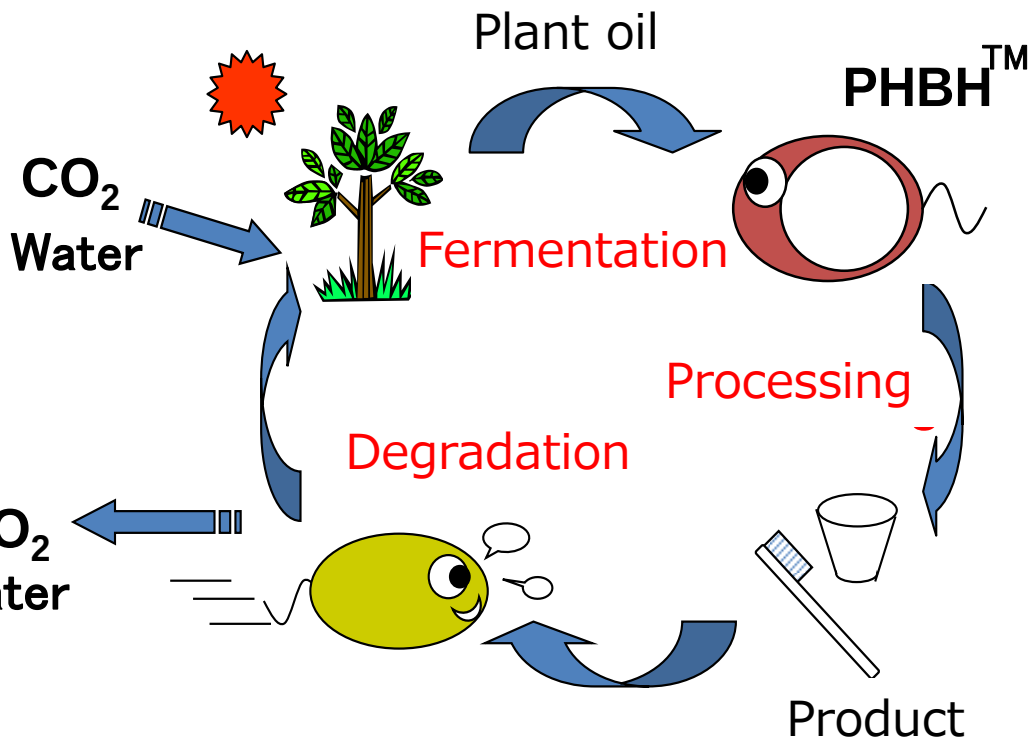
OK biobased | TÜV AUSTRIA ★★★★ S0318

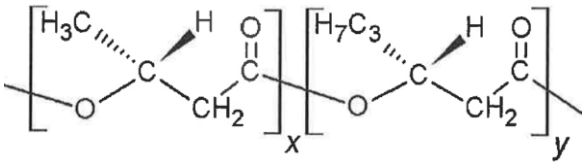
Life cycle of PHBH™



PHBH™ accumulated in microorganisms (Electron micrograph)







Poly (3-hydroxybutyrate-co-3-hydroxyhexanate)
PHBH™

Characteristics of PHBH™

- **100% bio-based**
- **Producing by fermentation**
- **biodegradable**

Example of Use

KANEKA Biodegradable Polymer™ PHBH™

Discarded plastic causes
- Land pollution
- Marine pollution
(microplastic problem)

Tighter regulation of plastics in Europe and other regions

Characteristics of PHBH™
- 100% plant-based
- Producing by fermentation
- Biodegradable

PHBH™ is a biodegradable polymer that is produced by microbial fermentation from plant oils.

