PA6/PA66增强尼龙耐化学性能表

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Influencing factors

Within the family of engineering plastics, polyamides are characterised by very good resistance to chemicals. Apart from concentrated acids, only very few chemicals attack polyamides. The chemical resistance of a plastic material is dependent on its molecular structure, the nature of the surrounding media (e.g. acidic or alkaline solutions, polar or non-polar solvents), the concentration of the reagents, the kind and duration of contact as well as the ambient temperature.

Kinds of chemical

Certain chemicals can induce physical or chemical damage to plastics. To what degree this takes place, depends amongst others on the chemical nature. Physical processes such as swelling are generally reversible whereas chemical attack can lead to irreversible changes in the material. Oxidation, for example, can cause the material to decompose.

Concentration of contact media

The higher the concentration of the active substances, the faster early fatigue of the polymeric material may occur.

Temperature

The application temperature has a direct influence on the resistance to chemicals. The higher the surrounding temperature, the greater and more rapid the effects of chemical attack are.

Types of exposure and duration

Along with the type of exposure (on one side, both sides, permanent or short-term contact) the chemical resistance of the plastic is influenced by the duration of the exposure. The longer the contact time, the stronger the effect of the chemicals on the material is.

The resistance tests were carried out on ISO standard test bars which were stored in the chemicals at room temperature for up to 12 months. This means that evaluation of material resistance is based on static storage of test specimens in a stress-free state. For deviating conditions in practical use, consultation is recommended. Characteristic properties such as change in weight, length, tensile stress and elongation at break of the test bars after aging in the diverse media served as test criteria.

As resistance to chemicals is primarily dependent on the basis polymer, the information applying to unreinforced grades is also valid for reinforced material groups.

Key for qualitative evaluation of the material resistance:

●●● Resistant 耐受良好
No or little reversible change in weight and/or dimensions possible

●● Limited resistance 有限耐受
Changes in weight, dimension or even irreversible changes to property values possible after longer exposure; consultation recommended

● Not resistant 不耐受
May be used under specific conditions, e.g. short-term contact

○ Strong attack or soluble 严重反应或溶解

The concentration values given in the table refer to the maxi-

Further information on stress corrosion cracking can be found in the corresponding product brochures. The brochure "Grilamid TR" in particular, gives details of the compatibility of different transparent material variants and their tendency to form stress cracking when in contact with specific solvents.

Hydrolysis resistance

All polyamides take up water when kept in a moist environment. At room temperature this is a physical process which is reversible. Irreversible chemical damage to the material can only be caused by water or aqueous solutions at high temperatures. This is referred to as hydrolysis.

Water uptake is mainly dependent on the amide group concentration of the individual polyamide type. For this reason, polyamide 12 is considerably more resistant to hydrolysis than polyamide 6 and polyamide 66. The Grivory grades also take up significantly less water and that more slowly than materials made of Grilon.

Medium 介质	**Concentration** 浓度	**Resistance** 耐受性能
Acetaldehyde 乙醛	40% aqueous solution 40%水溶液	●●
AcetamideÒÒõ£°·	50% aqueous solution 50%水溶液	●●
Acetic acid 乙酸，醋酸	10% aqueous solution 10%水溶液	●
Acetic acid	40% aqueous solution 40%水溶液	○
Acetic acid	technical grade 分析级	○
Acetic anhydride 乙酸酐，无水醋酸	technical grade	○
Acetone 丙酮	technical grade	●●●
Acetonitrile 乙腈，氰化甲烷	technical grade	●●●
Acetophenone 乙酰苯，苯乙酮	technical grade	●●●
Acetylene 乙炔，电石气	technical grade	●●●
Acetylsalicylic acid (Aspirin®) 乙酰水杨酸，阿司匹林	aqueous solution 水溶液	●●●
AdBlue®	commercial grade 商业级	●●
Aliphatic hydro-carbons	technical grade 分析级	●●●
Allyl alcoholÏ©±û´¼	technical grade	●●
Aluminium salts 铝盐	saturated, aqueous solution 饱和溶液	●●●
Amidosulfonic acid (descaler)	15% aqueous solution 15%水溶液	●
Ammoniac	10% aqueous solution 10%水溶液	●●●
Ammoniac 氨气	gas 气体	●●●
Amyl alcohol Amylacetate 戊醇戊乙酸酯.	technical grade 分析级	●●●
Aniline 苯胺	technical grade	●●●
Anisole±½¼×ÃÑ	technical grade	●●
Anti-freeze	technical grade	●●●
	technical grade	●●
Barium salts	saturated, aqueous solution 饱和溶液	●●●
Battery acid 钡盐	commercial grade	○
Beer 啤酒	commercial grade	●●●
Benzaldehyde 苯甲醛	technical grade	●
Benzoic acid 苯甲酸	aqueous solution	●
Benzole / Benzene 苯	technical grade	●●●
Benzyl alcohol±½¼×´¼£¬ÜÐ´¼	technical grade	●
Éúîï 柴油	commercial grade 商业级	●●●

