

**ABKÜRZUNGEN, TEMPERATUREN
UND CHEMISCHE BESTÄNDIGKEIT
DER KUNSTSTOFFMATERIALIEN**

Die nachfolgende Tabelle gibt eine Aufstellung der am häufigsten für Labormaterial verwendeten Kunststoffe.

Die Temperaturangaben in Klammern geben die nur für kurze Zeiträume tolerierten Grenzwerte an.

**ABBREVIATIONS, TEMPERATURE
AND CHEMICAL RESISTANCE OF
PLASTICS**

The table below lists commonly used abbreviations for plastics. This list covers plastics commonly employed in the manufacture of plastic laboratory ware.

Temperatures appearing in parentheses: limits tolerated for intervals only.

**СОКРАЩЕНИЯ, ТЕМПЕРАТУРНАЯ
И ХИМИЧЕСКАЯ СТОЙКОСТЬ
ПЛАСТИКОВЫХ МАТЕРИАЛОВ**

В следующей таблице перечислены распространенные сокращенные названия пластмасс. В нее вошли пластмассы, повсеместно использующиеся для производства пластиковых лабораторных изделий.

В скобках указана температура, которую пластиковый материал способен выдерживать кратковременно.

Abkürzungen DIN - Abbrev. Сокращения	Chemische Bezeichnung Chemical designation Химическое название	Allgemein tolerierter Temperaturbereich Tolerated temperature range in normal use Допустимый диапазон температур	
		from	to
ABS	Acrylnitril-Butadien-Styrol Acrylobutadiene-styrene copolymer Сополимер акрилбутадиен-стирен	- 40°C	+ 85 (100)°C
HDPE	Polyethylen hoher Dichte High-density PE Полиэтилен высокой плотности	- 50°C	+ 80 (120)°C
LDPE	Polyethylen niederer Dichte Low-density PE Полиэтилен низкой плотности	- 50°C	+ 75 (90)°C
PA	Polyamid (PA6) Polyamide (PA6) Полиамид (ПА6)	- 30°C	+ 80 (140)°C
PC	Polycarbonat Polycarbonate Поликарбонат	-100 °C	+135 (140)°C
PE	Polyethylen (HDPE/LDPE) PE (cf. HDPE/LDPE) Полиэтилен (ПЭВП / ПЭНП)	- 40°C	+ 80 (90)°C
PMP (Трх®)	Polymethylpenten Polymethylpentene Полиметилпентен	0°C	+120 (180)°C
PMMA	Polymethylmetacrylat Polymethylmethacrylate Полиметилметакрилат	- 40°C	+ 85 (90)°C
POM	Polyoxymethylen Polyoxymethylene Полиоксиметилен	- 40°C	+ 90 (110)°C
PP	Polypropylen Polypropylene Полипропилен	- 10°C	+120 (140)°C
PS	Polystyrol Polystyrene Полистирен	- 10°C	+ 70 (80)°C
SAN	Styren-Acrylonitril Styrene-acrylonitrile Стиролакрилонитрил	- 20°C	+ 85 (95)°C
SI	Silikonummi Silicone rubber Силиконовый каучук	- 50°C	+180 (250)°C
PVDF	Polyvinylidenfluorid Polyvinylidenfluoride Поливинилиденфторид	- 40°C	+105 (150)°C
PTFE	Polytetrafluorethylen Polytetrafluoroethylene Политетрафторэтилен	- 200°C	+ 260°C
E-CTFE	Ethylen-Chlortrifluorethylen Ethylene-Chlorotrifluoroethylene Этилен-хлортрифторэтилен	- 76°C	+150 (170)°C
ETFE	Ethylen-Tetrafluorethylen Ethylene-tetrafluoroethylene Этилен-тетрафторэтилен	- 100°C	+ 150 (180)°C
PFA	Perfluoralkoxy Perfluoroalkoxy Перфторалкокси-соединения	- 200°C	+ 260°C
FEP	Tetrafluorethylen-Perfluorethylenpropylen Tetrafluoroethylene-perfluoropropylene Тетрафторэтилен-перфторпропилен	- 200°C	+ 205°C
PVC	Polyvinylchlorid Polyvinylchloride Поливинилхлорид	- 20°C	+ 80°C
PUR	Polyurethan Polyurethane Полиуретан	-40°C	+90°C

