

Expandable Polystyrene Chemical Resistance Tables

I. GENERAL INFORMATION

Chemical resistance of thermoplastic expanded polystyrene is dependent on time, temperature, and applied stress in functional use. Chemical attack usually results in the softening, cracking, and/or crazing of the plastic product. As the plastic product degrades from chemical exposure, the immediate effect is the percent of weight increase, while mechanical and physical properties reduce substantially.

The chemical resistance and permeability ratings and data in these tables were obtained from reliable published sources. This information should be used as a preliminary guide however, and not as the basis for a final decision. The specific service conditions and part design involved in a new projected use may grossly affect the performance of the article in a chemical environment. It is normally advisable to run laboratory tests employing specimens resembling the actual parts and exposed to conditions of the end-use environment your product must encounter.

II. RATING SYMBOLS

In the following tables, overall chemical exposure performance is evaluated through the use of three rating symbols — **S**, **M** and **U** — which have the following significance:

- S Satisfactory:** Little or no noticeable effect, with no indication that serviceability is impaired.
- M Marginal:** Noticeable effect, but not necessarily indicating a lack of serviceability or useful life. Further testing is recommended in the specific application.
- U Unsatisfactory:** Severe effect and not recommended for service applications.

| REAGENT (Solids in saturated solution unless indicated otherwise) | Exposure | | Chemical Exposure Performance S = Satis. M = Marginal U = Unsatis. | Permeability (gm./24 hr./100 sq. in/mil) |
|---|------------------|-------------------|--|--|
| | Temp., °F | Time, days | | |
| Acetic Acid 5% | 77 | 365 | S | |
| Acetic Acid 10% | 77 | 365 | M | |
| Acetic Acid 100% | 77 | 365 | U | |
| Acetone | | | U | |
| Acetophenone | | | U | |
| Adrenalin Hydrochloride | | | S | |

| REAGENT (Solids in saturated solution unless indicated otherwise) | Exposure | | Chemical Exposure Performance S = Satis. M = Marginal U = Unsatis. | Permeability (gm./24 hr./ 100 sq. in/mil) |
|--|------------------|-------------------|---|--|
| | Temp., °F | Time, days | | |
| Adrenalin in oil | | | M | |
| Allyl Alcohol | | | U | |
| Aluminum Chloride (Sat.) | 122 | 365 | S | |
| Aluminum Sulphate (Sat.) | 122 | 365 | S | |
| Ammonia | | | S | |
| Ammonium Hydroxide | 122 | 365 | S | |
| Amyl Alcohol | | | U | |
| Amyl Acetate-n | | | U | X |
| Amyl Phthalate | | | U | |
| Amseed Oil | | | U | |
| Aspirin (powder) | | | S | |
| Atropine Sulphate | | | S | |
| Barium Carbonate (powder) | 122 | 365 | S | |
| Beef | | | S | |
| Benzaldehyde | | | U | |
| Benzedrine | | | S | |
| Benzene | | | U | X |
| Benzoic Acid | 122 | 365 | S | |
| Benzyl Acetate | | | U | |
| Borax (Sat.) | 122 | 365 | S | |
| Boric Acid | 122 | 365 | S | |
| Bromine Liquid | | | U | |
| Butter | | | U | |
| Butyl Acetate iso | | | U | X |
| Butyl Acetate n | | | U | X |
| Butyl Alcohol iso | 77 | 365 | S | |
| Butyl Alcohol n | | | S | |
| Butyl Phthalate | | | U | |
| Caffeine | | | S | |

