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Chemicals Alphabetical List

Product Description	Prod. No.	Page	Application
A cetonitrile, 450ml	18612	72	Substitute for Propylene Oxide
PELCO® Acrylic Embedding Resin, 500ml	18190	71	Embedding
Araldite 502, 500g	18060	72	Epoxy Resin
B enzoin Methyl Ether, 10g	18186	70	UV Catalyst, LR Gold, use at 0.5%w/v ~365nm
(BDMA) Benzyldimethylamine, 25g	18241	73	Accelerator, replaces 50g size
Biobond™, 20ml	15715	73	Tissue Section Adhesive
C acodylic Acid, Sodium Salt Tri-Hydrate, 100g	18851	73	Buffer
Cargille Immersion Oils, all products	19552 to 19568	76	Non-Fluorescent Immersion Oil
Chloramine-T Algicide	18625	73	For recirculation bath and chiller products
Citifluor Mountant Media, all products	19470	266-267	Immuno Fluorescent Mountant Media
Cold Water Fish Gelatin, 45%	15717	200	Blocking Agent
Cresyl Fast Violet, Certified, 5g, C.I.#51180	18709	73	Histology Stain
Cryo-Z-T™, 4 oz.	27055	73	Embedding matrix for frozen sections
D API, Fluorescent Dye, 10mg	18706	73	Cell permeable fluorescent dye (powder)
Deionized Water, 1 gal.	18708	74	General laboratory use
DER® 736, Diglycidyl Ether of Propylene Glycol, 250g	18310	74	Flexibilizer for Spurr's Resin
(DMAE) 2-Dimethylaminoethanol, 25g	18315	74	Accelerator
(DMP-30) 2,4,6-Tri(Dimethylaminomethyl) phenol, 25g	18042	74	Accelerator
(DDSA) Dodecenyl Succinic Anhydride, 450g	18022	74	Hardener, Crosslinker for Eponate 12™ and Araldite 502
Embedding Kits:			
Araldite 502 Embedding Kit, with BDMA, total volume: 950ml.	18050, 18052	69	Epoxy Resin Kit
Eponate 12™, with BDMA, total kit volume 1375g	18012	69	Epoxy Resin Kit (BDMA catalyst and lower viscosity than DMP-30)
Eponate 12™, with DMP-30, total kit volume 1375g	18010	70	Epoxy Kit (DMP-30 catalyst)
Eponate 12™ -Araldite 502 Kit, total kit volume: 1375g	18028	70	Mollenhauer Epoxy Resin Kit
Glycol Methacrylate (GMA), total kit volume 675ml +12g.	18350	70	GMA Embedding Kit
JB-4® Embedding Kit, total volume 830ml +12g	18020	70	Water Soluble LM Embedding Kit
JB-4 Plus® Embedding Kit, total volume 515ml +8g	18040	70	Water Soluble LM Embedding Kit
LR Gold Resin, 500ml	18183	70	Acrylic Resin (see Benzoin Methyl Ether or Benzil for catalyst)
LR White Cold Cure Accelerator, 10ml	18185	71	Accelerator
LR White Resin, Hard, 500ml	18182	70	Acrylic Resin (supplied with catalyst separate)
LR White Resin, Medium, 500ml	18181	70-71	Acrylic Resin (supplied with catalyst separate)
Lowicryl HM-20 MonoStep (non-polar), 225g	18174	77	Pre-mixed Lowicryl, ready to use
PELCO® Acrylic Embedding Resin, 500ml	18190	71	Embedding Resin
PELCO® Epoxy Mount Kit	813-500	71	Embedding Resin
Spurr Low Viscosity Kit, total kit volume 975g	18300-4221	72	Epoxy Resin Kit
Poly-Bed® 812 Test Kit, 118.5ml	18107	72	Epoxy Resin Kit, ref. Glauert
Spurr Low Viscosity Mini Kit, 88ml	18108	72	Epoxy Resin Kit

Product Description	Prod. No.	Page	Application
Eponate 12™, 450g	18005	74	Epoxy Resin
1, 2 Epoxypropane, 450ml> see Propylene Oxide, EM, 450ml	18601	80	Transition Solvent
ERL 4221 Epoxide Resin, 225ml	18306-4221	74	Spurr's Resin (epoxy)
Ethyl Alcohol, 1L	19206	74	Dehydration
Ethyl Alcohol, Denatured, 200ml	19207	74	Dehydration
F ormaldehyde, 16%, 10 x 10ml	18505	74	EM grade Fixative
Formaldehyde, 16%, 100ml	18505-100	74	EM grade Fixative
Formaldehyde, 37%, microfiltered, (Formalin) 10 x 10ml	18508	74	Histology Fixative
Formalin, 10% Neutral Buffered, 450ml	18510	75	Histology Fixative
Formvar, 100g	19222	75	Substrate Component
G elatin, Purified, 100g	19225	75	Slide Coating, Adhesive
Glutaraldehyde, 8% EM, 10 x 2ml	18420	75	EM Fixative
Glutaraldehyde, 8% EM, 10 x 10ml	18421	75	EM Fixative
Glutaraldehyde, 8% EM, 100ml	18422	75	EM Fixative
Glutaraldehyde, 25% EM, 10 x 10ml	18426	75	EM Fixative
Glutaraldehyde, 25% EM, 100ml	18427	75	EM Fixative
Glutaraldehyde, 50% EM, 10 x 10ml	18431	75	EM Fixative
Glutaraldehyde, 50% EM, 100ml	18432	75	EM Fixative
Glutaraldehyde, 70% EM, 10 x 2ml	18436	75	EM Fixative
GridStick™ Adhesive, 5ml	155-9	75	SynapTek™ Grid Adhesive
H ematoxylin, 10g, Certified, C.I.#75290	18721	75	Histology Stain
Hexamethyldisilazane (HMDS), 250g	18605	76	Dehydrant, SEM Prep
Histoclear, 1 ltr.	18390-L	76	Clearing agent, replacing Xylene
Histoclear, 1 gal.	18390-G	76	Clearing agent, replacing Xylene
Histoclear II, 1 ltr.	18391-L	76	Clearing agent, replacing Xylene (mixture)
Histoclear II, 1gal.	18391-G	76	Clearing agent, replacing Xylene (mixture)
Histomount, 100ml	19479	76	Mounting Media
Histomount, 450ml	19480	76	Mounting Media
Immersion Oil:			Low Fluorescence, PCB-free
Cargille Immersion Oil Type A, 120ml	19552	76	Examination fluid; low viscosity (150cs)
Cargille Immersion Oil Type B, 120ml	19556	76	Examination fluid; high viscosity (1250cs)
Cargille Immersion Oil Type NVH, 120ml	19562	76	Examination fluid; very high viscosity (21000cs)
Cargille Immersion Oil Type DF, 29.5ml	19564	76	Examination fluid; very high viscosity (21000cs)
Cargille Immersion Oil 5-Pack, 5 x 7.4cc	19568	76	Examination fluid; 4 Type package 1ea. Type 300, 1ea. Type NVH, 2ea. Type A, 1ea. Type B
JB-4 Embedding Kit® , total kit volume 800ml	18020	76	Water Soluble LM Embedding Kit
JB-4 Plus® Embedding Kit , total kit volume 500ml	18040	76	Water Soluble LM Embedding Kit
L iquid Release Agent, 100 ml	18027	77	Mold-release used in flat embedding of micro organisms
LR Gold Resin, 500ml	18183	77	Acrylic Resin (see Benzoin Methyl Ether or Benzil for catalyst)
LR White:			
LR White Cold Cure Accelerator, 10ml	18185	77	Accelerator
LR White Resin, Hard, 500ml	18182	77	Acrylic Resin (supplied with catalyst separate)
LR White Resin, Medium, 500ml	18181	77	Acrylic Resin (supplied with catalyst separate)
Lead Citrate, 10g.	19312	77	EM Stain
Lead Citrate, 50g.	19314	77	EM Stain
Lowicryl HM-20 MonoStep (non-polar), 225g	18174	77	Pre-mixed Lowicryl, ready to use
M ethylamine Tungstate, 1g	18353	77	Negative Stain, does not damage virus particles
Mold Release, Tissue-Tek™, 4 oz.	27215	78	Mold Release for paraffin blocks