CHEMISCHE BESTÄNDIGKEIT
DER KUNSTSTOFFMATERIALIEN
NACH ART DER CHEMISCHEN
SUBSTANZEN

LIST OF PLASTICS AND THEIR
CHEMICAL RESISTANCES TO
SUBSTANCE GROUPS

ХИМИЧЕСКАЯ СТОЙКОСТЬ
ПЛАСТИКОВЫХ МАТЕРИАЛОВ
В ЗАВИСИМОСТИ ОТ ТИПА
ХИМИЧЕСКИХ ВЕЩЕСТВ

Arten der chemischen Substanzen, +20°C Substance Group, at +20°C Типы химических веществ, + 20°C	LDPE	HDPE	PP	PMP Tpx®	PTFE FEP PFA	ECTFE ETFE	PA	PA
Aliphatische Alkohole Alcohols aliphatic Алифатические спирты	●	●	●	●	●	●	●	●
Aldehyde Aldehydes Альдегиды	●	●	●	●	●	●	●	●
Alkalien Alkalis Щелочи	●	●	●	●	●	●	●	●
Ester Esters Эфиры	●	●	●	●	●	●	●	●
Aliphatische Kohlenwasserstoffe Hydrocarbons, aliphatic Алифатические углеводороды	●	●	●	●	●	●	●	●
Aromatische Kohlenwasserstoffe Hydrocarbons, aromatic Ароматические углеводороды	●	●	●	●	●	●	●	●
Halogenierte Kohlenwasserstoffe Hydrocarbons, halogenated Галогенопроизводные углеводородов	●	●	●	●	●	●	●	●
Ketone Ketones Кетоны	●	●	●	●	●	●	●	●
Starke Oxydationsmittel (Säuren) Oxidants (oxidizing acids), strong Сильные окислители	●	●	●	●	●	●	●	●
Verdünnte schwache Säuren Acids, diluted, weak Разбавленные слабые кислоты	●	●	●	●	●	●	●	●
Starke konzentrierte Säuren Acids, conc., strong Концентрированные сильные кислоты	●	●	●	●	●	●	●	●

- Hohe Beständigkeit.
High resistance.
Высокая стойкость.
- Gute Beständigkeit; keine oder minimale bei Exposition von über 30 Tagen wird das Material angegriffen.
Good resistance; no, or only minor, damage resulting from exposures of more than 30 days.
Хорошая стойкость; отсутствие повреждений или незначительные повреждения контакте в течение более 30 дней.
- Geringe Beständigkeit; eine längere Exposition kann zu Beschädigungen einiger Kunststoffarten führen.
Marginal resistance; for some types of plastics, extended exposure can result in damage (hairline cracks, loss of mechanical strength, discolouration, etc.).
Незначительная стойкость; длительный контакт может привести к повреждению некоторых типов пластика.
- Keine Beständigkeit; der Kontakt kann zu Verformungen und starken Beschädigungen des Materials führen.
Non resistant; exposure can lead to deformation or destruction.
Низкая стойкость, контакт может привести к деформации или разрушению.

“SAUBERER” UND
ÖKOLOGISCHER KUNSTSTOFF

Die technologische Innovation und die allmähliche Anpassung an die höchsten Standards der Umweltverträglichkeit, hat die Kunststoffmaterialien, die von Kartell Labware verwendet werden, besonders innovativ gemacht. In der Tat erfüllen die verwendeten Kunststoffe die wichtigsten RicHTLinien, nachstehend nennen wir einige, jeweils im Hinblick auf die betroffene Eigenschaft.

- Eignung für den Kontakt mit Lebensmitteln (italienische und europäische RicHTLinie CE 1935/2004)
- Geeignet für den Kontakt mit Lebensmitteln (US FDA CFR 170/199)
- PTFE: Geeignet für den Kontakt mit Lebensmitteln (FDA CFR TITLE 177.1550)
- Eignung nach der RoHS-RicHTLinie
- Eignung nach den RicHTLinien zu BSE bzw. TSE
- Eignung nach den Atex-RicHTLinien. Kartell Labware fördert die Forschung im Bereich der Kunststoffmaterialien durch direkten Kontakt mit den wichtigsten, weltweiten Herstellern und durch die Forschung im Bereich der innovativen Materialien.

Wir erinnern daran, dass der Kunststoff von Kartell Labware, falls dieser nicht chemisch verunreinigt ist, vollständig recycelbar ist.

