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12/357,680	01/22/2009	Neil John Rogers	CM3274M	1142
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THE PROCTER & GAMBLE COMPANY Global Legal Department - IP Sycamore Building - 4th Floor 299 East Sixth Street CINCINNATI, OH 45202			WALKE, AMANDA C	
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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte NEIL JOHN ROGERS,
CHRISTOPHER LAMB and ANTHONY NICHOLAS JARVIS

Appeal 2011-012647
Application 12/357,680
Technology Center 1700

Before FRED E. McKELVEY, JAMES C. HOUSEL and DONNA M. PRAISS,
Administrative Patent Judges.

McKELVEY, *Administrative Patent Judge.*

DECISION ON APPEAL

Statement of the case

1 The Procter & Gamble Company (“applicant”), the real party in interest
2 (Brief, page 1), seeks review under 35 U.S.C. § 134(a) of a final rejection dated
3 14 October 2010.

4 In support of prior art rejections, the Examiner relies on the following
5 evidence.

Engel et al. “Engel 1”	U.S. Patent 7,459,259 B2	2 Dec. 2008 filed 29 Sep. 2004 published as 2006/0068316 A1 30 Mar. 2006
Engel et al. “Engel 2”	U.S. Patent Application Publication 2006/0072444 A1	6 Apr. 2006
Aagaard et al. “Aagaard”	International Application Publication WO 94/12352	9 June 1994
Kahn et al. “Kahn”	International Application Publication WO 2006/018640 A1	23 Feb. 2006

6 Applicant does not contest the prior art status of the evidence relied upon by
7 the Examiner.

8 We mention the following additional evidence in this opinion.

LyondellBasell	Hostalen ACP 5831 D	Release date: 09 Dec. 2011
Aldrich	Polymer Properties	No date

Appeal 2011-012647
Application 12/357,680

LyondelBasell was downloaded from the Internet on 17 January 2013:

<https://polymers.lyondellbasell.com/portal/binary/com.vignette.vps.basell.productgrade.ProductGradeFileDisplay?id=3fdf5cc1db237010VgnVCM100000646f3c14RCRD&type=iso>

Adrich was downloaded from the Internet on 18 January 2013:

<http://bluecoat-01/?cfu=aHR0cDovL3d3dy5zaWdtYWFsZHIpY2guY29tL2ltZy9hc3NldHMvMzkwMC9UaGVybWFsX1RyYW5zaXRpb25zX29mX0hvbW9wb2x5bWVycy5wZGY=>

1 We have jurisdiction under 35 U.S.C. § 134(a).

2 Rejections

3 Claims 1, 3-10, and 12-18 are on appeal. Brief, page 1; Answer, page 3

4 In the Answer, the Examiner has maintained the following rejections.

5 Rejection 1: Claims 1, 3-4, 6-10, 12-13, and 16-18 stand rejected under
6 § 103(a) over (1) Engel 1 and (2) Khan or Engel 2. Answer, page 4.

7 Rejection 2: Claims 1, 3-4, 6-10, 12-13, and 16-18 stand rejected under
8 § 103(a) over Engel 2. Answer page 5.

9 Rejection 3: Claims 5 and 14 stand rejected under § 103(a) over (1) Engel 1
10 or Engel 2, (2) Khan and (3) Aagaard. Answer, page 6.

11 With respect to Rejections 1 and 2, in the Brief applicant does not argue the
12 separate patentability of any dependent claim. Independent Claims 1 and 10 are
13 argued as a group. Accordingly, we decide Rejections 1 and 2 on the basis of
14 Claim 10 (reproduced below). 37 C.F.R. § 41.37(c)(1)(vii).

1 photo acid generators within the scope of Claim 10 are known. Answer, page 5;
2 Kahn, page 4:25 to page 5:5.

3 Engel 1 describes the use of a photo acid generator. Col. 10:41-67.
4 Specifically described is the use of the photo acid generator 1,2,3-
5 trihydroxybenzene tri-phenylsulfonylester. Col. 16:24-25.

6 Since Engel 1 describes the use of a photo acid generator and because Engel
7 2 and Kahn describe photo acid generators within the scope of Claim 10, the
8 Examiner reasoned that it would have been obvious to use known photo acid
9 generators (Engel 2 and Kahn) in the process of Engel 1 which also uses a photo
10 acid generator. Answer page 5.