Product Description	Prod. No.	Page	Application
Mount-Quick, Aqueous Mounting Medium, 30ml	19477	78	For mounting stained sections on slides for lipid and immune staining
Mount-Quick, Mounting Medium in a tube, 30ccm.	19478	78	For mounting on slides
N adic® Methyl Anhydride (NMA), 450g	18032	78	Anhydride; adjusts hardness of Epon blocks
Nonenyl Succinic Anhydride (NSA), 450g.	18301	78	Double distilled hardener for Spurr's Resin
O CT Compound, Tissue-Tek™, 4 oz.	27050	78	Cryostat sectioning
Osmium Tetroxide:			
Osmium Tetroxide, 4% aqueous, 10 x 2ml	18459	78	EM Fixative
Osmium Tetroxide, 4% aqueous, 10 x 5ml	18463	78	EM Fixative
Osmium Tetroxide, 4% aqueous, 10 x 10ml	18465	78	EM Fixative
Osmium Tetroxide, 0.25g crystal, pkg/10	18450	78	EM Fixative
Osmium Tetroxide, 0.50g crystal	18451	78	EM Fixative
Osmium Tetroxide, 1g crystal	18456	78	EM Fixative
OTE EM Stain, 10g.	19483	79	EM Stain, Possible substitute for UA
P araformaldehyde, Prill Purified, 1kg.	18501	79	EM/LM Fixative
PELCO® Acrylic Embedding Resin, 500ml.	18190	71	Embedding Resin, Metallographic Samples
PELCO® Epoxy Mount Kit	813-500	71	Embedding Resin, Metallographic Samples
PELCO® Epoxy Resin, 1 gallon (3,785ml)	813-501	71	Embedding Resin, Metallographic Samples
PELCO® Epoxy Resin, 0.5 gallon (1,892ml)	813-502	71	Embedding Resin, Metallographic Samples
PELCO® Fast Cure Hardener, 0.5 gallon (1,892ml)	813-504	71	Embedding Resin Hardener
PELCO® Hardener, quart (946ml)	813-505	71	Embedding Resin Hardener
Phosphotungstic Acid (PTA), 25g.	19402	79	Negative Stain
Pioloform™ Powder, 10g	19244	79	Substrate Component
Poly-Bed® 812 Resin Test Kit	18107	72	Epoxy Resin Mini Kit
Poly-L-Lysine, 500µl.	18021	79	Surface Coating for adhesion of cells/particles
Poly-L-Lysine, 10ml	18026	79	Surface Coating for adhesion of cells/particles
President SEM Replication Kit, 106ml	44870	79	For High Resolution SEM Replicas
Propylene Oxide, EM, 450ml	18601	80	Transition Solvent, aggressive
R uthenium Red, 1g.	19421	80	Fixative/Stain
S HUR/Mount™ Aqua-Poly/Mount, 20ml.	27212	80	Liquid Coverglass and Mounting Medium
SHUR/Mount™ Toluene-Based Liquid Mounting Medium, 4 oz.	27214	80	Liquid Coverglass and Mounting Medium
Sodium Hydroxide, pellets, 450g.	19539	80	For use during Lead Staining
Sodium Hydroxide, 2N, carbonate-free, 225ml	19540	80	For making Paraformaldehyde and Lead Staining
Sodium Phosphate, monobasic, 500g	19542	80	Buffer
Sodium Phosphate, dibasic, 500g	19545	80	Buffer
Sodium Sulfite, 500g.	19437	80	Film clearing agent
Spurr Low Viscosity Kit, total kit volume, 975g	18300-4221	80	Epoxy Resin Kit
T issue-Tack™ Adhesive, 100ml.	19250	80	LM Tissue Adhesive
Tissue Freezing Medium, 4 oz.	27209	128	Embedding matrix for frozen sections
Toluidine Blue O, certified, 25g	19451	80	LM Stain
U ranyl Acetate, 25g	19481	80	EM Stain, Negative Stain

Hazards and Safety in the Microscopy Laboratory

selections from "Procedures in Electron Microscopy", Appendices, A:2.1 ff (permission from Wiley Press)

Electron and Light Microscopy techniques require a number of hazardous reagents and great care should be taken in their receipt, handling, storage and disposal. National agencies involved in making and enforcing rules for hazardous chemicals include the Organization for Occupational Safety and Health (OSHA). Its research branch is the National Institute for Occupational Safety and Health (NIOSH).

A **Material Safety Data Sheet** (MSDS) is included with each hazardous chemical supplied. They are also available on our web site, www.tedpella.com.

Threshold Limit Value is expressed in concentrations of milligrams per cubic meter of air. Exceeding the limit could be hazardous to your health.

Fixatives

All fixatives used in microscopy are hazardous. They are potentially poisonous through inhalation, ingestion and skin contact. The higher the temperature, the greater the danger. Aldehydes and osmium tetroxide are the most obvious dangers in this class, but there is also serious risk when weighing out finely divided powders.

Eating, drinking and smoking must be prohibited in all circumstances in a well-run laboratory. Skin contact should be avoided, since local damage is certain to be caused. Eyes in particular are at risk, and goggles should always be worn when there is any possibility of fixative splashing into the face. Substances may be absorbed through the skin.

All legislation governing storage, and safety rules in general, should be followed in the use and disposal of toxic chemicals, including fixatives.

Organic Fixatives

Several aldehydes are commonly used as fixatives. Regarding the degree of care, two criteria should be recalled: Reactivity and volatility. The more reactive and more volatile the aldehyde, the greater will be the hazard. The TLV for formaldehyde is 2ppm, and for glutaraldehyde 0.2ppm.