“CLEAN” AND ECOLOGICAL
PLASTICS

Thanks to technological innovation and progressive adaptation to the most elevated eco-compatibility standards, Kartell plastic raw material are of excellent quality. In fact the used plastic materials grant wide compatibilities; hereunder you can find some standards conformities related to their characteristics.

- Foodstuff contact suitable (National and European Directive CE 1935/2004)
- Foodstuff contact suitable (US FDA CFR 170/199)
- PTFE: foodstuff contact suitable (FDA CFR TITLE 177.1550)
- Absence or limitation according the International Directives of: heavy metals, biphenyls and phthalates
- RoHS Directives Conformity
- BSE and/or TSE Directives Conformity
- Atex Directives Conformity

Kartell Labware promotes the research in the field of the plastic materials, through the direct contact with the most important worldwide raw materials manufacturers and the research of innovative materials. We would like to underline that Kartell Labware materials, if not chemically contaminated, are totally recyclable

«ЧИСТЫЕ» И ЭКОЛОГИЧНЫЕ
ПЛАСТИКОВЫЕ МАТЕРИАЛЫ

Новаторские технологии и постоянное приведение в соответствие самым строгим стандартам защиты окружающей среды обуславливают передовое место, которое занимают первичные пластиковые материалы, используемые Kartell Labware. Используемые пластиковые материалы пригодны для самого широкого использования, и, благодаря, своим характеристикам, соответствуют различным стандартам:

- Пригодны для использования с продуктами питания (национальная и европейская директива CE 1935/2004)
- Пригодны для использования с продуктами питания (US FDA CFR 170/199)
- PTFE: пригоден для контакта с продуктами питания (сертификат FDA название 177.1550)
- Отсутствие или ограничение согласно международным нормам тяжелых металлов, бифенилов и фталатов
- Соответствие директиве ЕС, ограничивающей содержание вредных веществ (RoHS)
- Соответствие директивам относительно BSE и/или TSE
- Соответствие директиве Atex

Kartell Labware активно стимулирует развитие технологий в области пластиковых материалов посредством сотрудничества с крупнейшими производителями со всего мира, а также исследуя инновационные методы. Напомним, что пластиковые материалы Kartell Labware не содержат химических загрязнений и полностью утилизируемы.

CHEMISCHE BESTÄNDIGKEIT

Die Daten zur chemischen Beständigkeit der Salze gelten auch für ihre wässrigen Lösungen.

CHEMICAL RESISTANCE

Data for the chemical resistance of salts also apply to their aqueous solutions.

ХИМИЧЕСКАЯ СТОЙКОСТЬ

Данные, относящиеся к химической стойкости солей и их водных растворов.

	PS		SAN		PMMA		PC		PVC		POM		PE-LD		PE-HD		
	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	
Acetaldehyde	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Acetic acid 50%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Acetic acid (glacial) 100%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Acetic anhydride	●	●					●	●	●	●	●	●	●	●	●	●	
Acetone	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Acetonitrile	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Acetophenone	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Acetylacetone	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Acetylchloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Acrylic acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Acrylonitrile	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Adipic acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Allyl alcohol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Aluminium chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Aluminium hydroxide	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Amino acids	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Ammonium chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Ammonium fluoride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Ammonium hydroxide 30%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Ammonium sulphate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
n-Amyl acetate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
n-Amyl alcohol (Pentanol)	●	●	●	●			●	●	●	●	●	●	●	●	●	●	
Amyl chloride	●	●	●	●			●	●	●	●	●	●	●	●	●	●	
Aniline	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Aqua regia	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Barium chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Benzaldehyde	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Benzene (Benzol)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Benzine (Gasoline)	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
Benzoyl chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Benzyl alcohol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Benzyl chloride	●	●															
Benzylamine	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	
Boric. acid, 10%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Bromide	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Bromobenzene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Bromoform	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Bromonaphthalene	●	●	●	●													
Butanediol	●	●	●	●							●	●	●	●	●	●	
1-Butanol (Butyl alcohol)	●		●		●	●	●	●	●	●	●	●	●	●	●	●	
n-Butyl acetate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Butylamine	●	●	●	●							●	●					
Butyl methyl ether	●	●	●	●			●	●	●	●	●	●	●	●	●	●	
Butyric acid	●	●	●	●			●	●	●	●			●	●	●	●	
Calcium carbonate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Calcium chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Calcium hydroxid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Calcium hypochlorite	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Carbon disulphide	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Carbon tetrachloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Chloro naphthalene											●	●					
Chloroacetaldehyd	●	●	●	●	●	●											
Chloroacetic acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Chloroacetone	●	●	●	●													
Chlorobenzene	●	●	●	●	●	●	●	●	●	●			●	●	●	●	
Chlorobutano	●	●	●	●	●	●	●										
Chloroform	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Chlorosulfonic acid											●	●					
Chromic acid 10%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Chromic acid 50%	●	●	●	●			●	●	●	●	●	●	●	●	●	●	
Chromosulphuric acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Copper sulfate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Cresol	●	●					●	●	●	●	●		●	●	●	●	
Cumene (Isopropyl benzene)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Cyclohexane	●						●	●	●	●	●	●			●	●	
Cyclohexanone	●	●					●	●	●	●	●		●	●	●	●	
Cyclopentane	●	●					●	●	●	●			●	●	●	●	
Decane							●			●		●			●	●	
Decanol	●		●				●			●		●			●	●	
Dibenzyl ether	●	●	●	●	●	●					●				●		