Medium 介质	**Concentration** 浓度	**Resistance** 耐受性能
Bitumen 沥青，柏油	commercial grade	●●●
Bleaching lye 漂白碱液	13% aqueous solution 13%水溶液	●
Boric acidÅðËá	10% aqueous solution 10%水溶液	●●
Brake fluid (DOT)É²³µÓÍ	commercial grade 商业级	●●●
Brandy°×À¼µØ¾Æ	commercial grade (~ 40%)	●●●
Bromine, bromine waterää	commercial grade	○
Butane¶¡Íé	technical grade 分析级	●●●
Butanoic acid¶¡Ëá	technical grade	●●
Butter»ÆÓÍ	commercial grade 商业级	●●●
Buttermilk	commercial grade	●●●
Butyl acetate 乙酸丁酯	technical grade	●●●
Butyl alcohol 丁醇	technical grade	●●
Butylene glycol 丁二醇	technical grade	●●●
Calcium chloride 氯化钙	10% aqueous solution 10%水溶液	●●●
Calcium chloride	saturated, aqueous solution 饱和溶液	●●
Calcium chloride	20% alcoholic solution 20%酒精溶液	●
Camphor 樟脑油	technical grade	●●●
Carbon tetrachloride 四氯化碳	technical grade	●●●
Catechol 儿茶酚	6% aqueous solution 6%水溶液	○
Caustic potash 苛性钾	50% aqueous solution 50%水溶液	●●●
Chloracetic acid 氯（代）乙酸	10% aqueous solution 10%水溶液	○
Chloramines 氯胺	5% aqueous solution 5%水溶液	●
Chlorated lime 加氯石灰	aqueous solution	●
Chlorine 氯气	gas 气体	○
Chlorine water 氯气溶液	5% aqueous solution 5%水溶液	●
Chlorobenzene 氯苯	technical grade 分析级	●●●
Chloroform 氯仿	technical grade	●
Chromates 铬酸盐	saturated, aqueous solution 饱和溶液	●●●
Chromic acid¸õËá	1% aqueous solution 1%水溶液	●
Chromosulfuric acid	aqueous solution	○

Medium 介质	**Concentration** 浓度	**Resistance** 耐受性能
Citrus acid 柑橘酸	concentrated 浓缩的	●●
Cocoa可可	commercial grade 商业级	●●●
Coffee咖啡	commercial grade	●●●
Cola可乐	commercial grade	●●●
Cooking oil and fat食用油	commercial grade	●●●
Cooking salt食盐	aqueous solution	●●●
Copper salts 铜盐	10% aqueous solution 10%水溶液	●●●
Cresol煤馏油酚	technical grade 分析级	○
Crude oil 原油	technical grade	●●●
Cyclohexane 环己烷	technical grade	●●●
Diesel 柴油	commercial grade 商业级	●●●
Diethyl ether 乙醚	technical grade	●●●
Dimethyl formamide 二甲替甲酰胺	technical grade	●●
Dimethyl sulfoxide 二甲亚砜	technical grade	●●
Dimethyl sulphide 甲硫醚	technical grade	●●●
Dioctyl phthalate 酞酸二辛酯	technical grade	●●●
Dioxane 二氧杂环乙烷	technical grade	●●●
Engine oil 机油	commercial grade	●●●
Ethanol 乙醇	technical grade	●●
Ethyl acetate 乙酸乙酯	technical grade	●●●
Ethylbenzene 乙苯	technical grade	●●●
Ethylene chloride 氯乙烯	technical grade	●●●
Fuel C (Fuel A, B and D)	technical grade	●●●
Furfurol 糠醛	technical grade	●●
Glycerine 甘油，丙三醇	technical grade	●●●
Glycol-water	50/50 mixture 50:50混合	●●
Halogenated hydrocarbons 卤代烃	technical grade	●●
Heating oil	commercial grade	●●●
Heptane 庚烷	technical grade	●●●
Hexane 乙烷	technical grade	●●●
Hydraulic oil 液压油	commercial grade	●●●
Hydrochloric acid 盐酸	1% aqueous solution 1%水溶液	●

