

Sustainable Biopolymer, PHA

Neat Resin: PHACT™ A1000P

Bring a New Wave
PHACT

Description of Material

Amorphous polyhydroxyalkanoate (aPHA) is a softer, more rubbery version of PHA that offers fundamentally different performance characteristics than the crystalline or semi-crystalline forms that currently dominate the PHA market. For its initial applications, aPHA will be used as a modifier to other polymers and biopolymers to improve functionality and processing characteristics and to enable these products to achieve faster rates of biodegradation or composting.

PHA Neat Resin

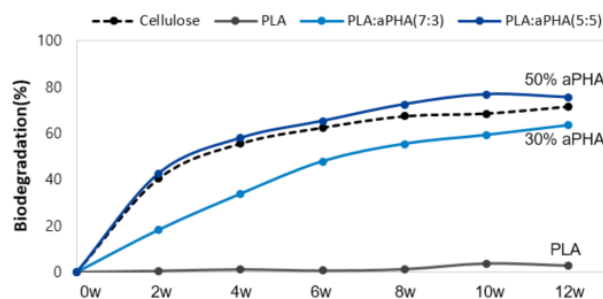
PHACT A1000P is an environmentally friendly amorphous PHA. It is a 100% bio-based material derived from nature and produced sustainably. It is certified biodegradable under industrial compost, soil (ambient), and marine environments. PHACT A1000P is suitable for general compounding with other polymers. It can be applied to various products in market, including packaging, agriculture, food waste management, coatings, personal care and healthcare. The product is supplied in pellet form.



PHACT A1000P Features

- 100% bio content
- TUV Certified home & industrial compostable
- TUV Certified marine and soil biodegradable
- Used as a modifier for other polymers
 - Improves impact strength of PLA
 - Enhances elongation of PLA
 - Enables faster composting relative to PLA

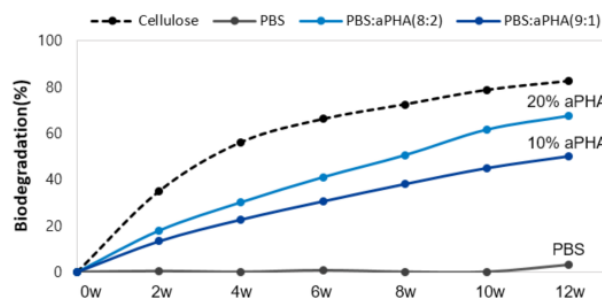
□ Evaluation of various PHA/PLA compositions in compost(58°C→30°C) (ISO14855-1*)
: The more PLA was mineralized in the present of PHA contents above 25%



Sample	0w	2w	4w	6w	8w	10w	12w
Standard cellulose	0.0	40.4	55.2	64.2	68.4	69.9	73.9
PLA:aPHA(5:5)	0.0	42.5	57.8	65.1	72.3	76.6	75.3
PLA:aPHA(7:3)	0.0	18.2	33.7	47.7	55.2	59.0	63.2
PLA	0.0	0.5	1.1	0.6	1.2	3.6	2.7

*Samples were tested modified temperature condition at 30°C referred to ASS810.

□ Evaluation of various PHA/PBS compositions in compost(58°C→30°C) (ISO14855-1*)
: The more PBS was mineralized in the present of PHA contents above 10%



Sample	0w	2w	4w	6w	8w	10w	12w
Standard cellulose	0.0	34.9	55.9	66.0	72.3	78.5	82.3
PBS:aPHA(8:2)	0.0	17.8	30.1	40.9	50.3	61.4	67.3
PBS:aPHA(9:1)	0.0	13.2	22.5	30.4	37.8	44.7	49.8
PBS	0.0	0.4	0.0	0.7	0.0	0.0	3.0

*Samples were tested modified temperature condition at 30°C referred to ASS810.
*All samples are compounds made by twin extruder.