- **Chemische Beständigkeit:** Ausgezeichnet
Chemical resistance: excellent.
Химическая стойкость:
отличная.

- Chemische Beständigkeit: Gut bis beschränkt
Chemical resistance: between good and limited.
Химическая стойкость: от хорошей до ограниченной.

- Chemische Beständigkeit: Unzureichend
Chemical resistance: poor.
Химическая стойкость: недостаточная.

[illegible]

CHEMISCHE BESTÄNDIGKEIT

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CHEMICAL RESISTANCE

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	PS		SAN		PMMA		PC		PVC		POM		PE-LD		PE-HD		
	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	
Dibromoethane																	
Dibutyl phthalate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dichlorobenzene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dichloromethane (Methylene chloride)	●	●					●	●	●	●			●	●	●	●	●
Dichloroacetic acid	●	●					●	●	●	●			●	●	●	●	●
Dichloroethane									●	●			●	●	●	●	●
Diesel oil	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Diethanolamine	●	●	●	●	●	●	●	●			●	●				●	●
Diethyl ether	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●
Diethylamine	●	●					●	●	●	●			●	●	●	●	●
Diethylbenzene	●	●					●	●	●	●			●	●	●	●	●
Diethylene glycol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dimethylaniline	●	●	●	●	●	●	●	●									
Dimethylformamide (DMF)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dimethyl sulfoxide (DMSO)	●	●	●	●	●	●	●	●	●	●			●	●	●	●	●
1,4 Dioxane	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Diphenyl ether	●	●	●	●	●	●					●	●					
Ethanol (Ethyl alcohol)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ethanolamine																	
Ethyl acetate	●	●					●	●	●	●			●	●	●	●	●
Ethyl methyl ketone	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ethylbenzene	●	●	●	●	●	●	●	●	●	●			●	●	●	●	●
Ethylene chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ethylene glycol (Glycol)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ethylene oxide	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Fluoroacetic acid	●	●	●	●	●	●	●	●	●	●	●	●					
Formaldehyde 40%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Formamide											●	●	●	●	●	●	●
Formic acid 98-100%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Glycerol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Glycolic acid 70%													●	●	●	●	●
Heating oil	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Heptane	●	●			●	●	●	●	●	●			●	●	●	●	●
Hexane	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hexanoic acid					●												
Hexanol					●										●	●	●
Hydriodic acid													●	●	●	●	●
Hydrobromic acid	●	●					●	●			●	●	●	●	●	●	●
Hydrochloric acid 10%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hydrochloric acid 20%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hydrochloric acid 37%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hydrofluoric acid 40%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hydrofluoric acid 70%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hydrogen peroxide 35%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Iodine / potassium iodine solution	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Iso octane	●	●	●	●			●										
Isoamyl alcohol											●	●	●	●	●	●	●
Isobutanol (Isobutyl alcohol)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Isopropanol (2-Propanol)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Isopropyl ether	●	●					●	●	●	●			●	●	●	●	●
Lactic acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mercury	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mercury chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Methanol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Methoxybenzene	●	●	●	●	●	●	●	●			●	●					
Methyl butyl ether	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Methyl formate	●	●	●	●	●	●	●	●			●	●					
Methyl propyl ketone	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Methylene chloride (Dichloro methane)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Minerale oil (Engine oil)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Monochloroacetic acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nitric acid 10%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nitric acid 30%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nitric acid 70%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nitrobenzene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Oleic acid	●	●	●	●	●	●											
Oxalic acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ozone	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
n-Pentane																	
Peracetic acid							●	●			●	●					

- Chemische Beständigkeit: Unzureichend
Chemical resistance: poor.
 Химическая стойкость: недостаточная.

