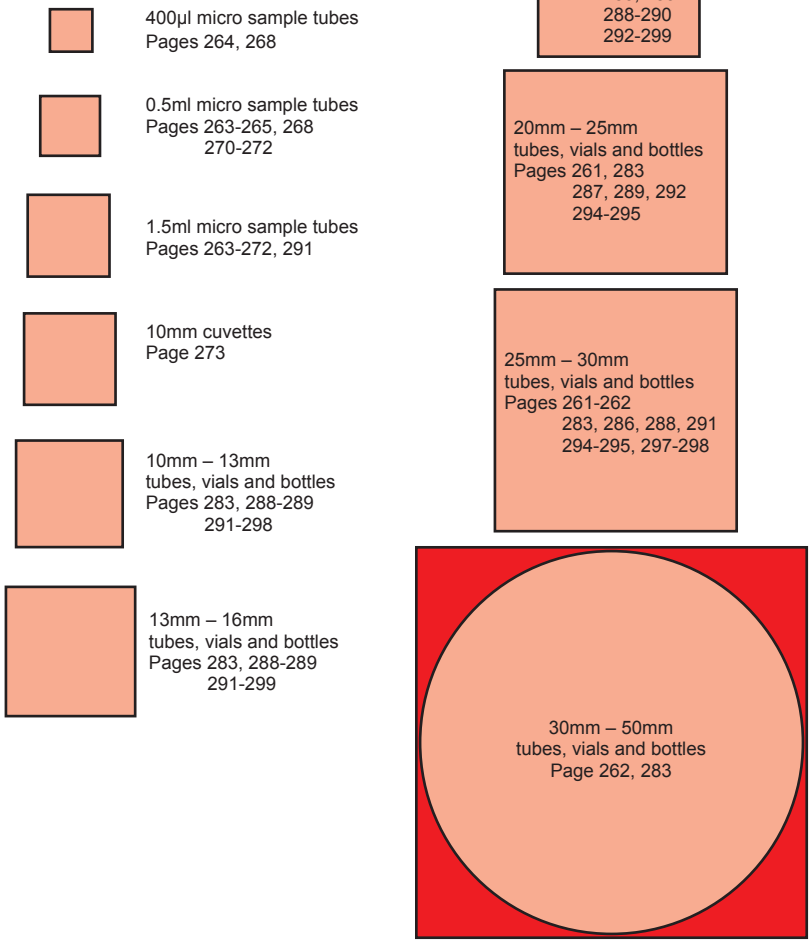
Rack Selection Guide – Tubes, Vials & Bottles

Use this sizing chart to determine the rack that best fits your tubes, bottles, vials, etc. Shaded area is the size of the rack opening. Tube bottom should fit within the shaded area. Catalog pages for racks designed to fit each tube or bottle size are located next to each schematic.

Scienceware® racks are manufactured from the highest quality materials and assure a precise fit for your tubes, bottles or vials. Choose from Poxygrid® coated wire racks, No-Wire™ polypropylene supports (racks) or any of our other molded plastic racks, each with unique features designed to meet your specific needs. Most Scienceware® racks are autoclavable, and many racks either stack or "knock down" for convenient storage.

If you have customized needs for a unique rack design that requires a special size, material or configuration, please contact us at 1.800.4BELART for a custom manufacturing quote.



Chemical Resistance Chart for Plastic Labware

Please see page 428 for table notes and guide to abbreviations.