Skin contact is more serious with glutaraldehyde. Quoted exposure limits are ceilings and should not be exceeded. Exposure should be kept far lower. Workers or others exposed to 1ppm can easily detect formaldehyde on first exposure, but repeated exposure can soon raise the level of detectability beyond the statutory limit. Dermatitis and allergic reactions are not uncommon among histology workers. For formaldehyde and glutaraldehyde, a proper fume hood must be used.

Osmium Tetroxide

Great care must be taken with Osmium Tetroxide. It is offered as pure crystal or as a prepared solution (4%). The crystals melt at 40°C and are extremely slow to dissolve in water. The crystals and diluted aqueous solutions emit fumes of Osmium Tetroxide (subli-

mation and evaporation respectively), even at 0°C. It has an extremely low TLV (0.0002ppm). Osmium fixatives must always be handled in a fume hood. They act rapidly and skin contact must be avoided at all times.

Other Heavy Metals

These include lead and uranium. All are cumulative poisons and should be handled with care. Copper and zinc salts are less toxic.

Storage Conditions

- Unnecessarily large quantities of fixatives should not be ordered.
- Household-type containers must not be used.
- The outside of all containers should be kept clean and free of contamination.
- Liter bottles or smaller are preferable to larger (2.5 liter) containers.
- All containers should be clearly labeled with a detailed list of contents and hazards (where known; see hazard symbols)

Buffers

A range of buffer constituents are used, such as hydrochloric acid, sodium phosphate, sodium hydroxide, veronal and acetate. Sodium cacodylate can contain about 30% arsenic.

Dehydrating and Embedding Solvents

Flammable organic solvents commonly used include acetone and ethanol. Neither is recognized as likely to present a significant health risk by inhalation in most cases of electron microscopy. Both will cause defatting and drying of skin, which may lead to skin problems. Propylene Oxide is reported as an animal carcinogen and currently carries a risk phase R45 (may cause cancer).

Embedding Resins

Containment is the essential strategy for handling laboratory chemicals. Resins are no exception. Resin components may be polymerized into an insoluble solid form that can be disposed of with other plastic waste. Guidelines follow.

Handling

Viscous Resins

Epoxy embedding resins are among the most viscous and persistent chemicals that will be encountered in EM. They should be dispensed and measured at as warm a temperature as possible. Epoxy resins can be stored at room temperature (RT), 25°C, provided no catalyst is present. Very viscous resins are preferably dispensed by weight rather than volume. The viscous components are weighed into a disposable mixing cup (see Tri-stir Beakers). The less viscous noncatalyst components are then added to warm viscous resin, the mixture allowed to cool and the catalytic elements added in liquid form.

Resin stirring implements should be disposable. Spillages should be taken care of immediately and not left to accumulate. Wearing disposable gloves (see Gloves section in catalog), wipe up the spillage with absorbent paper - **not a solvent** - and then clean

the surface with a water-based detergent abrasive cleaner. Skin contamination with viscous resin can be cleaned with a nonsolvent resin cleaner (see Epoxy Hand Cleaner, page 88). **Never remove resin from skin with an organic solvent.**

Solvent/Resin Mixtures

Potential penetration of resin into the hands of the technician is increased with mixtures (infiltration speed is increased). Use well sealed bottles. There should be no leakage if the container is inverted. Discarded resin/solvent mixtures should be kept in a well stoppered dark brown bottle bearing a label that records the combinations of resin and solvent that it contains. The waste solvent bottle should then be disposed of by a laboratory's waste disposal contractor. Never mix epoxy solvent waste with methacrylate waste, since they can react violently in combination.

Hazards of Resin Vapors

Vapor pressures of amines, lower methacrylates, vinyl monomers and low molecular weight epoxides used in tissue embedding are high enough at room temperature to have prompted the setting of threshold limits (TLVs). They should be dispensed in fume hoods. There should be no lingering smell of monomer in modern laboratories.

Many resin formulations are heat-cured and give rise to two hazards: a) At high temperatures many components become an irritant, e.g., anhydrides; and b) Ovens filled with resin vapor can explode if the vapor is above its flashpoint and the oven has inadequate thermostatic control (any control that sparks). All ovens should be vented properly.

Vapors from amines used in embedding are harmful. If a bottle of such amine is dropped in the laboratory, evacuate the laboratory and wear a respirator while dealing with the spillage. Such amines can cause bronchial spasms if inhaled in quite small quantities by sensitized subjects. Never sniff the contents of resin component bottles, and dispose of any unlabeled resin bottles as hazardous.

Carcinogens - Epoxy Resins

Spurr's resin and some diepoxides of glycerol are carcinogens. They should be used in a separate clearly marked area. Colleagues should be aware of the risks. An alternative noncarcinogenic resin should always be sought and tested before adopting a policy of long-term use of carcinogenic resins.

Specific Hazards with Methacrylate-containing Resins

Their use in EM for low-temperature embedding of biological material has grown in importance. They are most suitable for this work because of their low viscosity and their ability to polymerize at temperatures far below 0°C. Technicians and those associated in the laboratory should be aware of tissue-destructive potential and toxicological and allergenic sensitization risks involved in handling (meth)acrylates.

Potential health problems can occur with skin, mucous membranes, eyes and upper respiratory tract. A distinction should be drawn between monomeric methacrylates, used in EM, which pose significant health and safety threats and the poly(meth)acry-

late group, widely used in paints, which are virtually nonreactive.

Monomeric Methacrylates

The pungent, aggressive odors of the volatile methacrylate monomers persuasively impose the use of fume hoods, minimizing inhalation risk. Contact with skin and eyes must be avoided! Gloves made from latex or vinyl provide virtually no protection against exposure to methacrylates. Rubber gloves may be considered. Commentary:

Tober M, Freiburghaus AV, 1990. Occupational risks of (Meth)acrylate compounds in embedding media for electron microscopy. *J Microscopy* 160, (3): 291-298.

Reactions can appear quickly, within minutes or hours at the site of contact and include swelling, itching, blisters and even fissures. Recovery can take days to weeks, as with all allergies; symptoms may be potentiated and dramatic when contact is prolonged or repeated.

General Hazards of Monomeric Methacrylates

- High flammability
- Explosive properties of vapor/air mixtures in a wide range of ratios
- High density of vapors, causing them to accumulate in basins of all kinds - sinks/floors
- High volatility as a potentiating factor of these risks

With minute quantities of methacrylates, dangers are not intimidating, as is mostly the case in EM. Large quantities should not be allowed to accumulate in waste containers. The tightly closed containers should be kept in a well ventilated hood or refrigerator. Repeated exposure over longer periods of time may result in severe allergies.

Protective Measures

- High flammability precautions
- Restrict methacrylate quantities to an appropriate minimum
- Restrict manipulations of methacrylates to a minimum
- Work in a properly ventilated fume hood
- Wear protective clothing such as safety goggles and gloves
- Replace protective clothing immediately after any spillage or contamination
- Store waste in a safe place, shielded from heat and electric charges

Studies on methacrylate components in Lowicryl® resins show that vinyl or latex gloves provide virtually no protection against monomeric (meth)acrylates. Polar 2-hydroxy ethyl acrylate (found in Lowicryl® K4M at 23.7% and K11M at 20.6%) penetrated through both types of gloves within only 4 minutes, eliciting toxic/allergenic reactions. Studies in Sweden support the notion that methacrylates are "glove killers", much more destructive than classic epoxy embedding resins. Rubber gloves or our Nitrile gloves may be recommended if they "contain" (resist) the resin.