		Biodegradability	
		Biodegradable	Non-Biodegradable
Raw material	Bio-based	PHBH™ PLA(Polylactic acid) Starch etc.	Bio-PE Bio-PA Bio-PC etc.
	Fossil-based	PBS PBSA PBAT	PE PA PC ABS

Approval

Bio-based	○（Europe/Japan）	A42001
Biodegradable		
Compost (Industrial)	○(Europe/U.S./Japan)	A42001
Compost (Home)	○(Europe)	
Marine	○(Europe)	
Soil	○(Europe)	

※Europe: TÜV AUSTRIA BELGIUM、 U.S.: Biodegradable Products Institute、 Japan:JBPA: Japan BioPlastics Association

Obtained the “OK Biodegradable MARINE” certificate Expanding applications as a marine material

In November 2017, we obtained “OK Biodegradable MARINE” certification for PHBH. Our biodegradable polymer PHBH™ has registered as a Food Contact Material in EU Commission (Europe), FDA※1 (U.S.) and JHOSPA※2 (Japan).
These achievements enable us to use it as marine materials, food packaging materials and compost bags. We will accelerate the development of new biomass-based products with biodegradable property.

OK bio-degradable TÜV AUSTRIA MARINE S0318

Requirements of Seawater Test
- Biodegradation: >90% (within 6 months, 30ºC)
- Disintegration: <10% remains with a 2.0mm sieve (within 12 weeks, 30ºC)

“OK Biodegradable MARINE” certification granted by VINCOTTE, an international certification body

Food contact	
U.S.	○(Approved by Food and Drug Administration)
Europe(EU)	○(Approved by EU commission and listed in (EU) No 10/2011)
Japan	○(Approved by Japan Hygienic Olefin and Styrene Plastics Association)

※1: Food and Drug Administration, ※2: Japan Hygienic Olefin and Styrene Plastics Association

Status of Progress on Specific Initiatives

Joint development of products using PHBH™ and related initiatives are now under way in earnest

New straws for "SEVEN CAFÉ" run by Seven-Eleven Japan Co., Ltd. and other group companies will be introduced to the market by the autumn of 2019.
（news release issued on April 15, 2019）

Advance joint development of cosmetics containers with Shiseido Company, Limited
(news release issued on April 24, 2019)

Advance project to promote widespread use of Biodegradable Polymer shopping bags in the Republic of Kenya
（news release issued on September 4, 2018）

The problem of ocean pollution caused by plastic waste was covered in G20 Ministerial Meeting on Energy Transitions and Global Environment for Sustainable Growth, Biodegradable materials attract attention.（June 15-16 & 28-29, 2019）

Other than the above, we have received and are currently addressing inquiries and requests for joint development from around the world.

Status of Progress on JICA Project in Kenya

Background in Kenya

The number of single-use plastic shopping bags kept increasing, causing social problems such as insufficient capabilities of waste disposal plants and illegal dumping.
Kenya enacted "Plastic Bag Ban Law" in 2017, banning plastic bags. Unfortunately, appropriate alternatives are not available. New problems are arising such as less convenience to consumers and plastic bags production shut-down.

Roadside in Nairobi (from a car window)

Project Description

Contributing to resolve the above problems in Kenya through enhancement of understanding and promoting widespread use of biodegradable polymer shopping bags as alternatives.

Items to be implemented	Progress
1. To support Kenya authority to bring the certification and labeling system for biodegradability	KEBS※1 set the standard of biodegradability this April. NEMA※2 understood FT-IR is useful for detection of fake products.
2. Technical trainings to produce biodegradable polymer shopping bags	Bobmil [KE] made PHBH™ based compounds' bin liners in their existing machine by our trainings.
3. Implement of biodegradability test in Kenya	We are working out details with Japanese and Kenyan academia※3.

※1: Kenya Bureau of Standard, ※2: National Environmental Management Authority, ※3: National Institute for Environmental Studies [JP], Jomo Kenyatta University of Agriculture and Technology [KE]