11 Applicant's position

12 Applicant does not necessarily disagree with the Examiner's fact-finding.
13 Rather, applicant takes the position that "there is no motivation to combine the
14 references." Brief, page 3; Reply Brief, pages 1-2. In a post-*KSR* environment, we
15 construe applicant's argument to be that "there is reason to use the Engel 2/Kahn
16 photoacid generators in the method described by Engel 1."

17 Applicant's position is bottomed on the following discussion in Engel 2
18 (¶ 0098):

19 As can be seen from Table 8 [not reproduced], many photoacid
20 generators are not stable at temperatures of greater than or equal to
21 about 250 °C. Of the photoacid generators tested, the only photoacid
22 generator stable at such temperatures was 1,2,3-trihydroxybenzene
23 tris-phenylsulfonylester. Due to the stability of the 1,2,3-
24 trihydroxybenzene tris-phenylsulfonylester, this photoacid generator

1 other thermoplastics described as useful by both Engel 1 and Engel 2 have melt
2 temperatures below 250 °C. Engel 1 teaches that polyacrylates are suitable for use
3 in its method. Col. 3:39. Aldrich reveals the melt temperatures of various
4 polyacrylates, as well as high-density polyethylene (the thermoplastic described in
5 applicant's examples).

Thermoplastic polymer	T_m (Melt temperature) in °C
<i>tert</i> -Butyl acrylate	193
Ethylene (HDPE)	130
Isopropyl acrylate (isotactic)	162
Methyl methacrylate (syndiotactic)	200

6
7 According to the manufacturer in 2011, Hastalen ACP5831 D polyethylene
8 described in applicant's examples (Specification, pages 7-9) has a recommended
9 processing temperature of 180 °C to 210 °C. LyondellBasell, page 2. The 2011
10 recommended processing temperature is consistent with applicant's described
11 processing temperature of 190 °C.

12 It is true that Engel 1 states that “[t]he plastic can be any injection moldable
13 thermoplastic capable of being injection molded at temperatures of greater than or
14 equal to about 250 °C . . .” Col. 4:9-11. One skilled in the art would have
15 recognized that Engel 1 states “can” not “must” or “shall”. A reading of Engel 1 as
16 a whole would reveal that the Engel 1 invention is not limited to the use of
17 thermoplastics which can be injection molded at temperatures equal to or greater
18 than 250 °C.

19 *First*, Engel 1 teaches the use of polyacrylates, which as noted above have a
20 T_m less than 250 °C. Col. 3:39

1 *Second*, Engel 1 sets out other criteria for suitable polymers. Col. 3:29-60.

2 *Third*, Engel 1 Claim 1 has no processing temperature limitation, whereas
3 Engel 1 dependent Claim 14 requires a processing temperature of 250 °C or
4 greater. In this respect, the Engel 1 claim format parallels that of applicant.
5 Applicant's Claim 10 does not have a temperature processing limitation whereas
6 applicant's dependent Claim 18 calls for processing between about 100 °C and
7 500 °C.³

8 The record reveals that the Engel 1 processing temperature is a function of
9 the Engel 1 thermoplastic one chooses to use. In turn, one skilled in the art would
10 have recognized that a photoacid generator that is not unstable at the processing
11 temperature would have to be used. On that basis, it is readily apparent that
12 applicant has used known photoacid generators (Engel 2 and Kahn) in a known
13 process (Engel 1) to achieve an entirely expected result (a plastic article). *KSR*
14 *Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). The reason one skilled in the
15 art would have found it obvious to use the Engel 2 or Kahn photoacid generators is
16 that those skilled in the art use known elements for their known purpose. *Cf.*
17 (1) *Graham v. John Deere Co.*, 383 U.S. 1, 10 (1966) (Quoting Letter to Oliver
18 Evans (Jan. 1814), VI Writings of Thomas Jefferson, at 298 (Washington ed.):
19 "man has a right to use a saw, an axe, a plane separately; may he not combine their

³ We will note that if some of the Engel 2 photoacid generators are unstable at temperatures above 250 °C, then those same photoacid generators would be unstable when used *above* 250 °C in applicant's claimed process. We will assume for purposes of deciding the appeal that one skilled in the art would have been able to determine which photoacid generators described in applicant's specification could be used at temperatures below and above 250 °C.