| REAGENT (Solids in saturated solution unless indicated otherwise) | Exposure | | Chemical Exposure Performance S = Satis. M = Marginal U = Unsatis. | Permeability (gm./24 hr./ 100 sq. in/mil) |
|--|------------------|-------------------|---|--|
| | Temp., °F | Time, days | | |
| Calcium Hypochloride 15% | | | M | |
| Calcium Hypochlorite | | | U | |
| Camphor | | | M | |
| Carbon Tetrachloride | | | U | X |
| Carbolic Acid 50% | | | M | |
| Carbolic Acid 100% | | | U | |
| Cassia Oil | | | U | |
| Castor Oil | | | S | |
| Cedarwood Oil | | | U | |
| Cellosolve | | | U | |
| Cellulose Acetate | 122 | 365 | U | |
| Cetyl Alcohol | 77 | 365 | S | |
| Cherries Processed | | | S | |
| Chlorobenzene | | | U | X |
| Chloroform | | | U | X |
| Chlorine | | | U | |
| Chromic Acid 20% | | | S | |
| Citric Acid 10% | 77 | 365 | S | |
| Citric Acid 20% | | | M | |
| Cocoa Butter | | | M | |
| Cod Liver Oil | | | M | |
| Coconut Oil | | | M | |
| Coffee Solution | 122 | 365 | S | |
| Copper Sulphate | 77 | 10 | M | |
| Corn Oil | | | M | |
| Cottonseed Oil | | | M | |
| Cyclohexanol | 77 | 365 | S | |
| Cyclohexanone | | | U | X |
| Decalin | | | U | X |

| REAGENT (Solids in saturated solution unless indicated otherwise) | Exposure | | Chemical Exposure Performance S = Satis. M = Marginal U = Unsatis. | Permeability (gm./24 hr./ 100 sq. in/mil) |
|--|------------------|-------------------|---|--|
| | Temp., °F | Time, days | | |
| Detergents | | | M | |
| Diacetone | | | M | |
| Dibutyl Sebacate | | | U | |
| Dichlorobenzene-o | | | U | X |
| Dichlorobenzene-p | | | U | |
| Diethylene Glycol | 122 | 365 | S | |
| Diethylketone | 122 | 365 | S | X |
| Dimethyl Phthalate | | | U | |
| Ethyl Acetate 98% | | | U | X |
| Ethyl Alcohol 95% | 77 | 365 | M | |
| Ethyl Benzene | | | U | X |
| Ethyl Benzoate | | | U | |
| Ethyl Chloride (Gas and Liquid) | | | U | |
| Ethyl Ether | | | U | |
| Ethyl Lactate | | | U | |
| Ethylene Dichloride | | | U | X |
| Ethylene Glycol | | | S | |
| Ethylene Oxide | | | U | |
| Ferrous Chloride | 122 | 365 | S | |
| Formaldehyde | | | U | |
| Formic Acid 90% | | | M | |
| Furfuryl Alcohol | | | U | |
| Gasoline | | | U | |
| Glucose 30% | | | S | |
| Glycerine | 77 | 240 | S | |
| Heptyl Alcohol-n | | | S | |
| Hexane | | | U | |
| Hexyl Alcohol-n | | | S | |
| Horseradish | | | M | |

| REAGENT (Solids in saturated solution unless indicated otherwise) | Exposure | | Chemical Exposure Performance S = Satis. M = Marginal U = Unsatis. | Permeability (gm./24 hr./ 100 sq. in./mil) |
|--|------------------|-------------------|---|---|
| | Temp., °F | Time, days | | |
| Honey | | | S | |
| Hydrochloric Acid 10% | 77 | 365 | S | |
| Hydrochloric Acid 38% | | | M | |
| Hydrochloric Acid 100% | | | U | |
| Hydrogen Peroxide 30% | | | S | |
| Hydroquinone | | | M | |
| Iodine Tincture | | | M | |
| Isopropyl Alcohol | 77 | 365 | M | |
| Kerosene | | | U | |
| Lactic Acid 10% | | | U | |
| Lanolin | 77 | 375 | S | |
| Lard | | | U | |
| Lauryl Alcohol | | | S | |
| Lead Arsenate | | | M | |
| Lead Nitrate | 122 | 365 | S | |
| Lemon Juice | | | U | |
| Lime Water | | | S | |
| Lipstick | | | M | |
| Magnesium Carbonate | 122 | 365 | S | |
| Maleic Acid 10% | 77 | 365 | S | |
| Mercuric Chloride 5% | 122 | 365 | S | |
| Mesityl Oxide | | | U | X |
| Methyl Acetate | | | U | |
| Methyl Alcohol | | | M | |
| Methyl Chloride | | | U | |
| Methyl Ethyl Ketone | | | U | X |
| Methyl Isobutyl Ketone | | | U | X |
| Methyl Propyl Ketone | | | U | X |
| Methyl Salicylate (Oil of Wintergreen) | | | U | |