[illegible]

CHEMISCHE BESTÄNDIGKEIT

Die Daten zur chemischen Beständigkeit der Salze gelten auch für ihre wässrigen Lösungen.

CHEMICAL RESISTANCE

Data for the chemical resistance of salts also apply to their aqueous solutions.

ХИМИЧЕСКАЯ СТОЙКОСТЬ

Данные, относящиеся к химической стойкости солей и их водных растворов.

	PS		SAN		PMMA		PC		PVC		POM		PE-LD		PE-HD		
	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	20° C	50° C	
Perchloric acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Perchloroethylene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Petroleum	●	●			●		●	●	●	●	●	●	●	●	●	●	●
Petroleum ether	●	●			●				●	●	●	●			●	●	
Phenol	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●
Phenylethanol																●	
Phenylhydrazine																●	
Phosphoric acid 85%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Piperidine																●	
Potassium chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Potassium dichromate																	
Potassium hydroxide	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Potassium permanganate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Propanediol (Propylene glycol)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Propanol	●		●	●	●		●	●	●	●	●	●	●	●	●	●	●
Propionic acid	●	●					●	●	●	●	●	●	●	●	●	●	●
Pyridine	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Salicyl acid	●	●		●					●	●	●	●	●	●	●	●	●
Salicylaldehyde	●	●	●	●				●	●	●	●	●	●	●	●	●	●
Silver acetate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Silver nitrate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sodium acetate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sodium chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sodium dichromate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sodium fluoride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sodium hydroxide	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sulphuric acid 60%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sulphuric acid 98%	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tartaric acid	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tetrachloroethylene																	
Tetrahydrofuran	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tetramethylammonium hydroxide							●	●			●	●					
Toulene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Trichloroacetic acid	●	●					●	●	●	●	●			●	●	●	●
Trichlorobenzene	●	●					●	●	●	●	●			●	●	●	●
Trichloroethane	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Trichloroethylene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Trichlorotrifluoro ethane	●	●	●	●													
Triethanolamine	●	●	●	●													
Triethylene glycol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Trifluoro ethane	●	●	●	●													
Trifluoroacetic acid (TFA)	●	●	●	●							●	●					
Tripropylene glycol	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Turpentine	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Urea	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Xylene	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Zinc chloride	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Zinc sulphate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- **Chemische Beständigkeit:** Ausgezeichnet
Chemical resistance: excellent.
Химическая стойкость: отличная.

- Chemische Beständigkeit: Gut bis beschränkt
Chemical resistance: between good and limited.
Химическая стойкость: от хорошей до ограниченной.

- Chemische Beständigkeit: Unzureichend
Chemical resistance: poor.
Химическая стойкость: недостаточная.

[illegible]

**STERILISATION VON
KUNSTSTOFFMATERIALIEN IM
LABOR**

Vor der Sterilisation jedes Artikels ist zu prüfen, dass dieser keine Reste oder Spuren von verunreinigenden Substanzen enthält, da ihr Vorliegen den Kunststoff während der Sterilisation oder Autoklavierung beschädigen könnte.

Es wird empfohlen Verschlüsse, Zubehör oder Deckel jeder Art von den Kunststoffartikeln zu entfernen, bevor diese autoklaviert werden, die Behälter müssen separat von ihren Verschlüssen oder Deckeln autoklaviert werden, sonst läuft man Gefahr von Verformungen oder einer Beschädigung des Behälters.

Alle technischen Hinweise dienen nur zur Orientierung und führen zu keiner Haftbarkeit seitens Kartell. Alle Hinweise zur Beständigkeit von Kunststoffmaterialien gegen hohe Temperaturen, die Sterilisation und Reinigung wurden auf der Grundlage der Angaben der Hersteller des Kunststoffes, der in der wissenschaftlichen Literatur enthaltenen Informationen und der Erfahrung beim Umgang mit diesen Produkten formuliert.