Medium 介质	**Concentration** 浓度	**Resistance** 耐受性能
Hydrochloric acid 盐酸	10% aqueous solution 1%水溶液	○
Hydrochloric acid 盐酸	37% aqueous solution 37%水溶液	○
Hydrofluric acid 盐酸	40% aqueous solution 40%水溶液	○
Hydrogen peroxide 过氧化氢	2% aqueous solution 2%水溶液	●
Hydrogen peroxide 过氧化氢	10% aqueous solution 10%水溶液	●
Hydrogen peroxide 过氧化氢	30% aqueous solution 30%水溶液	○
Hydrogen sulphide 硫化氢	gas (< 5%) 气体	●●●
Ink	commercial grade	●●●
Iodine tincture, alcoholic碘酒	commercial grade	○
Iron salts 铁盐	20% aqueous solution, neutral 20%中性溶液	●●●
Iron salts	20% aqueous solution, acidic 20%酸性溶液	●
Isooctane 异辛烷	technical grade	●●●
Isopropanol异丙醇	technical grade 分析级	●●
Kerosene 煤油	commercial grade	●●●
Lactic acid 乳酸	5% aqueous solution	●●●
Lactic acid	90% aqueous solution	●●
Lanolin 羊毛脂	commercial grade 商业级	●●●
Lavender oil 熏衣草油	commercial grade	●●●
Lead salts 铅盐	saturated, aqueous solution	●●●
Lemon juice柠檬汁	commercial grade (< 10%)	●●●
Linseed oil 亚麻子油	commercial grade	●●●
Liqueur	commercial grade	●●●
Lubricating oil, fat, soap 润滑油脂、肥皂	commercial grade	●●●
Magnesium hydroxide 氢氧化镁	10% aqueous solution 10%水溶液	●●●
Magnesium salts 镁盐	10% aqueous solution	●●●
Mercury 水银	technical grade	●●●
Mercury salts 汞盐	aqueous solution	●●●
Methane 甲烷	gas 气体	●●●
Methyl alcohol 甲醇	technical grade	●●

Medium 介质	**Concentration** 浓度	**Resistance** 耐受性能
Methyl ethyl ketone (MEK) 丁酮	technical grade 分析级	●●●
Methylene bromochloride 亚甲基溴氯化物	technical grade	●●
Methylene chloride 二氯甲烷	technical grade	●●
Milk 牛奶	commercial grade 商业级	●●●
Mineral oil 矿物油	commercial grade	●●●
MTBE (methyl tert-butyl ether) 甲基叔丁基醚	technical grade	●●●
Naphthalene 萘	technical grade	●●●
Natural oil	commercial grade	●●●
Nickel salts 镍盐	saturated, aqueous solution 饱和溶液	●●●
Nitric acid 硝酸	10% aqueous solution 10%水溶液	○
Nitric acid	65% aqueous solution 65%水溶液	○
Nitro hydrochloric acid 硝酸	technical grade	○
Nitro thinner 硝基稀释剂	commercial grade	●●●
Nitrobenzene 硝基苯	technical grade	●●
Nitromethane 硝基甲烷	technical grade	●●●
Octane 辛烷	technical grade	●●●
Oils (also IRM reference oils)	commercial grade	●●●
Oleic acid 油酸	technical grade	●●●
Oleum, fuming sulphuric acid 发烟硫酸	technical grade	○
Olive oil 橄榄油	commercial grade	●●●
Oxalic acid 草酸	10% aqueous solution	●●
Oxygen 氧气	gas 气体	●●●
Ozone 臭氧	gas (2 ppm)	●●●
Paraffin oil 石蜡油	technical grade	●●●
Peanut oil 花生油	commercial grade	●●●
Peppermint oil 薄荷油	technical grade	●●
Petrol, E10 汽油	commercial grade	●●●
Petrol, E85	commercial grade	●●
Petrol, lead-free	commercial grade	●●●