CHEMICAL	LDPE 20°C	HDPE 20°C	PP 20°C	PMP 20°C	PMMA 20°C	PC 20°C	PVC 20°C	PS 20°C
Acetaldehyde	G	G	G	G	G	L	G	U
Acetamide, Sat.	E	E	E	E	E	U	U	E
Acetic Acid, 50%	E	E	E	E	N	E	E	G
Acetic Anhydride	U	L	G	E	N	U	U	U
Acetone	G	U	E	E	N	U	U	U
Acetonitrile	E	E	L	L	N	U	U	U
Acrylonitrile	E	E	L	L	N	U	U	U
Adipic Acid	E	E	E	E	G	E	E	E
Alanine	E	E	E	E	E	U	U	E
Allyl Alcohol	E	E	E	E	N	G	G	G
Aluminum Hydroxide	E	E	E	E	G	L	E	G
Aluminum Salts	E	E	E	E	E	E	E	G
Amino Acids	E	E	E	E	E	E	E	E
Ammonia	E	E	E	E	G	U	E	G
Ammonium Acetate,Sat.	E	E	E	E	E	E	E	E
Ammonium Glycolate	E	E	E	E	E	G	E	E
Ammonium Hydroxide,30%	E	E	E	E	E	U	E	G
Ammonium Oxalate	E	E	E	E	E	E	E	E
Ammonium Salts	E	E	E	E	E	E	E	G
Amyl Chloride	U	L	U	U	E	U	U	U
Aniline	E	E	G	G	N	L	U	U
Aqua Regia	U	U	U	U	F	U	U	U
Benzaldehyde	E	G	E	E	F	L	U	U
Benzene	U	U	U	G	N	U	U	U
Benzoic Acid, Sat.	E	E	E	E	E	E	E	G
Benzyl Acetate	E	E	E	E	N	L	U	U
Benzyl Alcohol	U	L	U	U	N	U	G	U
Bromine	U	L	U	U	N	L	G	U
Bromobenzene	U	U	U	U	N	U	U	U
Bromoform	U	U	U	U	N	U	U	U
Butadiene	U	L	U	U	G	U	L	U
Butyl Chloride	U	U	U	L	N	U	L	U
Butyl Acetate	G	G	G	G	U	U	U	U
Butyl Alcohol	E	E	E	E	L	G	G	E
Butyric Acid	U	L	U	U	N	L	G	U
Calcium Hydroxide, Conc.	E	E	E	E	G	U	E	G
Calcium Hypochlorite, Sat.	E	E	E	E	G	L	G	G
Carbazole	E	E	E	E	N	U	U	U
Carbon Disulfide	U	U	U	U	F	U	U	U
Carbon Tetrachloride	L	G	G	U	N	U	G	U
Cellosolve Acetate	E	E	E	E	G	L	L	U
Chlorobenzene	U	U	U	L	N	U	U	U
Chlorine, 10% (Moist)	G	G	L	G	E	G	E	U
Chloroacetic Acid	E	E	E	E	N	L	L	G
Chloroform	L	L	U	U	N	U	U	U
Chromic Acid, 50%	E	E	G	G	F	L	E	L
Citric Acid, 10%	E	E	E	E	E	E	G	E
Cresol	U	L	G	G	N	U	U	U
Cyclohexane	U	L	L	U	N	E	L	U
Cyclohexanone	U	L	L	G	N	U	U	U
Cyclopentane	U	L	L	L	G	U	L	U
Diacetone Alcohol	L	E	E	E	N	U	U	G
Diethyl Benzene	U	L	U	U	N	L	U	U
Diethyl Ether	U	L	U	U	F	U	L	U
Diethyl Ketone	U	U	G	L	N	U	U	U
Diethyl Malonate	E	E	E	E	NT	L	G	U
Diethylamine	U	L	G	L	G	U	U	G
Diethylene Glycol	E	E	E	E	E	G	L	G
Diethylene Glycol Ethyl Ether	E	E	E	E	E	L	L	U
Dimethyl Acetamide	L	E	E	L	E	U	U	U
Dimethyl Formamide	E	E	E	E	N	U	L	U
Dimethylsulfoxide	E	E	E	E	NT	U	U	E
Dioxane	G	G	G	L	N	U	L	U
Dipropylene Glycol	E	E	E	E	E	G	G	E
Ether	U	L	U	U	F	U	L	U
Ethyl Acetate	E	E	E	L	N	U	U	U
Ethyl Alcohol (Absolute)	E	E	E	E	G	E	E	L
Ethyl Benzene	U	U	U	U	N	U	U	U