Hazards and Safety in the Microscopy Laboratory, *continued*

Polyester Resins

Compositions of resins will include benzoyl peroxide, benzoin methyl ether, monomeric styrene and methyl ethyl ketone. Exposures to these substances are likely to be low, although irritancy can be a problem. Care should be taken in any event.

Stains

Stains present the greatest theoretical problem in assessment. Information on most of them is scant. However, they are used infrequently, in small quantities and mainly encountered in solution. Good precautions are necessary in handling, particularly in weighing dry ingredients. Stains such as diaminobenzidine ("DAB"), a carcinogen, are still encountered. Lead and other heavy metal salts are sometimes also used and are accumulative. In most EM situations exposure will be slight because of the small amounts and infrequency of use. It should however be noted "Lead and mercury salts used for staining are highly toxic. Lead can be absorbed through skin and mucus membranes. If lead or uranium solutions are spilled and allowed to dry, dust containing these metals may be inhaled. Cumulative lead poisoning can lead to sterility and brain damage".*

*Principles and Techniques of Electron Microscopy, Biological Applications, Fourth Edition; M. A. Hayat; ©Cambridge University Press, 2000; p 3.


Resins and other embedding components should always be handled with great care using proper clothing and carrying out procedures in the fume hood, even if there is no specific hazard warning for them. Amine vapors are to be avoided. Treat all listed compounds as potential hazards and suspected carcinogens and mutagenic hazards. Physical contact of dusts, vapors and liquids should be avoided. Use the fume hood, the proper gloves for the chemical being used, proper coat and protective glasses or shields. Keep chemical accident containment materials handy. Running water and soap are recommended cleaning agents (**never solvents**).

Absence of a hazard note should not be interpreted as a safe sign for a product.

Hazard Warning Guides Used in this catalog:

■ Cg = Suspected Carcinogen	■ O = Oxidizing
■ C = Corrosive	■ R = Radioactive
■ F = Flammable	■ T = Toxic
■ I = Irritant	□ U = Unlisted
■ L = Lachrymator	

Other designations:

M = MSDS on web page
T = Tech Note on web page
H  F = HAZARD Fee may apply*

*A hazard fee is required when hazardous goods are transported.

Chemicals

Embedding Kits

■ Araldite 502 Embedding Kit

The Araldite 502 kit with BDMA accelerator is equally efficient as the same kit using DMP-30. BDMA has a lower viscosity and diffuses more rapidly into tissues, porous specimens and rough surfaces. The Araldite 502 resins have better beam stability than the Eponate resins. BDMA is used in 3% concentrations versus 1.5 to 2% for DMP-30. Araldite kit may be used alone or mixed with other epoxies. Curing times are 16 to 24 hours at a temperature of 60°C or 2 to 3 hours using the PELCO BioWave® Pro.

18052 Araldite 502 Kit, 925g (w/BDMA) each

■ **I, Cg** Araldite 502, 450ml (18060) **M**

■ **I** DDSA, 450g (18022) **M**

■ **C, T, I, F** BDMA, 25g (18241) **M**

18050 Araldite 502 Kit, 925g (w/DMP-30). each

■ **I, Cg** Araldite 502, 450ml (18060) **M**

■ **I** DDSA, 450g (18022) **M**

■ **C, I** DMP-30, 25g (18042) **M**

1 Glauert AM, Glauert RH, 1958. Araldite as an embedding medium for electron microscopy. J Biophys Biochem Cytology 4: 191-194.

2 Glauert AM, 1975. Fixation, dehydration, and embedding of biological specimens. Practical Methods in Elec Micr, 3(1). Glauert AM, ed., North-Holland, Amsterdam, 5th reprint.


■ Eponate 12™ Kit, with BDMA



Aliphatic epoxy resin based on di- and tri-glycidyl ethers of glycerol with a significantly lower viscosity compared to Araldite 502. BDMA (<3%, see notes preceding) is used as the accelerator since it has lower viscosity and diffuses into tissues more rapidly. (See references on next page for epoxies).


The viscosity of Eponate™ 12 at 25°C is 15-21cP, WPE is 140-145 and Specific Gravity is 1.15-1.22g/ml. Other kit viscosities at 25°C include DDSA (290cP) and NMA (225-275cP). Eponate™ 12 is hygroscopic.

Curing time is 16 to 24 hours at a temperature of 60°C or 2 to 3 hours using the PELCO BioWave® Pro.

18012 Eponate™ 12 Embedding Kit, with BDMA **T**  **F** each

■ **Cg, I** Eponate 12 Resin, 450g (18005) **M**

■ **I** DDSA, 450g (18022) **M**

■ **C, I** NMA, 450g (18032) **M**  **F**

■ **C, T, I, F** BDMA, 25g (18032) **M**

■ Eponate 12™ Kit, with DMP-30

18010 Eponate™ 12 Embedding Kit, with DMP-30 **I** **H** **F** each

- **I** Eponate 12 Resin, 450g (18005) **M**
- **I** DDSA, 450g (18022) **M**
- **C, I** NMA, 450g (18032) **M** **H** **F**
- **T** DMP-30, 25g (18042) **M**

NMA Hardener in increased amounts in the embedding mixture makes a harder block.

■ Eponate 12™ Kit, with Araldite 502

18028 Eponate 12™ –Araldite 502 Kit **I** **H** **F** each

- **I** Eponate 12 Resin, 450g (18005) **M**
- **T, I** Araldite 502 Resin, 450g (18060) **M**
- **I** DDSA, 450g (18022) **M**
- **C, T, I, F** BDMA, 25g (18241) **M**

First use of Epon 812 in U.S.A.:

Finck H, 1960. Epoxy resins in electron microscopy. J Biophys Biochem Cytol 7: 27.

Luft JH, 1961. Improvements in epoxy resin embedding methods. J Biophys Biochem Cytol 9: 409.

■ Glycol Methacrylate (GMA) Kit

18350 Glycol methacrylate (GMA) Kit each

- **F, I, T** Glycol Methacrylate (GMA), 450ml (18091) **M**
- **F, I, T** n-Butyl Methacrylate, 225ml (18035) **M**
- **O** Benzoyl Peroxide Paste (50%), 15g (18097) **M**

■ JB-4® Embedding Kit

Based on Glycol Methacrylate (GMA) plastic embedding

18020 JB4® Embedding Kit each

- **F, I, T** Solution A, 800ml (18023) **M**
- **F, I, T** Solution B, 30ml (18024) **M**
- **O** Catalyst, 12g (18025) **M**

■ JB-4 Plus® Embedding Kit



Based on Glycol Methacrylate (GMA) plastic embedding.