**STERILISING PLASTIC
LABORATORY WARE**

Before sterilising any items of plastic laboratory ware, verify that no contamination or residues are present. Their presence could destroy plastics during sterilisation or autoclaving.

Observe the tolerated temperature ranges of plastic when autoclaving plastic laboratory ware. Remove any stoppers, fittings, or caps from plastic laboratory ware prior to autoclaving. Plastic vessels should be autoclaved separately from their closures and other fitting. Autoclaving vessels with their closures in place can lead to deformation and destruction of the vessels. All statements are advisory only, and imply no liability on the part of Kartell.

All statements relating to the resistances of plastic laboratory ware to high temperatures, chemicals, and to sterilisation and cleaning procedures have been cautiously formulated, based on statements of raw material manufactures, on statements appearing in the literature, plus experience gained in actual practice.

**СТЕРИЛИЗАЦИЯ
ЛАБОРАТОРНЫХ ИЗДЕЛИЙ ИЗ
ПЛАСТИКА**

Перед стерилизацией любых пластиковых изделий убедитесь в отсутствии загрязнений или остатков веществ. Они способны повредить пластик во время стерилизации или автоклавирования.

Перед автоклавированием вытаскивайте все пробки, соединительные детали и снимите крышки. Пластиковые емкости нужно автоклавировать отдельно от крышек и других деталей. Емкости, закрытые крышками, могут разрушиться или деформироваться во время автоклавирования.

Все описанное – просто рекомендации, а не обязательные к выполнению требования со стороны компании Kartell. Вся информация, касающаяся стойкости пластиковых лабораторных изделий к высоким температурам и химическим веществам, а также способов их стерилизации и очистки, собиралась очень внимательно на основе данных производителей сырья или опубликованных данных, полученных из практики.

Rohmaterial Plastics Исходный материал	Autoklavierbarkeit Autoclavable* Автоклавирование	Sterilisation / Sterilization / Стерилизация				
		Gassterilisation Ethylenoxidation Gas (Ethylene Oxide) Стерилизация газом (Окс. Этилена)	Trockensterilisation bei +160 °C Dry at 160° C Жар сухой при +160°C	Chemische Sterilisation (in Formaldehyd) Chemical (in Formalin) Хим. Стер. (формалином)	Gammastrahlen By Gamma Гамма -излучение	Mikrowellen Microwaves Микроволны
ABS	No	Yes	No	Yes	Yes	No
HDPE	No	Yes	No	Yes	Yes	Yes
LDPE	No	Yes	No	Yes	Yes	Yes
PC	Yes	Yes	No	Yes	Yes	Yes
PFA/FEP	Yes	Yes	Yes	Yes	No	Yes
PMP (TPX)	Yes	Yes	No	Yes	No	Yes
PP	Yes	Yes	No	Yes	Yes	Yes
PS	No	Yes	No	Yes	Yes	No
PTFE	Yes	Yes	Yes	Yes	No	Yes
ETFE/E-CTFE	Yes	Yes	Yes	Yes	No	Yes
PVC	No	Yes	No	Yes	No	Yes
POM	Yes	Yes	Yes	Yes	No	No

*Autoclavable at 121° C for 20 minutes

**REINIGUNG VON
KUNSTSTOFFARTIKELN IM LABOR**

Alle Polyolefine, wie LDPE, HDPE, PP und PMP (TPX®), sowie Fluorkunststoffe wie PTFE, PFA, FEP, ETFE und E-CTFE haben eine benetzbare Oberfläche, die sehr beständig gegen hohe Temperaturen und Chemikalien und daher leicht zu reinigen ist. Bei leichter Verschmutzung kann ein Neutralreiniger (pH 7) eingesetzt werden.

Bei starker Verschmutzung kann ein alkalischer Reiniger (bis pH 12) verwendet werden. Laborartikel, die für die Spurenanalytik verwendet werden, müssen mit einer Chlorwasserstoffsäure (HCl – 1N) über maximal 6 Stunden stehen gelassen und anschließend mit destilliertem Wasser gespült werden, um Kontaminationen von Kat- und Anionen zu vermeiden.

Scheuermittel bzw. Scheuerschwämme sollten für Laborartikel aus Kunststoff nicht verwendet werden. Artikel aus Polycarbonat (PC) sollten nicht mit alkalischen Reinigungsmitteln gespült werden.