Medium 介质	**Concentration** 浓度	**Resistance** 耐受性能
Petroleum 石油	technical grade	●●●
Petroleum ether 石油醚	technical grade 分析级	●●●
Phenol 苯酚，石碳酸	aqueous solution	●
Phenylethyl alcohol 苯基乙醇	technical grade	●●
Phosphor acid 磷酸	50% aqueous solution 50%水溶液	●
Phosphoric acid （正）磷酸	10% aqueous solution	●
Pine-needle oil 松针油	commercial grade 商业级	●●●
Plasticizer (phthalate based)	commercial grade	●●●
Potash 钾碱	aqueous solution	●●●
Potassium chlorate 氯酸钾	7% aqueous solution	●
Potassium nitrite 亚硝酸钾	saturated, aqueous solution 饱和溶液	●●●
Potassium permanganate 高锰酸钾	1% aqueous solution 1%水溶液	○
Propane 丙烷	gas 气体	●●●
Propanol 丙醇	technical grade	●●
Pyridine 吡啶	technical grade	●●●
R-12 (Frigene 12, Freon 12)	technical grade	●●●
R-22 (Frigene 22, Freon 22)	technical grade	●
Resorcinol 间苯二酚	technical grade	○
Resorcinol	alcoholic 酒精	○
Rose oil 玫瑰油	technical grade	●●●
Rum 朗姆酒	commercial grade (60%)	●●●
Sal ammonia	saturated, aqueous solution 饱和溶液	●●●
Salicylic acid 水杨酸	technical grade 分析级	●●●
Salt 氯化钠，盐 (sodium chloride)	saturated, aqueous solution	●●●
Sea water 海水		●●●
Silicon oil 硅油	technical grade	●●●
Silver salts 银盐	saturated, aqueous solution 饱和溶液	●●●
Soap suds 肥皂泡沫	aqueous solution	●●●

Medium 介质	**Concentration** 浓度	**Resistance** 耐受性能
Soda 苏打，碳酸钠 (sodium carbonate)	50% aqueous solution 50%水溶液	●●●
Sodium bicarbonate / bisulfite 碳酸氢钠，小苏打	saturated, aqueous solution	●●●
Sodium chlorite 亚氯酸纳	5% aqueous solution	●
Sodium hydroxide (caustic soda) 氢氧化钠	40% aqueous solution 40%水溶液	●●●
Sodium hypochlorite 次氯酸钠	5% aqueous solution 5%水溶液	●
Sodium nitrite 亚硝酸钠	5% aqueous solution 5%水溶液	●
Sodium perborate 高硼酸钠	5% aqueous solution 5%水溶液	●●●
Sodium salts 钠盐	saturated, aqueous solution	●●●
Soya oil 大豆油	commercial grade	●●●
Starch 淀粉	aqueous solution	●●●
Stearin, stearic acid 硬脂酸	technical grade	●●●
Styrene 苯乙烯	technical grade	●●●
Sugar 糖	aqueous solution	●●●
Sulphur dioxide 二氧化硫	gas (< 5%)	●
Sulphuric acid 硫酸	2% aqueous solution 5%水溶液	●
Sulphuric acid	10% aqueous solution 10%水溶液	○
Sulphuric acid	50% aqueous solution 50%水溶液	○
Sulphuric acid	96% aqueous solution 96%水溶液	○
Sweat (perspiration) 汗液		●●●
Tallow	commercial grade	●●●
Tar 焦油	technical grade	●●●
Tartaric acid 酒石酸	10% aqueous solution 10%水溶液	●●●
Tea 茶	commercial grade	●●●
Tetra hydrofuran 四氢呋喃	technical grade 分析级	●●●
Tetrachlorethylene 四氯乙烯	technical grade	●●●
Tetralin 萘满	technical grade	●●●
Thionyl chloride 硫化亚硫酰	technical grade	○
Toluene 甲苯	technical grade	●●●
Transformer oil 变压器油	commercial grade 商业级	●●●
Trichloroethane 三氯乙烷	technical grade	●●
Trichloroethylene 三氯乙烯	technical grade	●●

Medium 介质	**Concentration** 浓度	**Resistance** 耐受性能
Triethanolamine 三乙醇胺	technical grade	●●●
Trifluoroacetic acid 三氟乙酸	10% aqueous solution 10%水溶液	○
Trifluoroacetic acid	99% aqueous solution 99%水溶液	○
Turpentine oil 松节油	technical grade 分析级	●●●
Urea 碳酰胺	20% aqueous solution	●●●
Uric acid 尿酸	aqueous solution	●●●
Urine 尿液		●●●
Vaseline 凡士林	commercial grade	●●●
Vinegar 醋	5% aqueous solution 5%水溶液	●
Water 水	technical grade	●●●
Wax 蜡	commercial grade	●●●
Wine 葡萄酒	commercial grade	●●●
Xylene 二甲苯	technical grade	●●●
Zinc chloride 氯化锌	10% aqueous solution 10%水溶液	●●
Zinc chloride	50% aqueous solution 50%水溶液	●●