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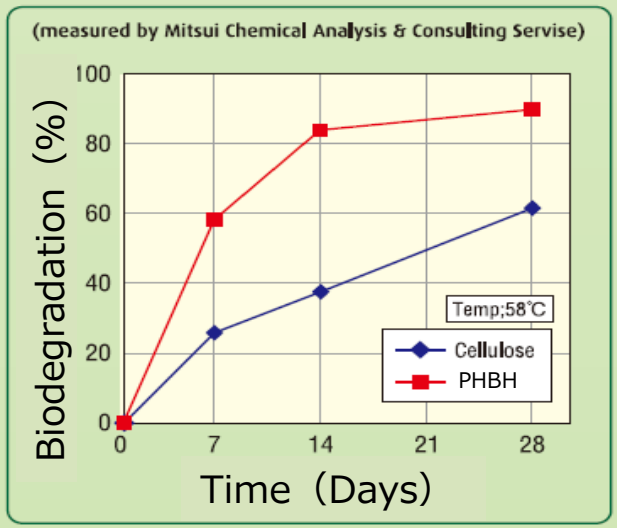
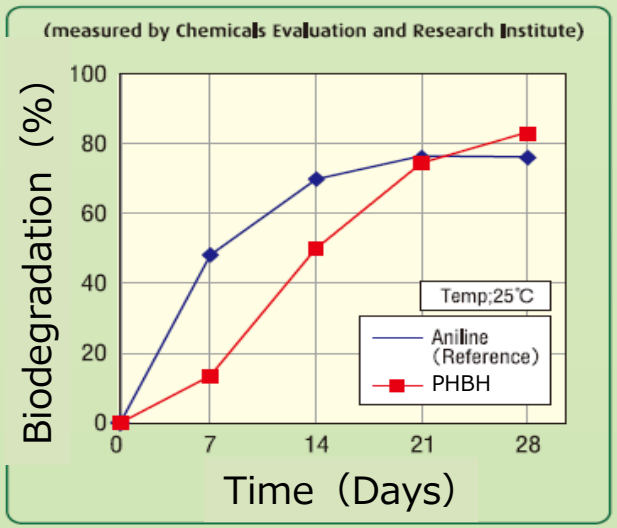
Biodegradability of PHBH™

Aerobic
Presence of O_2
Composting

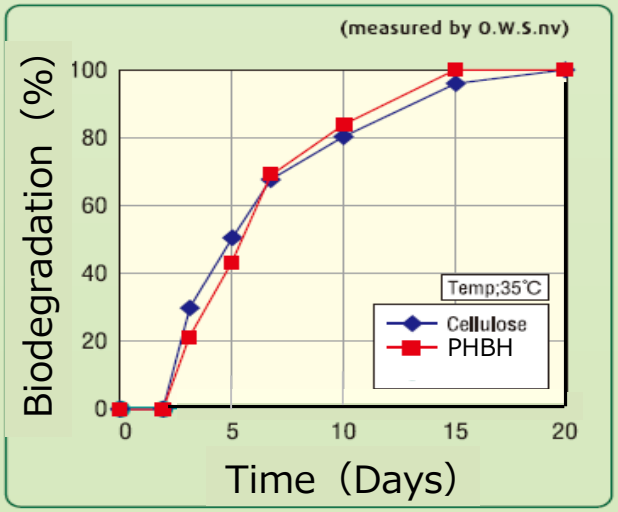


ISO14855 (compost)

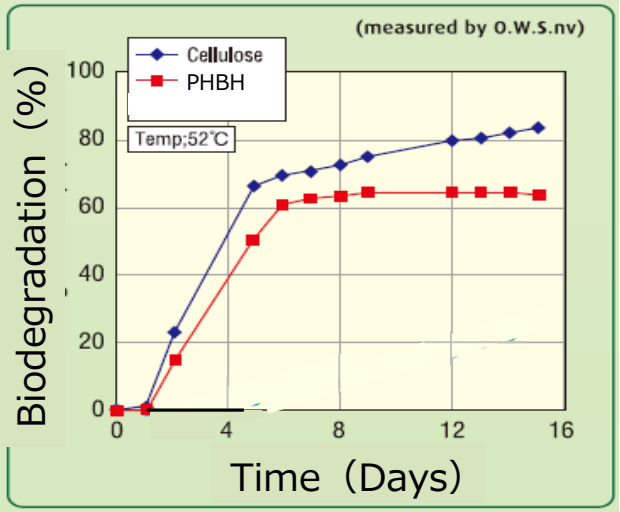


ISO14851(activated sludge)