**CLEANING PLASTIC LABORATORY
WARE**

All polyolefins, such as LDPE, HDPE, PP and PMP (TPX®), as well as the fluorinated hydrocarbons PTFE, PFA, FEP, ETFE and E-CTFE, have wettable surfaces that are both highly resistant to high temperatures and chemical attack and easy to clean. Slight contamination can be removed using a chemically neutral (pH 7) cleaning agent. Heavy contamination can be removed using an alkaline (pH up to 12) cleaning agent.

Use only chemically neutral (pH7) cleaning agents on polycarbonate (PC) or Polystyrene (PS).

Laboratory ware used in trace analyses should be cleaned in a 1-N hydrochloric acid (HCl) solution for periods of not more than 6 hours and then rinsed in distilled water in order to preclude contamination by cations or anions.

Never use scouring powders or abrasive sponges when cleaning plastic laboratory ware. Use no alkaline cleaning agents on polycarbonate (PC) laboratory ware.

**ОЧИСТКА ПЛАСТИКОВОЙ
ЛАБОРАТОРНОЙ ПОСУДЫ**

Все изделия из полиолефинов, таких, как полиэтилен высокой и низкой плотности, полипропилен и ПМП, а также фторсодержащих углеводородов (ПТФЭ, ПФА, ФЭП, ЭТФЭ и Э-ХТФЭ) имеют смачиваемые поверхности, стойкие как к высоким температурам, так и химическим веществам, и легко поддаются очистке. Небольшие загрязнения можно удалить нейтральными (pH=7) моющими средствами. При сильном загрязнении можно использовать щелочные (pH до 12) моющие средства.

Для поликарбоната (PC) или полистирола (PS) следует использовать только химически нейтральные (pH7) моющие средства.

Лабораторные изделия, использующиеся для анализа на микропримеси, нужно замачивать в 1N соляной кислоте (HCl) не более 6 часов, и затем смывать дистиллированной водой, чтобы исключить загрязнение катионами или анионами.

Никогда не пользуйтесь очищающими порошками или абразивными губками для очистки пластиковых изделий. Не мойте изделия из поликарбоната щелочными средствами.

CARATTERISTICHE GENERALI DELLE MATERIE PLASTICHE

POLIETILENE (PE)

Ha ottime proprietà isolanti, è leggero e chimicamente inerte. Nessuna sostanza è in grado di sciogliere il PE a temperatura ambiente. Resistente ai solventi. Il PE a bassa densità (LDPE) risulta meno compatto; il PE ad alta densità (HDPE) risulta più rigido e meno permeabile. Il PE non è autoclavabile.

POLIPROPILENE (PP)

È un materiale leggero, traslucido, resistente alla sterilizzazione in autoclave. Ha ottime caratteristiche di resistenza chimica e a temperatura ambiente non viene sciolto da alcun solvente.

POLIMETILPENTENE (PMP O TPX)

Si caratterizza per la sua eccellente trasparenza, rigidità, resistenza chimica alle alte temperature. Il PMP resiste a ripetuti autoclavaggi, anche alla temperatura di 150° C e può resistere ad esposizioni intermittenti a temperature fino a 175° C.

POLISTIROLO (PS)

È perfettamente trasparente e lucido. Ottima stabilità dimensionale e buona resistenza alle soluzioni acquose ma resistenza molto limitata ai solventi organici. Il PS non è autoclavabile.

CLORURO DI POLIVINILE (PVC)

Il PVC ha una notevole resistenza agli olii, tranne a quelli essenziali, ed una bassissima permeabilità alla maggior parte dei gas. Il PVC è trasparente con un leggero riflesso blaugastro. Mediante aggiunta di ftalati come plastificanti, il PVC diventa morbido e flessibile e quindi molto adatto per tubi di ogni dimensione. Il PVC non è autoclavabile.

POLIOSSIMETILENE (POM)

È dotato di elevata stabilità dimensionale e resiste anche alle alte temperature assicurando un'ottima resistenza alla maggior parte dei solventi organici.

POLITETRAFLUOROETILENE (PTFE)

Il PTFE mostra un'inerzia chimica praticamente totale ai reattivi ed ai solventi. Elevatissima stabilità termica (ininfiammabili). Eccezionali caratteristiche auto-lubrificanti e anti-urto, tenacità e flessibilità anche alle basse temperature. Permette lavorazioni continuative anche a 250° C.

