

Introduction

Among many of the positive attributes of polyethylene, it is probably best known for its resistance to highly aggressive chemicals. In fact, many corrosive and aggressive chemicals are often packaged in polyethylene bottles. While polyethylene is highly resistant to many chemicals at room temperatures, its chemical resistance decreases with increased temperatures. This technical note provides a basic resistance rating for many chemicals at 74°F and 140°F. This table is meant to serve as a general guide and should not be used to guarantee performance since specific site and application conditions may cause specific concerns which cannot be addressed in a general table.

Material	74° F	140° F	Material	74° F	140° F
Acetaldehyde - 100%	M	U	Bismuth Carbonate - Saturated	S	S
Acetic Acid* - 1-10%	S	S	Bleach Lye 10%	S	S
Acetic Acid* - 10-60%	S	M	Black Liquor	S	S
Acetic Acid* - 80-100%	S	M	Borax Cold - Saturated	S	S
Acetic Anhydride	U	U	Boric Acid - Dilute	S	S
Acetone	M	U	Boric Acid - Concentrate	S	S
Acrylic Emulsions	S	S	Boron Trifluoride	S	S
Aluminum Chloride - Dilute	S	S	Brine	S	S
Aluminum Chloride - Concentrate	S	S	Bromic Acid - 10%	S	S
Aluminum Fluoride - Concentrate	S	S	Bromine Liquid - 100%	S	S
Aluminum Sulfate - Concentrate	S	S	Butanediol* - 10%	S	S
Alums (All Types) - Concentrate	S	S	Butanediol* - 60%	S	S
Ammonia - 100% Dry Gas	S	S	Butanediol* - 100%	S	S
Ammonium Carbonate	S	S	Butter	S	S
Ammonium Chloride - Saturated	S	S	Butyl Alcohol* - 100%	S	S
Ammonium Fluoride - 20%	S	S	Cadmium Salts	S	S
Ammonium Hydroxide - 0.888 S.Q.	S	S	Calcium Bisulfide	S	S
Ammonium Metaphosphate - Saturated	S	S	Calcium Carbonate - Saturated	S	S
Ammonium Nitrate - Saturated	S	S	Calcium Chlorate - Saturated	S	S
Ammonium Persulfate - Saturated	S	S	Calcium Chloride - Saturated	S	S
Ammonium Sulfate - Saturated	S	S	Calcium Hydroxide	S	S
Ammonium Sulfide - Saturated	S	S	Calcium Hypochlorite - Bleach Solution	S	S
Ammonium Thiocyanate - Saturated	S	S	Calcium Nitrate - 50%	S	S
Amyl Acetate	M	U	Calcium Salts	S	S
Amyl Alcohol* 100%	S	S	Calcium Sulfate	S	S
Amyl Chloride 100%	M	U	Camphor Oil	M	U
Aniline 100%	S	M	Carbon Dioxide - 100% Dry	S	S
Antimony Chloride	S	S	Carbon Dioxide - 100% Wet	S	S
Aqua Regia	U	U	Carbon Dioxide - Cold Saturated	S	S
Aromatic Hydrocarbons	U	U	Carbon Disulfate	M	U
Ascorbic Acid - 10%	S	S	Carbon Monoxide	S	S
Arsenic Acid - Concentrate	S	S	Carbon Tetrachloride	M	U
Barium Carbonate - Saturated	S	S	Carbonic Acid	S	S
Barium Chloride	S	S	Castor Oil* - Concentrate	S	S
Barium Hydroxide	S	S	Chlorine - Dry Gas 100%	S	M
Barium Salts	S	S	Chlorine - Moist Gas	M	U
Barium Sulfate - Saturated	S	S	Chlorine Liquid	M	U
Barium Sulfide - Saturated	S	S	Chlorobenzene	M	U
Beer	S	S	Chloroform	M	U
Benzene	S	S	Chlorosulfonic Acid - 100%	M	U
Benzene Sulfonic Acid*	S	S	Chrome Alum - Saturated	S	S