Chemical Resistance Chart for Plastic Labware

CHEMICAL	LDPE 20°C	HDPE 20°C	PP 20°C	PMP 20°C	PMMA 20°C	PC 20°C	PVC 20°C	PS 20°C
Ethyl Benzoate	L	G	G	G	N	U	U	U
Ethyl Butyrate	G	G	G	L	N	U	U	U
Ethyl Chloride, Liquid	L	L	L	L	N	U	U	U
Ethyl Cyanoacetate	E	E	E	E	N	L	L	G
Ethyl Lactate	E	E	E	E	F	L	L	L
Ethylene Chloride	G	G	L	U	N	U	U	U
Ethylene Glycol	E	E	E	E	E	G	E	E
Ethylene Glycol Methyl Ether	E	E	E	E	E	L	L	U
Ethylene Oxide	L	G	L	L	E	L	L	U
Fatty Acids	E	E	E	E	E	G	E	E
Fluorides	E	E	E	E	N	E	E	G
Fluorine	L	G	L	L	N	G	E	U
Formaldehyde, 40%	E	E	E	E	E	E	G	U
Formic Acid, 98-100%	E	E	E	E	N	L	L	L
Freon TF	E	E	E	L	G	G	G	L
Fuel Oil	L	G	E	G	G	E	E	U
Gasoline	L	G	G	G	G	L	G	U
Glutaraldehyde (Disinfectant)	E	E	E	L	G	E	E	E
Glycerine	E	E	E	E	E	E	E	E
Hexane	U	G	G	L	E	L	G	U
Hydrazine	U	U	U	U	N	U	U	U
Hydrochloric Acid,35%	E	E	E	E	E	U	G	L
Hydrofluoric Acid,48%	E	E	E	E	U	U	G	U
Hydrogen Peroxide,90%	E	E	E	E	N	E	E	E
Iodine Crystals	U	U	L	G	N	U	U	U
Isobutyl Alcohol	E	E	E	E	F	E	E	G
Isopropyl Acetate	G	E	G	G	N	U	U	U
Isopropyl Alcohol	E	E	E	E	F	E	E	E
Isopropyl Benzene	L	G	L	U	N	U	U	U
Isopropyl Ether	U	U	U	U	F	U	U	U
Jet Fuel	L	L	L	L	G	U	E	G
Kerosene	L	G	G	G	G	E	E	U
Lacquer Thinner	U	L	L	L	N	U	U	U
Lactic Acid,85%	E	E	E	E	E	E	G	G
Mercury	E	E	E	E	E	U	E	E
Methoxyethyl Oleate	E	E	E	E	E	L	U	U
Methyl Acetate	L	L	G	E	N	U	U	U
Methyl Alcohol	E	E	E	E	F	G	E	L
Methyl Ethyl Ketone	U	U	E	U	N	U	U	U
Methyl Isobutyl Ketone	U	U	G	L	N	U	U	U
Methyl Propyl Ketone	G	E	G	L	N	U	U	U
Methyl-t-butyl Ether	U	L	L	E	G	U	U	U
Methylene Chloride	L	L	L	L	N	U	U	U
Mineral Oil	G	E	E	E	E	E	E	E
Mineral Spirits	L	L	L	E	F	U	G	L
Nitric Acid,1-10%	E	E	E	E	E	E	E	G
Nitric Acid,50%	G	G	L	L	G	G	G	U
Nitric Acid,70%	L	G	U	L	F	U	L	U
Nitrobenzene	U	L	U	U	N	U	U	U
Nitromethane	U	L	L	E	N	U	U	U
n-Octane	E	E	E	E	E	G	L	U
Ozone	E	E	E	E	E	E	E	L
Perchloric Acid	G	G	G	G	N	U	G	G
Perchloroethylene	U	U	U	U	F	U	U	U
Phenol, Liquid	U	U	U	U	N	U	U	U
Phosphoric Acid,85%	E	E	E	E	F	E	E	E
Picric Acid	U	U	U	E	N	U	U	G
Pine Oil	G	E	E	G	E	G	L	U
Potassium Hydroxide,Conc.	E	E	E	E	E	U	E	G
Propane Gas	U	L	U	U	E	L	E	U
Propionic Acid	L	E	E	E	N	U	G	G
Propylene Glycol	E	E	E	E	E	G	L	E
Propylene Oxide	E	E	E	E	N	G	L	U
Resorcinol,Sat.	E	E	E	E	N	G	L	G
Salicylaldehyde	E	E	E	E	G	G	L	U
Salicylic Acid,Sat.	E	E	E	E	F	E	G	E
Salt Solutions, Metallic	E	E	E	E	E	E	E	G
Silicone Oil	E	E	E	E	E	E	E	E