18040 JB4 Plus® Embedding Kit. each

- **F, I, T** Monomer Solution A, 500ml (18043) **M**
- **F, I, T** Accelerator Solution B, 15ml (18044) **M**
- **O** Catalyst, 8g (18045) **M**

■ LR Gold Resin

LR Gold was designed for embedding at lower temperatures than are possible with LR White. A major component is a Polyhydroxy-substituted bisphenol A dimethacrylate resin (80%), with a long-chain C12 methacrylate ester (19.6%). The accelerator is N,N-dimethyl paratoluidine (0.4%). It is particularly useful for em-

bedding large samples, up to 3 x 3 x 3mm in size, of unfixed tissue for light microscopy.

The tissue is dehydrated in methanol and PVP and infiltrated with LR Gold at -25°C, and the resin is then polymerized at -25°C by irradiation with blue light, after the addition of 0.1% (w/v) of the photo-initiator, benzil. The resin polymerizes in about 20 h at -25°C (Causton 1984). Alternatively LR Gold is polymerized at temperatures down to -25°C by UV irradiation, after the addition of 0.5 to 0.6% (w/w) benzoin methylether as the initiator. The final blocks are gold in color.

LR Gold does not appear to have any advantages over LR White for electron microscopy, since the preservation of ultrastructure is very poor. It is mainly of value for cytochemical and immunocytochemical studies by light microscopy. **I**

18183 LR Gold Resin, 500ml, ■ **I**; ■ **M** each

Reference for LR Gold

Glauert AM, Lewis PR, 1988. Biological Specimen Preparation. In Practical Methods in Electron Microscopy, Vol. 17. Glauert, AM (ed.), Princeton University Press, Princeton, N. J.: 248.

■ Benzoin Methyl Ether

UV Catalyst for Prod. No. 18183 LR Gold; use at 0.5% w/v, ~365nm.

18186 UV, Benzoin Methyl Ether, 10g, ■ **T**; ■ **M** each

■ LR Gold Resin, Hard

Non-toxic resin with catalyst packaged separately. Accelerator 18185 can be used for cold-cure (room temperature). Heat cure is 24 hours between 50°C and 65°C. Gelatin capsules are recommended for temperatures below 60°C. Tightly close BEEM® Capsules and PTFE Molds with ACLAR® as cover (Prod. No. 10506 or 10508) work well at 65°C. Widely used because of excellent immunolabeling results and very low viscosity (8cps). ■ **I**; ■ **M**

18182 LR Gold Resin, Hard, 500ml each

■ LR White Resin, Medium



Resin with initiator (BPO) packaged separately. Accelerator 18185 can be used for cold-cure (room temperature). Heat cure is 24 hours between 50°C and 65°C. Gelatin capsules are recommended for temperatures below 60°C. Tightly closed BEEM® Capsules and PTFE Molds with ACLAR™ as cover (Cat. No. 10506 or 10508) work well at 65°C. Widely used because of excellent immunolabeling results. LR White is a polar, monomer polyhydroxylated aromatic acrylic resin (see PTFE Molds, page 602).

Sections from LR White appear "bumpy" in contrast to Epon resin sections. It is possible that Epon links covalently to tissue proteins while LR White links more weakly. "LR White appears to act in a manner similar to ice in a freeze-fractured specimen".* A. Yamamoto and Y. Tashiro, using AFM, found a strong relief surface

continued on next page

on LR White sections, 3-4nm on average. Depressions range from 6 to 30nm. Protrusions could be seen on the complimentary surface. Epon sections show relatively smooth surfaces.** Micrographs appear similar to freeze-etched images but scaled to nm instead of μm . ■ I; ■ M ■ T

18181 LR White Resin, Medium, 500ml. each

References for LR White Medium

*Carmichael SW, 1995. Down the resolution road: freeze-fracture revisited? Microscopy Today: 3.

**Yamamoto A, Tashiro Y, 1994. Visualization by an atomic force microscope of the surface of ultra-thin sections of rat kidney and liver cells embedded in LR White. J Histochem Cytochem 42: 1463-1470.

Newman GR, 1987. Use and abuse of LR White. J. Histochem, 19: 118.

Newman GR, 1989. LR White embedding medium for colloidal gold methods. In: Colloidal Gold: Principles, Methods, and Applications, V. 2, (Hayat MA, ed).

■ LR White Cold Cure Accelerator

18185 Accelerator for LR White, 10ml ■ I; ■ M each

■ Lowicryl Kit

Lowicryl HM20®, MonoStep®, Non-Polar

18174 Lowicryl® HM-20, MonoStep®, Non-Polar, 225g ■ I ■ F; ■ M each

■ PELCO® Acrylic Embedding Resin Kit

A unique acrylic resin modeled after the UNICRYL® acrylic resin. The advantage of this resin is that the catalyst is supplied separate from the resin components. Shelf life is improved and heat induced changes during shipping are eliminated.

This resin is ideally suited for LM and EM applications (immunocytochemistry, ultrastructural preservation, *in situ* hybridization with good cutting properties for either thick or thin sectioning).

Unique cutting properties have been attributed to this resin formulation. Proteins, nucleic acids and macromolecules are revealed at the surface during sectioning. It is a hydrophilic resin which exhibits unique staining properties at the light level for a wide range of stains (i.e. Hematoxylin, Silver Methenamine, Light Green, Eosin, Safranin, Toluidine Blue).

The resin contains Styrene Monomer (hazard, see MSDS), Monomeric (Meth)-acrylate Esters with Benzoyl Peroxide supplied as the initiator. Mixing of the initiator is required prior to use. The resin is best stored at -20°C after the addition of the initiator but the resin will remain liquid down to -50°C. It is a pale yellow liquid with a pungent odor that can be cured with either heat or UV radiation. Best results are attained when the resin is microwave cured. The resin should be capped during polymerization due to evaporation. Use proper gloves, fume hood and eye protection.

18190 PELCO® Acrylic Embedding Resin Kit, 500ml. . each

■ F, I, T PELCO® Acrylic Embedding Resin Kit, 500ml ■ M

■ O, I Benzoyl Peroxide Paste, 6.5g (18190-B) ■ M

■ M = MSDS on web page

■ T = Tech Note on web page

■ H ◀ F = HAZARD Fee may apply*

■ PELCO® 2-Hour Epoxy Mount Kit

for optical clarity, high hardness, low viscosity and good adhesion



The PELCO® Epoxy Mount Kit uses a cold embedding material designed for metallography, ceramography, geology and petrology samples. Used for light microscopy, scanning electron microscopy and micro probe analysis. It has low viscosity, low exotherm and low shrinkage.

It can be used in conjunction with vacuum impregnation to ensure complete and void-free embedding. The cured resin is extremely hard, optically clear, and has excellent bond strength. It gives excellent polish and edge retention to the sample. Polymerization time is 2 hours at 77° F (25° C). Mixing ratio is 2:1 per volume (resin 2 parts to hardener 1 part). ■ T



Example: Circuit Board encapsulated using the PELCO® Epoxy Mount Kit. The clear resin allows for easy identification of sample.