S=Satisfactory

M =Marginal

U=Unsatisfactory Performance



Material	74° F	140° F	Material	74° F	140° F
Chromic Acid - 20%	S	S	Hydrofluoric Acid - 75%	S	S
Chromic Acid - Up to 50%	S	S	Hydrogen - 100%	S	S
Chromic Acid & Sulfuric Acid	S	M	Hydrogen Bromide - 10%	S	S
Cider*	S	S	Hydrogen Chloride - Dry Gas	S	S
Citric Acid - Saturated	S	S	Hydrogen Peroxide - 30%	S	S
Coconut Oil Alcohols*	S	S	Hydrogen Peroxide - 90%	S	M
Coffee	S	S	Hydrogen Phosphide - 100%	S	S
Cola Concentrates*	S	S	Hydroquinone	S	S
Copper Chloride - Saturated	S	S	Hydrogen Sulfide	S	S
Copper Cyanide - Saturated	S	S	Hypochlorous Acid - Concentrate	S	S
Copper Fluoride - 2%	S	S	Inks*	S	S
Copper Nitrate - Saturated	S	S	Iodine (In Kl. Solution) - Concentrate	S	U
Copper Sulfate - Dilute	S	S	Lactic Acid* - 10%	S	S
Copper Sulfate - Saturated	S	S	Lactic Acid*	S	S
Corn Oil	S	S	Latex*	S	S
Cottonseed Oil*	S	S	Lead Acetate - Saturated	S	S
Cupric Salts	S	S	Lead Nitrate	S	S
Cuprous Chloride - Saturated	S	S	Lime	S	S
Cuprous Salts	S	S	Lube Oil	S	M
Cyclohexanol*	S	S	Magnesium Carbonate - Saturated	S	S
Cyclohexanone	M	U	Magnesium Chloride - Saturated	S	S
Detergents, Synthetic*	S	S	Magnesium Hydroxide - Saturated	S	S
Developers, Photographic	S	S	Magnesium Nitrate - Saturated	S	S
Dextrin - Saturated	S	S	Magnesium Salts	S	S
Dextrose - Saturated	S	S	Magnesium Sulfate - Saturated	S	S
Diazo Salts	S	S	Mercuric Chloride - Saturated	S	S
Dibutylphthalate	S	M	Mercuric Cyanide - Saturated	S	S
Dichlorobenzene	S	S	Mercurous Nitrate - Saturated	S	S
Diethyl Ketone	M	M	Mercury	S	S
Disodium Phosphate	S	S	Methyl Alcohol* - 100%	S	S
Diethylene Glycol*	S	S	Methyl Bromide	M	U
Diglycolic Acid*	S	S	Methyl Chloride	M	U
Dimethylamine	M	U	Methyl Ethyl Ketone - 100%	M	U
Emulsions, Photographic*	S	S	Methylsulfuric Acid*	S	S
Epsom Salts (Magnesium Sulfate)	S	S	Methylene Chloride - 100%	M	U
Ethyl Acetate - 100%	M	U	Milk	S	S
Ethyl Alcohol - 100%	S	S	Mineral Oils	S	U
Ethyl Alcohol *- 35%	S	S	Molasses - Comm.	S	S
Ethyl Benzene	U	U	Naptha	M	U
Ethyl Butyrate	M	U	Napthalene	U	U
Ethyl Chloride	M	U	Nickel Chloride - Saturated	S	S
Ethyl Ether	U	U	Nickel Nitrate - Concentrate	S	S
Ethylene Chloride	U	U	Nickel Sulfate - Saturated	S	S
Ethylene Chlorohydrin	U	U	Nicotine* - Dilute	S	S
Ethylene Dichloride	M	U	Nicotinic Acid*	S	S
Ethylene Glycol*	S	S	Nitric Acid - 0-30%	S	S
Ferric Chloride - Saturated	S	S	Nitric Acid - 30-50%	S	M
Ferric Nitrate - Saturated	S	S	Nitric Acid - 70%	S	M
Ferric Salts	S	S	Nitric Acid - 95-98%	U	U
Ferrous Chloride - Saturated	S	S	Nitrobenzene - 100%	U	U
Ferrous Sulfate	S	S	Octyl Cresol	S	U
Fish Solubles*	S	S	Oils and Fats	S	U
Fluoboric Acid	S	S	Oleic Acid - Concentrate	S	U
Fluorine	S	U	Oleum - Concentrate	U	U
Fluosilicic Acid - 32%	S	S	Orange Extract	S	S
Fluosilicic Acid - Concentrate	S	S	Oxalic Acid* - Dilute	S	S

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POLYETHYLENE CHEMICAL RESISTANCE