Chemical Resistance Chart for Plastic Labware

CHEMICAL	LDPE 20°C	HDPE 20°C	PP 20°C	PMP 20°C	PMMA 20°C	PC 20°C	PVC 20°C	PS 20°C
Silver Acetate	E	E	E	E	E	E	G	G
Silver Nitrate	E	E	E	E	E	E	E	G
Sodium Acetate, Sat.	E	E	E	E	E	E	G	G
Sodium Hydroxide, 1%	E	G	E	E	E	E	E	G
Sodium Hydroxide, 50% to Sat	G	G	E	E	E	U	U	E
Sodium Hyprochlorite, 15%	E	E	G	E	E	G	E	E
Stearic Acid, Crystals	E	E	E	E	E	E	E	E
Sulfuric Acid, 60%	E	E	E	E	G	G	E	G
Sulfuric Acid, 98%	G	G	L	G	N	U	G	U
Sulfur Dioxide, Liquid	U	U	U	U	N	G	L	U
Sulfur Salts	L	G	L	L	G	L	U	U
Tartaric Acid	E	E	E	E	E	E	E	G
Tetrahydrofuran	L	G	G	L	N	U	U	U
Thionyl Chloride	U	U	U	U	N	U	U	U
Toluene	L	L	L	L	N	L	U	U
Tributyl Citrate	G	E	G	G	F	U	L	U
Trichloroacetic Acid	L	L	L	E	N	L	L	L
Trichloroethane	U	L	U	U	N	U	U	U
Trichloroethylene	U	L	U	U	N	U	U	U
Tris Buffer, Solution	E	E	E	E	E	G	G	G
Turpentine	L	G	G	L	F	L	G	U
Undecyl Alcohol	E	E	E	E	N	G	E	G
Urea	E	E	E	E	E	G	G	E
Vinylidene Chloride	U	L	U	U	N	U	U	U
Xylene	G	L	L	L	N	U	U	U
Zinc Stearate	E	E	E	E	E	E	E	E

Resin Codes:

LDPE ..... Low-Density Polyethylene

HDPE ..... High-Density Polyethylene

PP ..... Polypropylene

PMP ..... Polymethylpentene

PMMA ..... Acrylic

PC ..... Polycarbonate

PVC ..... Polyvinyl Chloride

PS ..... Polystyrene

Chemical Resistance: This chemical resistance chart is a general guide only. Because of the variety of factors that can affect the chemical resistance of a plastic product, it is recommended that the user make tests under expected use conditions. Chemicals may affect the strength, appearance, color, dimensions, flexibility or weight of plastics. Variable factors like temperature, pressure, chemical concentration, length of exposure, and combinations of chemical reagents can affect the chemical resistance of plasticware. As temperature increases, resistance to chemical attack decreases. Environmental stress cracking differs from chemical attack and is caused by the combined factors of tensile stress, the inherent susceptibility of the plastic to stress crack and stress-cracking agents. Such agents as detergents, lubricants, plating additives and brighteners and surface-active agents, even in small concentrations, may cause cracking.

Letter Codes:

E=Excellent
No damage after 30 days of constant exposure

G=Good
Little or no damage after 30 days of constant exposure

L=Limited
Some effect after 7 days of constant exposure

NT=Not Tested

U=Unsatisfactory
Immediate damage, not recommended

Physical Properties of Resins

	Max. Use Temp. (°C)	Brittleness Temp. (°C)	Transparency	Flexibility
LDPE	80	-100	Translucent	excellent
HDPE	120	-100	Translucent	rigid
PP	135	0	Translucent	rigid
PMP	175	+20	Clear	rigid
PMMA	90	-60	Clear	rigid
PC	135	-135	Clear	rigid
PVC	70	-30	Clear	rigid
PS	90	+20	Clear	rigid

	Sterilization* Autoclaving	Sterilization* Gas	Sterilization* Dry Heat	Sterilization* Disinfectants	Specific Gravity
LDPE	No	Yes	No	Yes	0.92
HDPE	No	Yes	No	Yes	0.95
PP	Yes	Yes	No	Yes	0.90
PMP	Yes	Yes	Yes	Yes	0.83
PMMA	No	No	No	Some	1.18
PC	Yes	Yes	No	Yes	1.20
PVC	No	Yes	No	Yes	1.34
PS	No	Yes	No	Some	1.05