1 uses on the same piece of wood?" and (2) *Dunbar v. Myers*, 4 Otto (94 U.S.) 187,
2 195 (1876) (Ordinary mechanics know how to use bolts, rivets and screws and it is
3 obvious that anyone knowing how to use such devices would know how to
4 arranged a deflecting plate at one side of a circular saw which had such a device
5 properly arranged on the other side.).

6 **Other arguments**

7 We have considered applicant's remaining arguments and find none that
8 warrant reversal of the Examiner's rejections. *Cf. In re Antor Media Corp.*, 689
9 F.3d 1282, 1294 (Fed. Cir. 2012).

10 **Decision**

11 Upon consideration of the appeal, and for the reasons given herein, it is
12 **ORDERED** that the decision of the Examiner rejecting the claims on
13 appeal as being unpatentable over the prior art is *affirmed*.

14 **FURTHER ORDERED** that no time period for taking any
15 subsequent action in connection with this appeal may be extended under 37 CFR
16 § 1.136(a)(1)(iv).

17 **AFFIRMED**

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19 cam
20 cc:
21 PTO-892
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Notice of References Cited	Application/Control No. 12/357,680	Applicant(s)/Patent Under Reexamination	
	Examiner PTAB (McKelvey)	Art Unit 4400	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

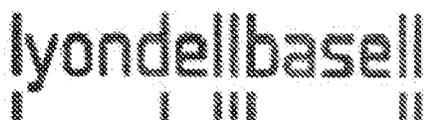
FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Lyondell Basell, Hostalen ACP 5831 D, "Polyethylene, High Density" (Dec. 9, 2011); https://polymers.lyondellbasell.com/portal/binary/com.vignette.vps.basell.productgrade.ProductGradeFileDisplay?id=3fd5cc1db237010VgnVCM100000646f3c14RCRD&type=iso .
	V	Aldrich, Reference: Polymers Properties, (No date); http://bluecoat-01/?cfu=aHROcDovL3d3dy5zaWdtYWFsZHJpY2guY29tL2ltZy9hc3N1dHMvMzkwMC9UaGVybWFsX1RyYW5zaXRpb25zX29mX0hvbW9wb2x5bWVycy5wZGY= .
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



Hostalen ACP 5831 D

Polyethylene, High Density

Product Description

Hostalen ACP 5831 D is a high density polyethylene (HDPE) resin used in small blow molding applications such as thin-wall packaging, consumer goods and toys. It exhibits a very good combination of high stiffness and high stress cracking resistance. Hostalen ACP 5831 D is delivered in pellet form, demonstrates good organoleptic properties, contains antioxidants and has a broad molecular weight distribution. Hostalen ACP 5831 D is not intended for use in medical and pharmaceutical applications.

Product Characteristics

Status	Commercial; Active
Test Method used	ISO
Availability	Europe, Asia-Pacific, Australia/NZ, Africa-Middle East, Latin America
Processing Method	Extrusion Blow Molding
Features	Antioxidant, High ESCR (Environmental Stress Cracking Resistance), High Rigidity
Typical Customer Applications	Blow Moulding Applications, Sports, Leisure and Toys, Bottles For Consumer Goods, Consumer Packaging, Jerry Cans, Bottles and vials

Typical Properties	Method	Value	Unit
Physical			
Density	ISO 1183	0.958	g/cm ³
Melt flow rate (MFR)	ISO 1133		
(190°C/2.16kg)		0.30	g/10 min
(190°C/21.6kg)		22	g/10 min
(190°C/5.0kg)		1.2	g/10 min
Bulk density	ISO 60	>0.500	g/cm ³
FNCT (3.5 MPa, 2% Igepal BC/9, 80°C)	ISO 16770	8	h
Mechanical			
ESCR	ASTM D 1693	150	h
Tensile Modulus	ISO 527-1, -2	1350	MPa
Tensile Stress at Yield	ISO 527-1, -2	28.0	MPa
Tensile Strain at Yield	ISO 527-1, -2	7.5	%
Tensile Impact Strength	ISO 8256	75.0	kJ/m ²
Note: notched, -30°C			

Impact

Charpy notched impact strength (-30 °C, Type 1, Notch A)	ISO 179	6.5	kJ/m ²
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Hardness

Shore hardness (Shore D)	ISO 868	64	
Ball indentation hardness (H 132/30)	ISO 2039-1	60	MPa

Additional Properties

Recommended processing temperature 180°C - 210°C

Notes

Typical properties; not to be construed as specifications.