Material	74° F	140° F	Material	74° F	140° F
Formaldehyde* - 40%	S	M	Oxalic Acid* - Saturated	S	S
Formic Acid* - 0-20%	S	S	Ozone - 100%	S	U
Formic Acid* - 20-50%	S	S	Perchloric Acid - 10%	S	S
Formic Acid* - 100%	S	S	Perchloroethylene	U	U
Fructose - Saturated	S	S	Petroleum Ether	U	U
Fruit Pulp	S	S	Phenol - 90%	U	U
Fuel Oil	S	U	Phosphoric Acid - Up to 30%	S	S
Furfural - 100%	M	U	Phosphoric Acid - 90%	S	S
Furfuryl Alcohol	M	U	Phosphorous (Yellow) - 100%	S	M
Gallic Acid* - Saturated	S	S	Phosphorus Pentoxide - 100%	S	M
Gasoline	S	M	Photographic Solutions	S	S
Gin	S	U	Pickling Baths:Hydrochloric Acid*	S	U
Glucose	S	S	Sulfuric Acid*	S	S
Glycerine*	S	S	Sulfuric Nitric*	S	U
Glycol*	S	S	Plating Solutions: Brass*	S	S
Glycolic Acid* - 30%	S	S	Cadmium*	S	S
Grape Sugar - Saturated Aq.	S	S	Chromium*	S	S
Hexanol, Tert.*	S	S	Copper*	S	S
Hydrobomic Acid - 50%	S	S	Gold*	S	S
Hydrocyanic Acid - Saturated	S	S	Indium*	S	S
Hydrochloric Acid - 10%	S	S	Lead*	S	S
Hydrochloric Acid - 30%	S	S	Nickel*	S	S
Hydrochloric Acid - 35%	S	S	Rhodium*	S	S
Hydrochloric Acid - Concentrate	S	S	Silver*	S	S
Hydrofluoric Acid - 40%	S	S	Tin*	S	S
Hydrofluoric Acid - 60%	S	S	Zinc*	S	S
Potassium Bicarbonate - Saturated	S	S	Sodium Ferricyanide	S	S
Potassium Borate - 1%	S	S	Sodium Ferrocyanide - Saturated	S	S
Potassium Bromate - 10%	S	S	Sodium Fluoride - Saturated	S	S
Potassium Bromide - Saturated	S	S	Sodium Hydroxide - Concentrate	S	S
Potassium Carbonate	S	S	Sodium Hypochlorite	S	S
Potassium Chlorate - Saturated	S	S	Sodium Salts	S	S
Potassium Chloride - Saturated	S	S	Sodium Nitrate	S	S
Potassium Chromate - 40%	S	S	Sodium Sulfate	S	S
Potassium Cyanide - Saturated	S	S	Sodium Sulfide - 25%	S	S
Potassium Dichromate - 40%	S	S	Sodium Sulfide - Saturated Solution	S	S
Potassium Ferri/Ferro Cyanide - Saturated	S	S	Sodium Sulfite - Saturated	S	S
Potassium Fluoride	S	S	Stannic Chloride - Saturated	S	S
Potassium Hydroxide - 20%	S	S	Stannous Chloride - Saturated Solution	S	S
Potassium Hydroxide - Concentrate	S	S	Starch Solution* - Saturated	S	S
Potassium Nitrate - Saturated	S	S	Stearic Acid* - 100%	S	S
Potassium Perborate - Saturated	S	S	Sulfuric Acid - 0-50%	S	S
Potassium Perchlorate - 10%	S	S	Sulfuric Acid - 70%	S	M
Potassium Permanganate - 20%	S	S	Sulfuric Acid - 80%	S	U
Potassium Persulfate - Saturated	S	S	Sulfuric Acid - 96%	M	U
Potassium Sulfate - Concentrate	S	S	Sulfuric Acid - 98%	M	U
Potassium Sulfide - Concentrate	S	S	Sulfuric Acid, Fuming	U	U
Potassium Sulfite - Concentrate	S	S	Sulfurous Acid	S	S
Propargyl Alcohol*	S	S	Tallow	S	M
Propyl Alcohol*	S	S	Tannic Acid - Saturated	S	S
Propylene Dichloride - 100%	U	U	Tanning Extracts* - Comm.	S	S
Propylene Glycol*	S	S	Tetrahydrofuran	U	U
Pyridine	S	-	Titanium Tetrachloride - Saturated	U	U

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Material	74° F	140° F	Material	74° F	140° F
Rayon Coagulating Bath*	S	S	Toluene	M	U
Resorcinal - Saturated	S	S	Transformer Oil	S	M
Salicylic Acid - Saturated	S	S	Trichloroethylene	U	U
Sea Water	S	S	Triethylene Glycol	S	S
Selenic Acid	S	S	Trisodium Phosphate - Saturated	S	S
Shortening*	S	S	Turpentine	U	U
Silicic Acid	S	S	Urea* - Up to 30%	S	S
Silver Nitrate Solution	S	S	Urine	S	S
Silver Salts	S	S	Vinegar - Comm.	S	S
Soap Solution - Any concentration	S	S	Vanilla Extract*	S	S
Sodium Acetate - Saturated	S	S	Wetting Agents*	S	S
Sodium Benzoate - 35%	S	S	Whiskey*	S	U
Sodium Bicarbonate - Saturated	S	S	Wines	S	S
Sodium Bisulfate - Saturated	S	S	Xylene	M	U
Sodium Bisulfite - Saturated	S	S	Yeast	S	S
Sodium Borate	S	S	Zinc Bromide - Saturated	S	S
Sodium Bromide - Dilute Solution	S	S	Zinc Carbonate - Saturated	S	S
Sodium Carbonate - Concentrate	S	S	Zinc Chloride - Saturated	S	S
Sodium Carbonate	S	S	Zinc Oxide	S	S
Sodium Chlorate - Saturated	S	S	Zinc Salts	S	S
Sodium Chloride - Saturated	S	S	Zinc Stearate	S	S
Sodium Cyanide	S	S	Zinc Sulfate - Saturated	S	S
Sodium Dichromate - Saturated	S	S			

*Certain conditions, such as excess temperatures and/or pressures, may lead to stress.

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SOURCES: The test results indicated in this table are based on data provided by ASTM D 543-87 (Standard Test Method for Resistance of Plastics to Chemical Reagents), U.S.I. Chemicals of New York, New York, Phillips 66 Company of Pasadena, Texas, and information from other reliable published sources. The following list is accurate to the best of our knowledge and serves only as a guide to compare the relative resistance of polyethylene to various chemical agents. However, any information contained herein cannot be guaranteed since conditions vary and are entirely beyond our control. Anyone who uses this information assumes all risk as to any results associated with its use.