*Sterilization:

- (A) **Autoclaving** - Clean and rinse item with distilled water before autoclaving. Certain chemicals which have no appreciable effect on resins at room temperature may cause deterioration at autoclaving temperatures unless removed with distilled water beforehand.
- **Gas** - Ethylene oxide.
- **Dry Heat** - at 160°C.
- **Disinfectants** - Benzalkonium chloride, formalin, ethanol, etc.

Cleaning and Sterilization Guide to Plastic Labware

Scienceware® plastic labware is designed to provide many years of useful service under normal laboratory conditions. The physical properties and chemical resistance of the plastics used in the manufacture of Scienceware® plastic labware are provided for your convenience.

In addition, the following recommendations for cleaning and sterilization of plastic labware are designed to ensure their continuous, effective performance.

Cleaning:

1. Wash in a mild, non-alkaline detergent. We recommend the use of Bel-Art Aquet® Detergent F17094 (Catalog page 70).
2. Next, rinse thoroughly in tap water.
3. Final rinse in distilled water to eliminate all traces of residue.
   - To avoid damage to plastic products, do not utilize abrasive materials such as cleansers or scouring pads. Polycarbonate (PC) items should not be exposed to strong alkaline cleaning agents, as these agents will cause crazing and cracking of the polycarbonate surface.
   - If ultrasonic cleaners are employed, avoid direct contact with transducer diaphragm. When special cleaning is necessary, such as the removal of grease or oil, organic solvents (e.g., acetone, alcohols) may be applied. Use these with caution, as more than brief exposure may affect the polyolefins. Rinse again thoroughly before use. For PS or PVC, only an alcohol-based solution should be utilized. Do not use organic solvents when cleaning acrylics.
   - To remove organic matter from plastic labware, sodium hypochlorite solutions (bleaches) are suggested. A cleaning agent made of chromic acid, though effective, will eventually cause plastic to become brittle.

Laboratory Washing Machines:

Laboratory washing machines are a convenient method of cleaning most types of plastics with the exception of low-density polyethylene, acrylic and polystyrene. Items manufactured of these plastics are adversely affected by the heat involved. In addition, the strength of polycarbonate (PC) will be weakened by repeated exposure to washers. Polycarbonate labware utilized in high stress situations should be washed by hand to ensure effective performance.

When laboratory washing machines are used, water temperature should be set at 57ºC (135ºF) maximum. To avoid damage or abrasion, labware should be weighted down so it stays firmly in place. Exposure to the metal spindles of the washers can be eliminated by covering them with plastic tubing.

Sterilization:

Always clean items and rinse thoroughly in distilled water prior to autoclaving. To avoid pressure build-up, set closures upon containers loosely without threading. Carboys and spigots should be autoclaved empty to prevent leakage. Autoclave at 121ºC (250º F) for twenty minutes to ensure sterility. Ethylene-oxide or chemical disinfectants are recommended for PVC.

Chemical disinfectants such as benzalkonium chloride, formalin, ethanol, iodophor and quaternary ammonium compounds may be used. When choosing ethyleneoxide (ETO) gas sterilization, a seven to fourteen day quarantine period is necessary for the assurance of no ETO residue.

Microwaving:

All plastic materials allow transmission of microwaves; however, please refer to the Physical Properties Chart (page 429) before using plastic containers in a microwave, as the contents in the plastic container may exceed the actual plastic container's heat resistance.

Key to Icons

For your convenience, the following symbols, or icons, are used throughout this catalog. They serve to identify the areas in the lab where the product(s) can be used, safety/environmental hazards, processes and component materials.

Relates to products involving radioactive materials.

Indicates a Biohazard; usually found on waste containers.

Indicates that a product may be autoclaved.

Indicates that the product is CE Certified.

Indicates that the product is ETL listed.

High Density Polyethylene

Low Density Polyethylene

Polycarbonate

Polyethylene

Polypropylene

Polystyrene

Polyvinyl Chloride

Polymethylpentene