Further Information**Hostalen ACP 5831 D**

Conveying: Conveying equipment should be designed to prevent production and accumulation of fines and dust particles that are contained in polymer resins. These particles can under certain conditions pose an explosion hazard. We recommend the conveying system used is equipped with adequate filters, is operated and maintained that no leak develops and adequate grounding exists at all times.

Health and Safety:

The resin is manufactured to the highest standards but, special requirements apply to certain applications such as food end-use contact and direct medical use. For specific information on regulatory compliance contact your local representative.

Workers should be protected from the possibility of skin or eye contact with molten polymer. Safety glasses are suggested as a minimal precaution to prevent mechanical or thermal injury to the eyes.

Molten polymer may be degraded if it is exposed to air during any of the processing and off-line operations. The products of degradation have an unpleasant odour. In higher concentrations they may cause irritation of the mucus membranes. Fabrication areas should be ventilated to carry away fumes or vapours. Legislation on the control of emissions and pollution prevention must be observed. If the principles of sound manufacturing practice are adhered to and the place of work is well ventilated, no health hazards are involved in processing the resin.

The resin will burn when supplied with excess heat and oxygen. It should be handled and stored away from contact with direct flames and/or ignition sources. In burning the resin contributes high heat and may generate a dense black smoke. Starting fires can be extinguished by water, developed fires should be extinguished by heavy foams forming an aqueous or polymeric film. For further information about safety in handling and processing please refer to the Material Safety Data Sheet.

Storage:

The resin is packed in 25 kg bags or in bulk containers protecting it from contamination. If it is stored under adverse conditions, i. e. if there are large fluctuations in ambient temperature and the atmospheric humidity is high, moisture may condense inside the packaging. Under these circumstances, it is recommended to dry the resin before use. Unfavourable storage conditions may also intensify the resin's slight characteristic odour.

The resin is subjected to degradation by ultra-violet radiations or by high storage temperatures.

Therefore the resin must be protected from direct sunlight, temperatures above 40°C and high atmospheric humidity during storage. The resin can be stored over a period of more than 6 months without significant changes in the specified properties, appropriate storage conditions provided. Higher storage temperatures reduce the storage time.

The information submitted is based on our current knowledge and experience. In view of the many factors that may affect processing and application, these data do not relieve processors of the responsibility of carrying out their own tests and experiments; neither do they imply any legally binding assurance of certain properties or of suitability for a specific purpose. The data do not relieve the customer from his obligation to control the resin upon arrival and to complain about faults. It is the responsibility of those to whom we supply our products to ensure that any proprietary rights and existing laws and legislation are observed.

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LyondellBasell markets this product through the following entities:

- Equistar Chemicals, LP
- Basell Sales & Marketing Company B.V.
- Basell Asia Pacific Limited
- Basell International Trading FZE
- LyondellBasell Australia Pty Ltd

For the contact details of the LyondellBasell company selling this product in your country, please visit <http://www.lyondellbasell.com/>.

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 (ii) the manufacture of any of the following, without prior written approval by Seller for each specific product and application: U.S. FDA Class II medical devices; Health Canada Class II or III medical devices; European Union Class II medical devices; or any equivalent U.S. FDA, Health Canada, or European Union regulations pertaining to medical devices; packaging in direct contact with a pharmaceutical active ingredient and/or dosage form; and tobacco-related products and applications. This product(s) may not be used in the manufacture of any of the following applications: U.S. FDA Class III medical devices; Health Canada Class IV medical devices; European Class III medical devices; applications involving permanent implantation into the body; life-sustaining medical applications; and lead, asbestos or MTBE related applications. All references to the U.S. FDA, Health Canada and European Union regulations include another country's equivalent regulatory classification.