Anaerobic
Absence of O_2
Biogasification



ISO14853 (aqueous phase)



ISO15985 (solid phase)

PHBH™ has biodegradability equal to or higher than that of cellulose which is a component of paper

OK compost TÜV AUSTRIA INDUSTRIAL S0318
OK compost TÜV AUSTRIA HOME S0318

Biodegradability of PHBH™ in Sea water

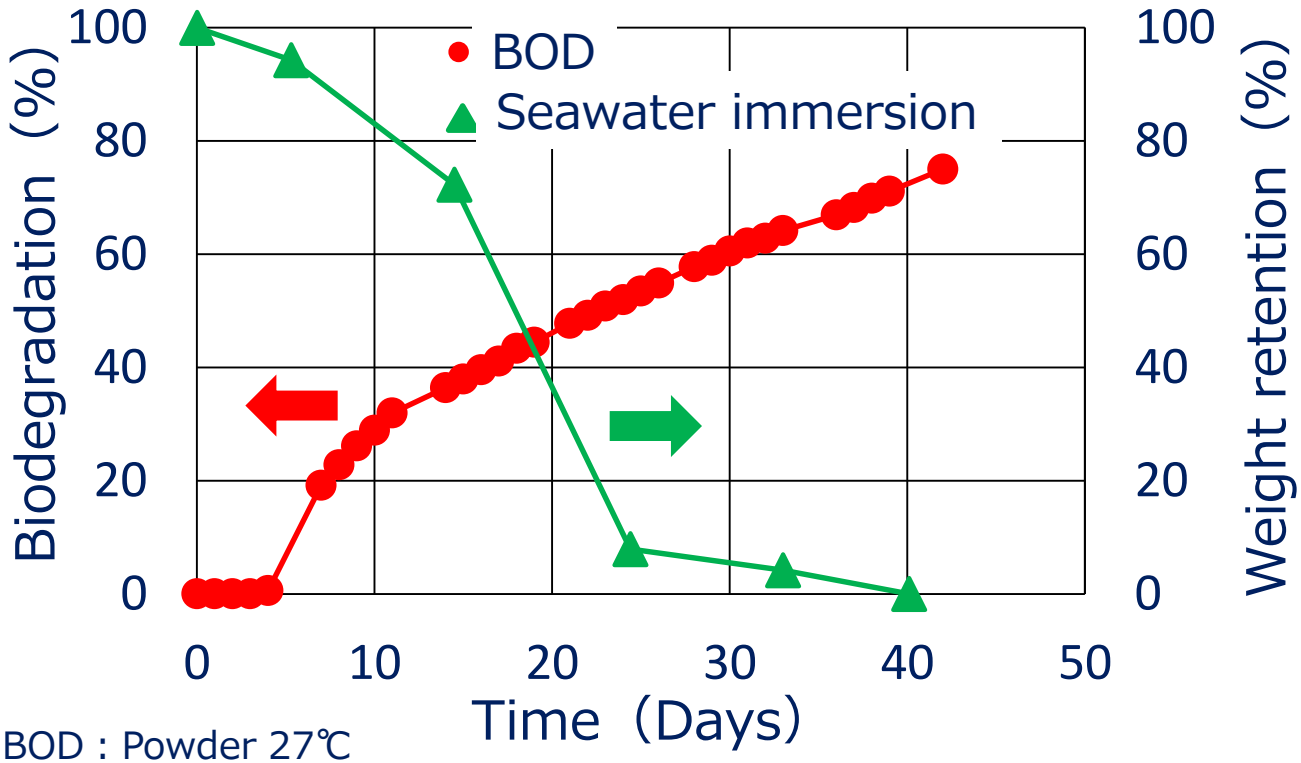
Biological oxygen demand(BOD) (Calculate from oxygen demand)

Tested by The National Institute of Advanced Industrial Science and Technology

Seawater immersion test (Measure from weight loss)