The Kit contains the following items:

PELCO® Epoxy Resin, 1 gallon (3,785ml), (813-501), □ U; ■ M

PELCO® Fast Cure Hardener, 0.5 gallon (1,892ml), (813-504) □ U; ■ M H ◀ F

PELCO® Epoxy Pump, set of 2, (813-503)

Mixing Sticks, pkg/100, (128-4)

Tri-Stir Beakers, 100ml, with pouring spout, pkg/20, (12904-20)

Tri-Stir Beakers, 250ml, with pouring spout, pkg/20, (12906-20)

813-500 PELCO® 2-Hour Epoxy Mount Kit each

■ Cg = Suspected Carcinogen

■ C = Corrosive

■ F = Flammable

■ I = Irritant

■ L = Lachrymator

■ O = Oxidizing

■ R = Radioactive

■ T = Toxic

□ U = Unlisted

■ "Spurr" Low Viscosity Kits

The Spurr Kit gives excellent penetration for tough materials particularly in the studies of botanical, mineral and other hard biological specimens. When the mixture is kept at room temperature for 24 hours its viscosity will increase to 140cP, as is the case with other resins. When fully formulated, the Spurr's resin will store in a deep-freeze for two months and at room temperature for two days. Curing is done at 70°C for about 8 hours (see our Microwave system for significant time saving during epoxy processing). See the E. Ann Ellis article referenced below for information about new formulation.

For making high resolution replication molds for casting "Spurr" resin go to President Replication Kit.

18300-4221 Low Viscosity "Spurr" Kit, total kit volume 975g **T H F** each

- **Cg** ERL 4221 (replaces ERL 4206), 225ml (18306-4221) **M**
- **I** DER® 736, 250g (18310) **M**
- **I** NSA, 450g (18301) **M**
- **C** DMAE, 25g (18315) **M**

Spurr AR, 1969. A low-viscosity epoxy resin embedding medium for electron microscopy. J Ultrastruc Res, 26: 31.

ERL 4221 has replaced ERL 4206. ERL 4221 has a higher viscosity than the previously used ERL 4206.

* Spurr-replacement "New Formulation"

Ellis EA, 2006. Solutions to the Problem of Substitution of ERL 4221 for Vinyl Cyclohexene Dioxide in Spurr Low Viscosity Embedding Formulations, Microscopy Today, Vol 14, No. 4.

Mini Test Kits

■ Poly-Bed® 812 Resin Test Kit



Contains BDMA as accelerator in place of DMP-30 for faster infiltration. Instructions, Supplies, Syringes provided for leftovers. Mixture bottle provided.

18107 Poly-Bed® Test Kit **T H F** each

- **I** Poly-Bed 812®, 50ml **M**
- **I** DDSA, 40ml **M**
- **T** NMA, 25ml **M**
- **C, T, I, F** BDMA, 3.5ml **M**

■ "Spurr" Low Viscosity Mini Kit



Includes 92ml total consisting of ERL 4221, DER® 736, NSA, DMAE and supplies for embedding.

See the E. Ann Ellis paper regarding the use of ERL 4221 under Prod. No. 18300-4221, left column.

18108 "Spurr" Low Viscosity Mini Kit **T H F** each

- **Cg** ERL 4221 (replaces ERL 4206), 225ml **M**
- **I** DER® 736, 20ml **M**
- **I** NSA, 55ml **M**
- **C** DMAE, 5ml **M**

Electron and Light Microscopy Tissue Processing

■ Acetonitrile

Suggested substitute for Propylene Oxide. It is reported as non-carcinogenic, less toxic and not as flammable. High purity; miscible with water, alcohols, acetone and epoxy resins*.

Also used as a dehydrating agent for cells prepared for SEM**.

■ **F, T, M**; **H F**

18612 Acetonitrile, 450ml each
CH₃CN; [75-05-08]; FW 41.05

*Tarnowski BI, Schonbaum GR, 1984. Acetonitrile: substitute for propylene oxide in tissue processing for transmission electron microscopy. Proc 42nd Ann Meeting Elec Mic Soc Amer: 38.

Edwards HH, Yeh YY, Tarnowski BI, Schonbaum GR, 1992. Acetonitrile as a substitute for ethanol/propylene oxide in tissue processing for transmission electron microscopy: Comparison of fine structure and lipid solubility in mouse liver, kidney, and intestine. Micro Res & Tech, 21: 39 50.

**Also used as a dehydrating agent for cells prepared for SEM: Holshek JG, Akins RE, 1994. Acetonitrile is better than ethanol as a dehydrating agent for cells prepared for SEM. Proc Mic Soc of Amer, 52nd Annual Mtg 1994, San Francisco Press, ed GW Bailey and AJ Garrett-Reed: 324-325.

■ Araldite 502

See details under Araldite 502 Embedding Kit on page 69.

■ **C, T, I, F**; **M**

18060 Araldite 502, 450g. each
[25068-38-6]

■ Benzoin Methyl Ether

UV Catalyst for Prod. No. 18183 LR Gold; use at 0.5% w/v, ~365nm.

■ T, I; ■ M

18186 Benzoin Methyl Ether, 10g each
[3524-62-7]; MW 226.3

■ Benzyldimethylamine

(BDMA) N,N-Dimethylbenzylamine catalyst for epoxy resins. Has lower viscosity compared to DMP-30 and also stores longer.

■ C, T, I, F; ■ M

18241 Benzyldimethylamine, 25g each
 $C_6H_5CH_2N(CH_3)_2$; [103-83-3]; FW 135.21

Viscosities: BDMA= 0.85 cP; DMAE= 3.32 cP; DMP-30= 20.50 cP (at 25°C)

■ Biobond™

Tissue Section Adhesive

slide coating with advantages, especially for immunolabeling



Coating slide surfaces has been done with a variety of adhesives such as Poly-L-Lysine, chrome alum and other materials but they are not suitable for immunogold labeling because of increased background caused by attraction of gold particles to the slide's adhesive.

The surface of glass slides is uneven and is activated by the silicon tetrahedral structure. Active sites are then provided for adsorption of proteins

or reactions with chemicals and reagents. A coating material of low reactivity towards reagents minimizes this possibility.

Biobond™ produces a very strong adhesion between the glass and the tissue section for subsequent incubations. BIOBOND coats a glass slide with a protective layer to minimize interaction of charged glass surfaces with reagents. This is important for reproducibility of results because of variations that occur between glass slides obtained from different sources and in different countries. It is very effective when used under severe incubating conditions such as those encountered for *in situ* hybridization.

Biobond™ is suitable for all kinds of tissue specimens including paraffin wax or resin sections, cell smears, cytopins or cryostat sections. It is supplied in 10ml volumes sufficient to coat at least 1,000 slides.

Detailed protocols provided. ■ I; ■ M ■ T

15715 Biobond™ Tissue Adhesive, 20ml each

■ Cacodylic Acid, Sodium Salt, trihydrate

Arsenic compound. **Highly toxic.** Hygroscopic.