Users should review the applicable Material Safety Data Sheet before handling the product.

Addhere, Adflex, Adstif, Adsyl, Akoafloor, Akoalit, Alathon, Alkylate, Amazing Chemistry, Aquamarine, Aquathene, Arconate, Arcopure, Arcosolv, Arctic Plus, Arctic Shield, Avant, Catalloy, Clyrell, CRP, Crystex, Dexflex, Duopac, Duoprime, Explore & Experiment, Filmex, Flexathene, Glacido, Hifax, Histif, Hostacom, Hostalen, Ideal, Integrate, Koattro, LIPP, Lucalen, Lufflexen, Lupolen, Lupolex, Luposim, Lupostress, Lupotech, Metocene, Microthene, Moplen, MPDIOL, Nerolex, Nexprene, Petrothene, Plexar, Polymeg, Pristene, Proflex, Pro-Fax, Punctilious, Purall, SAA100, SAA101, Sequei, Softell, Spherilene, Spheripol, Spherizone, Starflex, Stretchene, Superflex, TBAC, Tebol, T-Hydro, Toppyl, Trans4m, Tufflo, Ultrathene, Vacido and Valtec are trademarks owned or used by the LyondellBasell family of companies.

Adsyl, Akoafloor, Akoalit, Alathon, Aquamarine, Arconate, Arcopure, Arcosolv, Arctic Plus, Arctic Shield, Avant, CRP, Crystex, Dexflex, Duopac, Duoprime, Explore & Experiment, Filmex, Flexathene, Hifax, Hostacom, Hostalen, Ideal, Integrate, Koattro, Lucalen, Lupolen, Microthene, Moplen, MPDIOL, Nexprene, Petrothene, Plexar, Polymeg, Pristene, Pro-Fax, Punctilious, Purell, Sequei, Softell, Spheripol, Spherizone, Starflex, Tebol, T-Hydro, Toppyl, Tufflo and Ultrathene are registered in the U.S. Patent and Trademark Office.

Release Date: 08 Dec 2011

from about 0.01% to about 10% by weight of the photoacid generating agent.

9. (original) Thermoplastic material according to claim 1, further comprising at least one other substance capable of changing colour upon irradiation.
10. (original) Method of processing thermoplastic material to form a plastic article, wherein the method comprises the step of processing the thermoplastic material at a temperature greater than the melt temperature, T_m , of the thermoplastic, wherein the thermoplastic material comprises polymer and at least one charge transfer agent, wherein the charge transfer agent is substantially colourless when neutral, but which develops colour when a charge is acquired, ~~and further comprising a photo acid generating agent selected from the group consisting of sulphonium and iodonium compounds, wherein the photo acid generating agent comprises a compound selected from the group consisting of onium type compounds, triazine, phthalimide, naphthalimide and carboximide compounds,~~ and wherein the method further comprises the step of irradiating the plastic article to colour at least a region of the plastic article.
11. (canceled)
12. (currently amended) Method of processing thermoplastic material according to claim 10[[1]], wherein the photo acid generating agent comprises an iodonium or sulphonium compound.
13. (original) Method of processing thermoplastic material according to claim 12, wherein the photo acid generating agent comprises a perfluoro-1-butanesulfonate, *p*-toluenesulfonate, 9,10-dimethoxyanthracene-2-sulfonate, nitrate, triflate or hexafluorophosphate salt of the iodonium or sulphonium compound.
14. (original) Method of processing thermoplastic material according to claim 10, wherein the polymer is a polyolefin selected from polyethylene, polyethylene terephthalate, polypropylene, or mixtures thereof.
15. (original) Method of processing thermoplastic material according to claim 10, wherein the thermoplastic material comprises:

from about 80% to about 99.98% by weight of the polymer;

Reference: Polymer Properties

Thermal Transitions of Homopolymers: Glass Transition & Melting Point

Literature values for the glass transition temperature, (T_g), and melting temperature, (T_m), are given in Table I for the more common homopolymers. Polymers are listed by the repeating unit in the polymer chain. These polymers and corresponding monomers are available from Aldrich. Literature values for a given material can vary widely. The values reported

in Table I have been taken from various sources and represent the most commonly reported numbers.¹ Several factors can influence the reported values, including molecular weight, molecular weight distribution, tacticity, thermal history, purity, and method of measurement.