TETRAFLUOROETILENE - PERFLUOROPROPILENE (FEP)

È una resina traslucida, flessibile e pesante per il suo elevato peso specifico. Resiste a tutti i prodotti chimici conosciuti tranne i metalli alcalini fusi ed il fluoro nascente alle alte temperature. Resiste ad un intervallo di temperature da -200° a +205° C e può essere sterilizzato ripetutamente con tutti i mezzi, chimici o termici, conosciuti.

PERFLUOROALCOSSIDO (PFA)

È una resina traslucida e leggermente flessibile. Resiste ad un intervallo di temperature da -270° a +260° C, con un'elevata resistenza chimica nell'intero intervallo.

NYLON (PA6)

Il Nylon è rigido e robusto, resiste all'abrasione, all'urto e all'usura; ha una resistenza chimica eccellente.

POLICARBONATO (PC)

Il PC ha la trasparenza del vetro, è rigido, infrangibile, atossico, sterilizzabile in autoclave e di notevole resistenza meccanica. È praticamente infrangibile e resiste a temperature da -50° a +130° C; ha una elevata resistenza all'esposizione al sole e agli UV.

POLIMETILMETACRILATO (PMMA)

È un materiale rigido, trasparente, resistente agli agenti atmosferici; sostituisce di fatto il vetro in tutte le sue applicazioni. Il PMMA non è autoclavabile.

GENERAL PROPERTIES OF PLASTICS

POLYETHYLENE (PE)

PE has excellent insulating properties and is lightweight and chemically inert. PE cannot be dissolved by any substances at ambient temperature. It is resistant to solvents. Low density PE (LDPE) is less compact; high density PE (HDPE) is more rigid and less permeable. PE cannot be sterilised in an autoclave.

POLYPROPYLENE (PP)

PP is lightweight, translucent and resistant to sterilisation in an autoclave. It boasts excellent chemical resistance and is not dissolved by any substance at ambient temperature.

POLYMETHYLPENTENE (PMP OR TPX)

PMP boasts excellent transparency, rigidity, and chemical resistance even at high temperature. It withstands repeated autoclave sterilisations, even at 150° C and can withstand intermittent exposure to temperatures up to 175° C.

POLYSTYRENE (PS)

PS is perfectly transparent and glossy. It boasts excellent dimensional stability and good resistance to water-based solutions but only very limited resistance to organic solvents. PS cannot be sterilised in an autoclave.

POLYVINYL CHLORIDE (PVC)

PVC boasts good resistance to oils other than essential oils, and very low permeability to most gases. It is transparent with a slightly bluish tint. With the addition of phthalate plasticisers, PVC becomes softer and flexible and well suited to the production of tubes of all sizes. PVC cannot be sterilised in an autoclave.

POLYOXYMETHYLENE (POM)

POM boasts excellent dimensional stability, is resistant even to high temperatures, and is highly resistant to most organic solvents.

POLYTETRAFLUOROETHYLENE (PTFE)

PTFE is almost totally inert to reactants and solvents. It boasts excellent thermal stability (non-flammable). It has excellent self-lubricating and impact-resistant properties, tenacity and flexibility even at low temperatures. It can be worked continuously even at 250° C.

TETRAFLUOROETHYLENE - PERFLUOROPROPYLENE (FEP)

FEP is a translucent resin that is flexible but heavy due to its high specific weight. It resists all known chemical products except molten alkali metals and fluorine produced at high temperatures. It resists a temperature interval from -200° to +205° C and can be sterilised repeatedly using any known chemical or thermal method.

PERFLUOROALCOXY (PFA)

PFA is a translucent, slightly flexible resin. It resists a temperature interval from -270° to +260° C and boasts excellent chemical resistance throughout this interval.

NYLON (PA6)

Nylon is rigid, robust and resistant to abrasion, impact and wear. It also boasts excellent chemical resistance.

Polycarbonate (PC)

PC has the same transparency as glass and is rigid, unbreakable, non-toxic, sterilisable in an autoclave and has good mechanical resistance. It is practically unbreakable and resists temperatures from -50° to +130° C. It is also highly resistant to sunlight and UV.

POLYMETHYLMETHACRYLATE (PMMA)

PMMA is rigid, transparent and resistant to atmospheric agents. It effectively replaces glass in its various applications. PMMA cannot be sterilised in an autoclave.