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Certifications

• Biobased Certificate



Biobased 100% by Vincotte



Biobased 100% by DinCertco

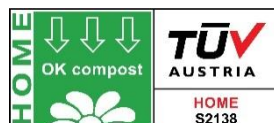


BioPreferred by USDA

• Biodegradability Certificate



OK Compost Industrial



OK Compost Home



OK Biodegradable Soil



OK Biodegradable Marine



BPI Compostable



Seeding / DIN EN 13432



Industrial compostable by DinCertco



JBPA (A46001)

• Food contact and Packaging Compliance

- Ministry of Food and Drug Safety of the Republic of Korea: Registered the list of Food Utensils, Containers, and Packages (registered as HBP (hydroxybutyl polyester))
- US FDA Food Contact Substance (FCN2281)
- The Chinese Ministry of Health: Registered the list of National Food Safety Standard Food Contact Plastic Resin (GB 4806.6-2016)
- BRCGS Packaging Materials
- Kosher Certification (KLBD65399)
- Indonesia Halal Certification (ID00410000464030322)

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Mechanical Properties

PHA Neat Resin			
Properties	Units	ASTM	A1000P
Forms	-	-	Pellet
Specific Gravity	-	D792	1.23
Hardness (Max/15s)	Shore A	D2240	53 / 41
Tensile Strength at Break ⁽¹⁾	MPa	D638	2.2
Elongation at Break ⁽¹⁾	%	D638	500%
Glass Transition Temperature ⁽²⁾	°C	D3418	-15
Melt Flow Rate (165 °C, 5 kg)	g/10 min	D1238	5
Haze ⁽³⁾	%	E313-73	8.9
Transmittance ⁽³⁾	%	-	93

- 1) Injection specimens conform to ASTM D638. Crosshead speed 200 mm/min for tensile strength.
- 2) Differential Scanning Calorimeter (DSC), the peak of endotherm. Heating rate 10 °C/min.
- 3) Film thickness 90µm.

Recommended Processing Conditions

Neat Resin for General Purpose	
Dry Temperature	50 °C X 5 hrs.
Feed Temperature	40 °C
Melt Temperature	135 ~ 175 °C
Compression Section	130 ~ 165 °C
Nozzle	130 ~ 165 °C
Screw Speed	80 ~ 150 rpm

Storage Conditions

- PHACT A1000P is an amorphous polymer that is aggregated easily when exposed to 60 °C with humid condition.
- Avoid direct sunlight, heat, or fire, and store it in a dry ventilated cool place.

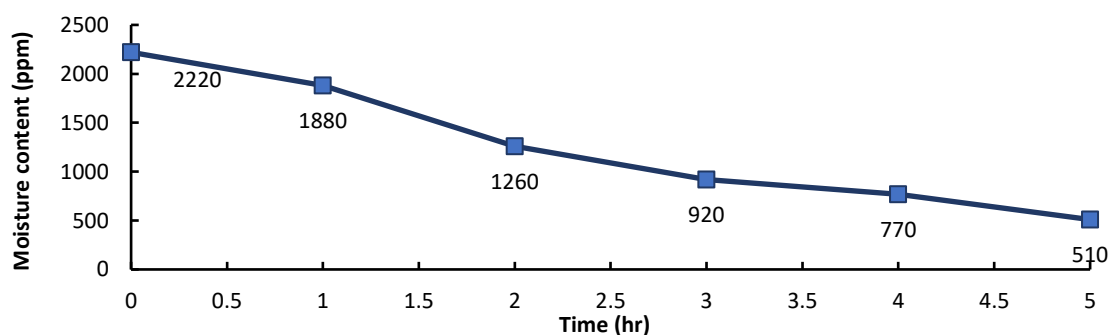
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Drying Process Conditions

- Biodegradable materials are highly hygroscopic. Store in a dry condition.
- PHACT A1000P is supplied in foil-lined boxes or bags dried to < 500 ppm.
- Consume all the products with an open bag if possible, and if there is a residual unavoidably, seal them completely and keep them in a dry place and avoid storing them for a long time.
- It is recommended to dry PHACT from packaging for 4-6 hrs. at below 50 ° C.
- It is preferable to dry with air below -40 ° C dew point.
- For the drying process, the paddle-type dehumidifying dryer is recommended to prevent aggregation during drying.

*Figure 1 shows the moisture content of PHA reached 500 ppm after 5 hrs. in the paddle-type dryer at 50 ° C.



[Figure 1 – Moisture content of PHA in Paddle Dryer]

General Compounding Conditions

- PHACT A1000P is suitable for compounding with PLA. However, due to the high heat-sensitive properties of PHA, the extrusion temperature condition should be mild for reducing degradation of PHA during the process.

*Figure 2 shows an example of the extrusion temperature profile for PHA/PLA compounding.

Screw RPM	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	DA	head
120-150	40	80	155	165	165	165	170	175	165	165	165	165	165
	Feeding zone	Heating zone			Melting zone			Mixing zone		Compression zone			

[Figure 2 – Extrusion temperature profile]

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For additional information or specific recommendations for your intended applications, please contact us at:

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