Table I: Thermal Transitions of Homopolymers: Glass Transition (T_g) & Melting Point (T_m) Temperatures

Repeating Unit	T_g (°C)	T_m (°C)	Repeating Unit	T_g (°C)	T_m (°C)
Acenaphthylene	214		<i>N,N</i> -Dimethylacrylamide	89	
Acetaldehyde	-32	165	Dimethylaminoethyl methacrylate	19	
4-Acetoxy styrene	116		2,6-Dimethyl-1,4-phenylene oxide	167	
Acrylamide	165		Dimethylsiloxane	-127	-40
Acrylic acid	105		2,4-Dimethylstyrene	112	
Acrylonitrile, syndiotactic	125	319	2,5-Dimethylstyrene	143	
Allyl glycidyl ether	-78		3,5-Dimethylstyrene	104	
Benzyl acrylate	6		Dodecyl acrylate	-3	
Benzyl methacrylate	54		Dodecyl methacrylate	-65	
Bisphenol A- <i>alt</i> -epichlorohydrin	100		Dodecyl vinyl ether	-62	
Bisphenol A terephthalate	205		Epibromohydrin	-14	
Bisphenol carbonate	174		Epichlorohydrin	-22	
Bisphenol F carbonate	147		1,2-Epoxybutane	-70	
Bisphenol Z carbonate	175		1,2-Epoxydecane	-70	
4-Bromostyrene	118		1,2-Epoxyoctane	-67	
<i>cis</i> -Butadiene	102	1	2-Ethoxyethyl acrylate	-50	
<i>trans</i> -Butadiene	-58	148	4-Ethoxystyrene	86	
1-Butene	-24	171	Ethyl acrylate	-24	
<i>N-tert</i> -Butylacrylamide	128		Ethyl cellulose	43	
Butyl acrylate	-54		Ethylene, HDPE	-125	130
<i>sec</i> -Butyl acrylate	-26		Ethylene adipate	-46	54
<i>tert</i> -Butyl acrylate	43-107	193	Ethylene- <i>trans</i> -1,4-cyclohexyldicarboxylate	18	-
2- <i>tert</i> -Butylaminoethyl methacrylate	33		Ethylene isophthalate	51	
Butyl glycidyl ether	-79		Ethylene malonate	-29	
Butyl methacrylate	20		Ethylene 2,6-naphthalenedicarboxylate	113	
<i>tert</i> -Butyl methacrylate	118		Ethylene oxide	-66	66
4- <i>tert</i> -Butylstyrene	127		Ethylene terephthalate	72	265
<i>tert</i> -Butyl vinyl ether	88	250	2-Ethylhexyl acrylate	-60	
Butyl vinyl ether	-55	64	2-Ethylhexyl methacrylate	-10	
ϵ -Caprolactone	-60		2-Ethylhexyl vinyl ether	-66	
Cellulose nitrate	53		Ethyl methacrylate	65	
Cellulose tripropionate			Ethyl vinyl ether	-43	86
<i>cis</i> -Chlorobutadiene	-20	80	4-Fluorostyrene	95	
<i>trans</i> -Chlorobutadiene	-40	101	Formaldehyde	-82	181
2-Chlorostyrene	119		Hexadecyl acrylate	35	
3-Chlorostyrene	90		Hexadecyl methacrylate	15	
4-Chlorostyrene	110		Hexyl acrylate	57	
Chlorotrifluoroethylene	52	214	Hexyl methacrylate	-5	
2-Cyanoethyl acrylate	4		2-Hydropropyl methacrylate	76	
Cyclohexyl acrylate	19		Hydroquinone- <i>alt</i> -epichlorohydrin	60	
Cyclohexyl methacrylate	92		2-Hydroxyethyl methacrylate	57	
Cyclohexyl vinyl ether	81		Indene	85	
2,6-Dichlorostyrene	167		Isobornyl acrylate	94	
Diethylaminoethyl methacrylate	20		Isobornyl methacrylate	110	

¹See catalog numbers Z41,247-3, Z41,255-4, Z22,171-6, Z40,683-1 and Z22,195-3 in the Book section.