Tested by Kaneka

BOD bottle



BOD : Powder 27℃
Seawater immersion : 20μm film 23℃

✓ **PHBH™ biodegrades into CO_2 and H_2O in seawater (Biodegradation rate depending on conditions)**

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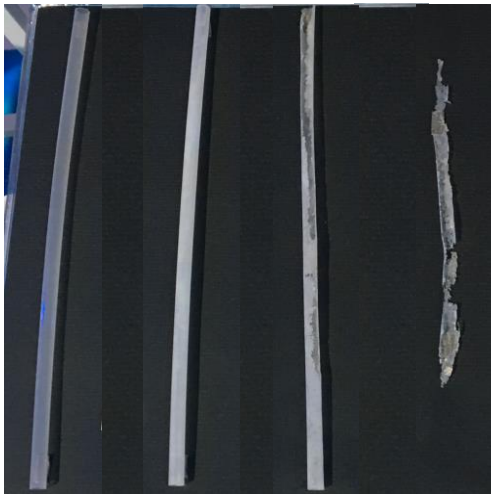
MARINE
S0318

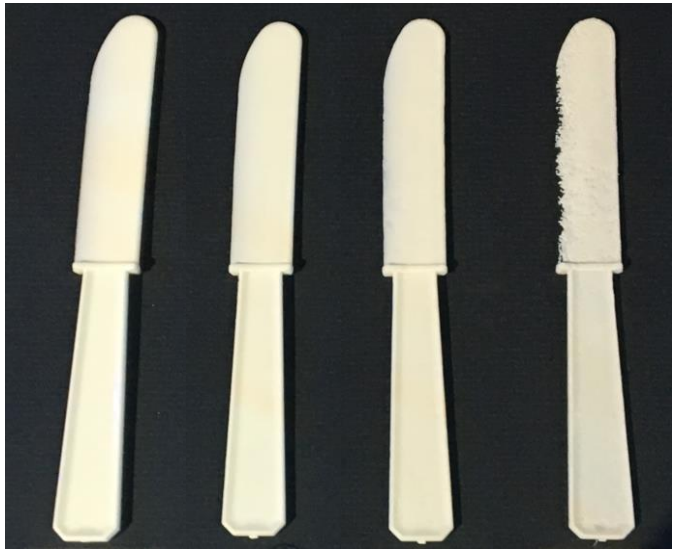
Biodegradability of PHBH™ in Seawater

Straw



Start 24d 61d 88d

Knife



Start 24d 61d 88d

Bottle

Start 114d

Seawater Immersion Test

Temperature : 23˚C

Seawater : Takasago, Hyogo

*Biodegradation behavior shown here is a typical test result at Kaneka. Disintegration speed will vary depending on natural conditions.

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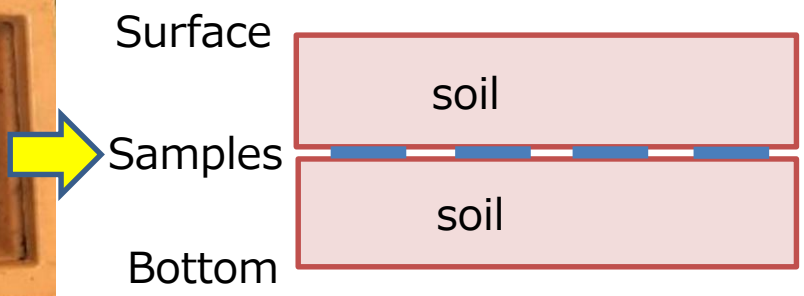
Biodegradability of PHBH™ in Soil

Sample setting

Sample size:
10cm x 10cm
20μm in thickness



Started from April 2018 in Nairobi, Kenya (monthly mean temp. for that period is 18-22℃.)

Start	1 month	2 months	4 months	6 months
				Completely degraded

✓ **PHBH™ biodegrades in soil (Biodegradation rate depending on conditions)**

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SOIL

*Biodegradation behavior shown here is a typical test result at Kaneka. Disintegration speed will vary depending on natural conditions.