



PHA Formulations

PHA polymers (PolyHydroxyAlkanoates) are a thermoplastic resin that can be used in injection molding, thermoforming and extrusion. PHA is made by bacterial fermentation and is 100% biobased and 100% biodegradable. They have a potentially large design space and resulting application options, if properly applied. And this is where PHARadox comes in. By blending different PHA polymers, and by possibly adding some sustainable fillers or fibers, PHARadox finetunes its PHA formulations to match perfectly with the customer needs.

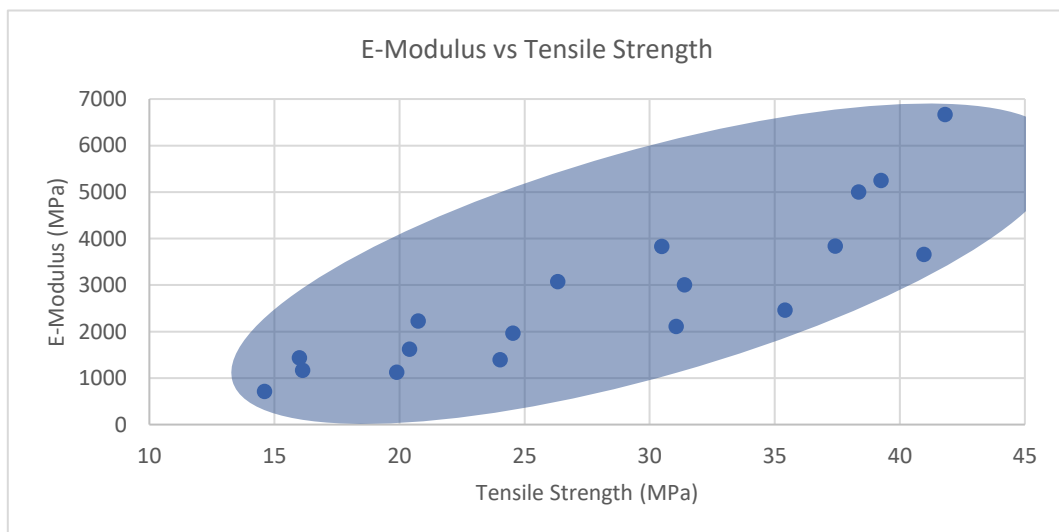
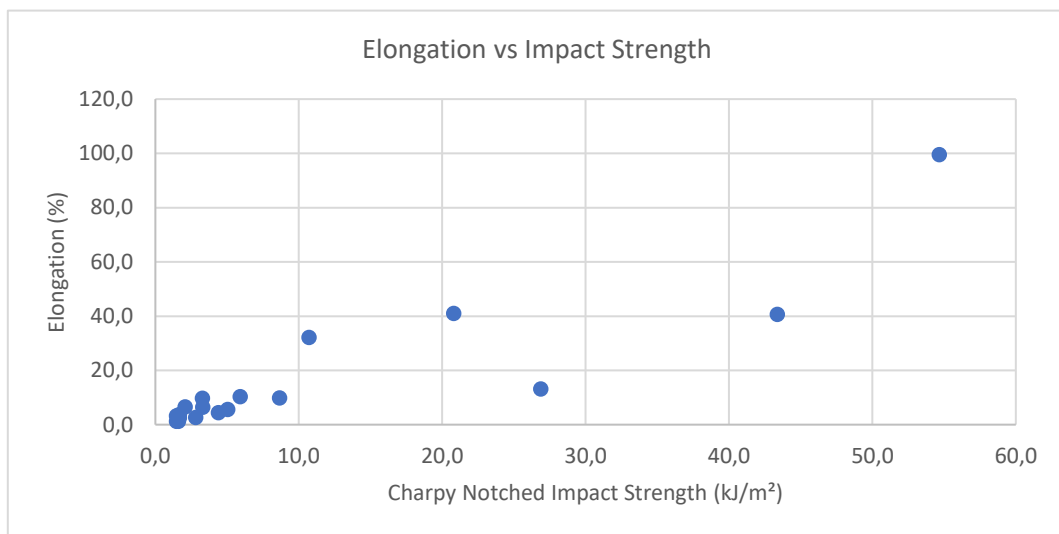
Unfilled resins

Property	Method	Unit	PHAx 622	PHAx 13967	PHAx 12977	PHAx 11987	PHAx 10997	PHAx 10007
E-Modulus	ISO 527	MPa	3650	2450	2100	1400	1100	700
Tensile Strength	ISO 527	MPa	40	35	30	25	20	15
Elongation	ISO 527	%	2-3	6-7	10	10	40	100
Flex Modulus	ISO 178	MPa	3400	2100	2000	1150	1000	600
Flex Strength	ISO 178	MPa	70	60	55	40	30	20
Notched Impact Strength	ISO 179-1/1 eA	kJ/m ²	1,7	2,1	3,3	8,7	20,8	54,7
Unnotched Impact Strength	ISO 179-1/1 eU	kJ/m ²	8	15	36	NB	NB	NB
HDT	ISO 75	°C	153	146	138	121	103	91

Mineral filled

Property	Method	Unit	PHAx 622 MFT10	PHAx 5776 MFT10	PHAx 12175 MFT10	PHAx 11284 MFT10	PHAx 10393 MFT10	PHAx 9502 MFT10
E-Modulus	ISO 527	MPa	5250	3850	3000	2000	1600	1150
Tensile Strength	ISO 527	MPa	40	35	30	25	20	15
Elongation	ISO 527	%	1-2	3-4	6-7	10	32	40
Flex Modulus	ISO 178	MPa	5050	3700	2800	1750	1500	1000
Flex Strength	ISO 178	MPa	70	65	55	40	35	25
Notched Impact Strength	ISO 179-1/1 eA	kJ/m ²	1,5	1,5	3,3	5,9	10,7	43,4
Unnotched Impact Strength	ISO 179-1/1 eU	kJ/m ²	5	15	33	85	NB	NB
HDT	ISO 75	°C	154	149	141	130	116	96

Property	Method	Unit	PHAx	PHAx	PHAx	PHAx	PHAx	PHAx
			622	5685	11373	10581	9789	8997
			MFT20	MFT20	MFT20	MFT20	MFT20	MFT20
E-Modulus	ISO 527	MPa	6650	5000	3830	3050	2250	1450
Tensile Strength	ISO 527	MPa	40	40	30	25	20	15
Elongation	ISO 527	%	1-2	3-4	2-3	4-5	5-6	13
Flex Modulus	ISO 178	MPa	6000	4450	3650	2850	2250	1450
Flex Strength	ISO 178	MPa	70	60	55	45	35	25
Notched Impact Strength	ISO 179-1/1 eA	kJ/m ²	1,6	1,7	2,8	4,4	5,0	26,9
Unnotched Impact Strength	ISO 179-1/1 eU	kJ/m ²	7	18	26	39	47	87
HDT	ISO 75	°C	156	148	145	135	TBD	118



The described materials are acquired by pilot scale production and the material properties are correct to the best of our knowledge. Small deviations can occur from batch to batch due to the nature of the PHA building blocks.