Reference: Polymer Properties

Thermal Transitions of Homopolymers: Glass Transition & Melting Point (continued)

Table I: Thermal Transitions of Homopolymers: Glass Transition (T_g) & Melting Point (T_m) Temperatures (continued)

Repeating Unit	T_g (°C)	T_m (°C)	Repeating Unit	T_g (°C)	T_m (°C)
Isobutyl acrylate	-24		<i>p</i> -Phenylene terephthalamide	345	
Isobutylene	-73		Phenylene vinylene	80	380
Isobutyl methacrylate	53		Phenyl methacrylate	110	
Isobutyl vinyl ether	-19	165	Phenyl vinyl ketone	74	
<i>cis</i> -isoprene	-63	28	Potassium acrylate	194	
<i>trans</i> -isoprene	-66	65	Propylene, atactic	-13	
<i>N</i> -isopropylacrylamide	85-130		Propylene, isotactic	-8	176
Isopropyl acrylate, isotactic	-11	162	Propylene, syndiotactic	-8	
Isopropyl methacrylate	81		Propylene oxide	-75	66
Methacrylic acid	228		Propyl vinyl ether	-49	76
Methacrylic anhydride	159		Sodium acrylate	230	
Methacrylonitrile	120		Sodium methacrylate	310	
2-Methoxyethyl acrylate	-50		Styrene, atactic	100	
4-Methoxystyrene	113		Styrene, isotactic	100	240
Methyl acrylate	10		Tetrabromobisphenol A carbonate	157	
Methyl cellulose			Tetrafluoroethylene	117	327
Methyl glycidyl ether	-62		Tetrahydrofuran	-84	
Methyl methacrylate, atactic	105,120		Tetramethylene adipate	-115	
Methyl methacrylate, syndiotactic	115	200	Tetramethylene terephthalate	17	232
4-Methylpentene	29	250	Thio-1,4-phenylene	97	285
Methylphenylsiloxane	-86		2,2,2-Trifluoroethyl acrylate	-10	
Methylstyrene	20		Trimethylene oxide	-78	
3-Methylstyrene	97		Trimethylsilyl methacrylate	68	
4-Methylstyrene	97		2,4,6-Trimethylstyrene	162	
Methyl vinyl ether	-31	144	Vinyl acetal	355	82
Nylon 4,6 (tetramethylene adipamide)	43		Vinyl acetate	30	
Nylon 6 (ϵ -caprolactam)	52	225	Vinyl alcohol	85	220
Nylon 6,6 (hexamethylene adipamide)	50	265	Vinyl benzoate	71	
Nylon 6,9 (hexamethylene azelamide)	58		Vinyl 4- <i>tert</i> -butylbenzoate	101	-
Nylon 6,10 (hexamethylene sebacamide)	50	227	Vinyl butyral	322	49
Nylon 6,12 (hexamethylene dodecane-diamide)	46		Vinyl carbazole	227	320
Nylon 11 (ω -undecanamide)	42	189	Vinyl chloride	81	227
Nylon 12 (ω -dodecanamide)	41	179	Vinyl cyclohexanoate	76	
1-Octadecane	55		Vinylferrocene	189	
Octadecyl methacrylate	-100		Vinyl fluoride	41	200
1-Octene	-63		Vinyl formal	106	
Octyl methacrylate	-20		Vinylidene chloride	-18	200
Oxy-4,4'-biphenyleneoxy-1,4-phenylenesulfonyl-1,4-phenylene	230	290	Vinylidene fluoride	-40	171
Oxy-1,4-phenylenesulfonyl-1,4-phenyleneoxy-1,4-phenyleneisopropylidene-1,4-phenylene	165	190	2-Vinyl naphthalene	151	
Oxy-1,4-phenylenesulfonyl-1,4-phenylene ether	214	230	Vinyl pivalate	86	
<i>p</i> -Phenylene isophthalamide	225	380	Vinyl propionate	10	
			2-Vinylpyridine	104	
			4-Vinylpyridine	142	
			1-Vinyl-2-pyrrolidone	54	
			Vinyl trifluoroacetate	46	