■ T (Highly); ■ M; ■ H◀F

18851 Cacodylic Acid, Sodium Salt, trihydrate, 100g. each
 $(CH_3)_2As(O)ONa \cdot 3H_2O$; [124-65-2]; FW 214.02; UN1688

Sabatini DD, Miller F, Barnett RJ, 1963. Cytochemistry and electron microscopy. The preservation of cellular structure and enzymatic activity by aldehyde fixation. J Cell Biol 17: pp 19 58.

■ Citifluor Mountant Media

All products are shown on page 266 - 267 and 451 to 452.

■ Chloramine-T Algicide



A non-corrosive algicide for use with constant temperature bath or recirculation chillers like the PELCO Steadytemp™ and chillers used for TEM/SEM systems. Chloramine-T algicide prevents the growth of algae which can be damaging to equipment and instrumentation. The product can be used as a shock treatment, or as a preventative treatment at a dosage of 1 gram per gallon. Best to use distilled water to avoid scaling and shield the bath and cooling lines from light. □ U; ■ M

18625 Chloramine-T Algicide, 25gm each

■ Cresyl Fast Violet, Certified

Histology Stain (Cresyl Violet Acetate). Solubility: 0.13% water.

□ U; ■ M

18709 Cresyl (Fast) Violet, Certified,
C.I. #51180, 5g each
 $C_{18}H_{15}N_3O_3$; [10510-54-0]; FW 312.34

Nguyen KB and Pender MP, 1989. Assessment of Demyelination in Glycol Methacrylate Sections: a New Protocol for Cresyl Fast Violet Staining. Stain Technology 64:4: 163-167.

■ PELCO CryO-Z-T™



Embedding matrix for frozen sections. Freezes specimen matrix for cryostat sectioning at temperatures <-10°C. Formulation of water soluble glycols and resins. No residue on slides during staining procedure.

27055 PELCO CryO-Z-T™, 4 oz. each

■ DAPI, Fluorescent Dye

Cytochemical investigations. Cell permeable fluorescent minor groove-binding probe for natural double-stranded DNA (powder).

■ I; ■ M

18706 DAPI, Fluorescent Dye (powder), 10mg each
4',6-Diamidino-2-phenylindole Dihydrochloride:Hydrate
 $C_{16}H_{15}N_5 \cdot 2HCl$; [28718-90-3]; FW 350.3

■ Cg = Suspected Carcinogen	■ O = Oxidizing
■ C = Corrosive	■ R = Radioactive
■ F = Flammable	■ T = Toxic
■ I = Irritant	□ U = Unlisted
■ L = Lachrymator	

CHEMICALS

Electron Microscopy and Light Microscopy Tissue Processing

■ Deionized Water, Reagent Grade A.C.S.

Prepared at 18 megohm/cm specific resistance using a reverse osmosis, mixed deionization, activated filtration and final filtration at 0.2 microns. □ U

Color: (APHA) <±5

Bacteriological purity 0CFUs/L

Residue after evaporation . . . 10ppm

Coliform negative

18708 Deionized Water, 1 gal. each
H₂O; [7732-18-5]; FW 18.02

■ Diglycidyl Ether of Poly(propylene glycol) (DER 736)

Epoxy flexibilizer; Viscosity 33.6 cP @ 25°C. ■ I; ■ M

18310 Diglycidyl Ether of Poly(propylene glycol) (DER 736), 250g each
[41638-13-5]; Specific gravity 1.14

■ (DMAE) 2-Dimethylaminoethanol S-1

Solvent; Substrate ■ C, L; ■ M

18315 2(Dimethylamino)ethanol (DMAE), 25g each
C₄H₁₁NO; [108-01-0]; FW 89.14

Viscosities: BDMA= 0.85 cP; DMAE= 3.32 cP; DMP-30= 20.50 cP (at 25°C)

■ (DMP-30) 2,4,6-Tri (Dimethylaminomethyl) phenol

Tertiary amine accelerator. Inactivated by water. Store in dark in vacuum desiccator.

DMP dehydration for EM references next column. ■ I; ■ M

18042 (DMP-30) 2,4,6-Tri (Dimethylaminomethyl) phenol, 25g each
[90-70-2]; FW 265.0; UN2735

Viscosities: BDMA= 0.85 cP; DMAE= 3.32 cP; DMP-30= 20.50 cP (at 25°C)

DMP-30 references:

Muller LL, Jacks TJ, 1975. Rapid Chemical Dehydration of Samples for Electron Microscopic Examinations. The Journal of Histochemistry and Cytochemistry. Vol. 23, No. 2: 107-110.

Johnson WS, Hooper GR, Holdaway BF, Rasmussen HP, 1976. 2,2-Dimethoxypropane, a rapid dehydrating agent for scanning electron microscopy. W.S.Johnson, G.R. Hooper, B.F. Holdaway, and H.P. Rasmussen. Micron, Vol. 7: 305-306.

Morton D, Maser, Trimble JJ III, 1977. Rapid Chemical Dehydration of Biologic Samples for Scanning Electron Microscopy using 2,2-Dimethoxypropane. The Journal of Histochemistry and Cytochemistry, Vol. 25, No. 4: 247-251.

Thorpe JR, Diana MR, Harvey, 1979. Optimization and Investigation of the Use of 2,2-Dimethoxypropane as a Dehydration Agent for Plant Tissues in Transmission Electron Microscopy. Journal of Ultrastructure Research, 68: 186-194.

■ (DDSA) Dodecenyl Succinic Anhydride

Double-distilled. Moisture sensitive. Hardener for epoxy resins. Viscosity 290-295 cP, density 1.005g/ml.

■ I; ■ M

18022 Dodecenyl Succinic Anhydride, (DDSA) 450g each
[26544-38-7]; FW 266.38

■ Eponate 12™ Resin

Aliphatic epoxy resin based on di- and tri-glycidyl ethers of glycerol. Substitute for "Epon®". Excellent results with traditional EM specimen block preparations. Viscosity (cP) at 25°C 130-170, WPE 140-150, specific gravity 1.24.

■ I, Cg; ■ M

18005 Eponate 12™ Resin, 450g each
[25038-04-4]

■ 1, 2 Epoxypropane

Note: See Propylene Oxide (transition solvent)

■ ERL 4221 Epoxide Resin

A Cycloaliphatic Epoxide Resin specially formulated to take the place of ERL 4206 which is no longer available.

■ Cg; ■ M

18306-4221 ERL 4221 Epoxide Resin, 225ml each
C₁₄H₂₀O₄; [2386-87-0; 2611-00-9]; FW 1.173

■ Ethyl Alcohol, Anhydrous

■ F, T; ■ M; H◀F

19206 Ethyl Alcohol, 1 Liter, A.C.S., glass distilled . . each

19207 Ethyl Alcohol, 200ml, A.C.S., glass distilled . . each
C₂H₅OH; [64-17-5]; FW 46.07

■ Formaldehyde, 16%

EM grade. Paraformaldehyde solution (methanol free). Pre-scored amber ampoules sealed under inert gas.