| REAGENT (Solids in saturated solution unless indicated otherwise) | Exposure | | Chemical Exposure Performance S = Satis. M = Marginal U = Unsatis. | Permeability (gm./24 hr./ 100 sq. in/mil) |
|--|------------------|-------------------|---|--|
| | Temp., °F | Time, days | | |
| Methylene Chloride | | | U | |
| Milk | 77 | 14 | S | |
| Mineral Oil | | | S | |
| Mono-Chloro Benzene | | | U | X |
| Motor Oil | | | M | |
| Mustard | | | M | |
| Nitric Acid 20% | | | U | |
| Nitroglycerine | | | S | |
| Nonyl Alcohol | | | S | |
| Octyl Alcohol | | | S | |
| Oils-Essential | | | U | |
| Oleic Acid 100% | 7 | 365 | M | |
| Orange Juice Fresh | | | M | |
| Orange Juice Concentrate | | | S | |
| Oxalic Acid 10% | 122 | 365 | S | |
| Ozone (absence of light) | | | S | |
| Palm Oil | | | M | |
| Palmitic Acid | 77 | 365 | M | |
| Peanut Oil | | | U | |
| Pectin (Sat.) | | | S | |
| Petroleum Jelly | 122 | 365 | S | |
| Phenol 5% | | | M | |
| Phosphoric Acid 50% | 122 | 365 | S | |
| Phosphorous (white) | | | M | |
| Potassium Hydroxide 30% | 77 | 365 | S | |
| Potassium Hydroxide 35% | 77 | 365 | M | |
| Potassium Bromide 3% | 77 | 365 | M | |
| Potassium Ferricyanide | 122 | 365 | S | |
| Potassium Iodide (Sat.) | 122 | 365 | S | |

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|--|------------------|-------------------|---|--|
| | Temp., °F | Time, days | | |
| Potassium Permanganate | 122 | 365 | M | |
| Propyl Alcohol (iso) | 77 | 365 | M | |
| Propylene Dichloride | | | U | X |
| Propylene Glycol | 122 | 365 | S | |
| Pyrogallic Acid | 77 | 365 | M | |
| Resorcinol Crystals | | | S | |
| Rubber | | | S | |
| Salicylic Acid (sat.) | 122 | 365 | S | |
| Silver Nitrate (sat.) | 122 | 365 | S | |
| Sodium Acetate (sat.) | 122 | 365 | S | |
| Sodium Benzoate | 122 | 365 | S | |
| Sodium Bicarbonate | 122 | 365 | S | |
| Sodium Bisulphite (sat.) | 122 | 365 | M | |
| Sodium Borate | | | S | |
| Sodium Bromide | 122 | 365 | S | |
| Sodium Carbonate (sat.) | 122 | 365 | M | |
| Sodium Chloride (sat.) | 122 | 365 | M | |
| Sodium Dichromate 10% | | | M | |
| Sodium Fluoride 5% | | | M | |
| Sodium Hydroxide 40% | 77 | 30 | S | |
| Sodium Hypochlorite 15% | | | S | |
| Sodium Tetraborate (Borax) | 122 | 365 | S | |
| Stannic Chloride | | | S | |
| Stearic Acid (powder) | 122 | 365 | S | |
| Sucrose 30% | | | S | |
| Sulphur | | | S | |
| Sulphuric Acid 50% | | | S | |
| Sulphuric Acid 96% | | | U | |
| Tannic Acid 2% | | | U | |

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|--|------------------|-------------------|---|--|
| | Temp., °F | Time, days | | |
| Tea (Sol.) | | | S | |
| Tetrahydrofurfuryl Alcohol | | | U | |
| Tetralin | | | U | X |
| Titanium Tetrachloride | | | U | |
| Toluene | | | U | X |
| Trichloroethylene | | | U | X |
| Triethylene Glycol | | | S | |
| Triethylene Tetramine | | | M | |
| Turpentine | | | U | X |
| Water | | | S | |
| Water Carbonated | | | S | |
| Witch Hazel Distilled | | | S | |
| Worcestershire Sauce | | | S | |
| Zinc Carbonate | 122 | 365 | S | |
| Zinc Chloride 50% | 122 | 365 | S | |
| Zinc Stearate | 122 | 365 | S | |
| Xylene | | | U | X |

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