■ Cg, T (Highly); ■ M ⓘ

18505 Formaldehyde, 16%, 10x10ml each

18505-100 Formaldehyde, 16%, 100ml each
HCHO; [50-00-0]; FW 30.03

■ Formaldehyde, 37%

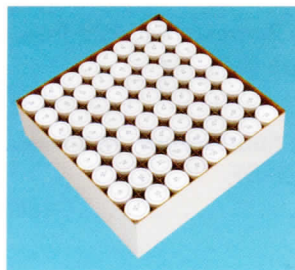
Histological Fixative. (35 - 38% Formaldehyde, 10 - 15% Methanol)

■ Cg, T (Highly); ■ M ⓘ

18508 Formaldehyde, 37%, microfiltered (Formalin), 10 x 10ml. each

■ M = MSDS on web page
ⓘ = Tech Note on web page
H◀F = HAZARD Fee may apply*

■ Pre-Fill Formalin Containers



This traditional fixative is buffered to a neutral pH. It is used in histological

applications for fixing and storing tissue specimens. This line of all plastic containers is designed specifically for the collection and transportation of various sizes of tissue samples. Each container is half filled with 10% neutral buffered formalin. The sizes offered are 20ml and 120ml. They are packaged in the proprietary Sure-Lok system. These containers are 95 kPa compliant.

- 18511** NB Pre-Fill Formalin 20ml Containercase/128
- 18512** NB Pre-Fill Formalin 20ml Containercase/780
- 18513** NB Pre-Fill Formalin 40ml Containercase/50
- 18514** NB Pre-Fill Formalin 60ml Containercase/50
- 18515** NB Pre-Fill Formalin 90ml Containercase/50

■ Formalin, 10% W/V Neutral Buffered

Histological Fixative. Phosphate Buffer. pH 6.9 - 7.1 at 25°C.

Note: ACS Reagent Grade Formalin (35 - 38% Formaldehyde, 10 - 15% Methanol) larger quantities available on request.

■ Cg, T (Highly); ■ M ■ T

- 18510** Formalin, 10% Neutral Buffered, 450ml.each

■ Formvar

Polyvinyl formal powder. Substrates for EM; soluble in ethylene dichloride, chloroform, dioxane.

■ I; ■ M

- 19222** Formvar 15/95 Resin, Powder, 100g.each
[63450-15-7]

■ Gelatin, Purified

Coating glass slides - adhesive. Cryosectioning¹⁶.

□ U; ■ M [9000-70-8]

- 19225** Gelatin, Purified, 100geach

Hartmann R, 1984. A new embedding medium for cryosectioning eggs of high yolk and lipid content. Eur J Cell Biol, 34: 206.

■ Glutaraldehyde

EM grade purified glass distilled Glutaraldehyde sealed with inert gas in amber small-volume ampoules, or in bottles for larger volumes.

■ C, T, L (all); ■ M



- 18420** Glutaraldehyde, 8% EM grade, 10 x 2mleach

- 18421** Glutaraldehyde, 8% EM grade, 10 x 10mleach
- 18422** Glutaraldehyde, 8% EM grade, 100mleach
- 18426** Glutaraldehyde, 25% EM grade, 10 x 10mleach
- 18427** Glutaraldehyde, 25% EM grade, 100mleach
- 18431** Glutaraldehyde, 50% EM grade, 10 x 10mleach
- 18432** Glutaraldehyde, 50% EM grade, 100mleach
- 18436** Glutaraldehyde, 70% EM grade, 10 x 2mleach

■ Ampoule Breaker; Soft Silicone



A simple way to break ampoules. Takes 5, 7, and 10ml ampoules. Reduces injury and spillage.

- 439-5** Ampoule Breaker, Silicone.each

■ Ampoule Breaker; Disposable



for safely fracturing prescored ampoules

Slip the Ampoule Breaker over the top of the ampoule at the prescored portion, press on collar to snap off the top. Discard the top along with the Ampoule Breaker (using proper safety precautions for hazardous waste disposal).

- 18407** Ampoule Breaker, Disposable,
11-20ml sizepkg/1000

■ GridStick™ Adhesive

Used to adhere SynapTek™ grids to the GridStick™.

■ F, I, T; ■ M

- 155-9** GridStick™ Adhesive, 5mleach

■ Hematoxylin

(Natural Black I, Hydroxybrasilin) Solubility: 10.0% Water; 10.0% Alcohol; 9.5% Cellosolve; 10% Glycol; 0.0% Xylene.

■ I; ■ M

- 18721** Hematoxylin, Certified, C.I. #75290, 10geach
C₁₆H₁₄O₆; [517-28-2]; FW 302.29

Chen, Chang S, 1972. A certified biological stain used in histology and cytology and plastic embedded tissues. Chen, Chang, S., J Arch. of Path., 93: 334. -

■ Cg = Suspected Carcinogen
■ C = Corrosive
■ F = Flammable
■ I = Irritant
■ L = Lachrymator

■ O = Oxidizing
■ R = Radioactive
■ T = Toxic
□ U = Unlisted

■ M = MSDS on web page
■ T = Tech Note on web page
H◀F = HAZARD Fee may apply*

■ Hexamethyldisilazane (HMDS)

Drying tissues for SEM. Stain Tech, 58(6), 347, 1983.

■ C, F, I, T; ■ M; H◀F

18605 Hematoxylin, Certified, C.I. #75290, 10g . . . each
(CH₃)₃SiNH₂Si(CH₃)₃; [999-97-3]; FW 161.40; UN2924

■ HistoClear/HistoClear II

HistoClear (distilled essential oils - food grade) and HistoClear II (a mixture of essential oils - food grade, reduced citrus odor) are excellent clearing agents replacing Xylene. □ U; ■ M

18390-L HistoClear, liter each

18390-G HistoClear, gallon. each

18391-L HistoClear II, liter each

18391-G HistoClear II, gallon each

■ HistoMount™

Museum quality mounting media, permanent clarity, stringently controlled optical specifications.



HistoMount™ is the classic choice in synthetic mounting media. HistoMount™ provides a permanent seal to store or ship slides with confidence.

HistoMount™ is a pH neutral, UV stabilized preparation which retains its clarity and brilliance for years. Refractive index is matched to glass cover slips and slides, reducing chromatic aberration with any light source.

HistoMount™ is effective with most clearing agents when used as a liquid cover slip or as a permanent mounting medium for traditional glass cover slipping. A dip stick providing an optimal amount of HistoMount™ is provided with each 100ml bottle.

□ U; ■ M

19479 HistoMount™, 100ml each

19480 HistoMount™, 450ml each

■ Immersion Oil



Low viscosity (150cSt), low fluorescence, PCB-free.

19552 Cargille Immersion Oil, Type A, low viscosity, 120ml each

High viscosity (1250cSt), low fluorescence, PCB-free.

19556 Cargille Immersion Oil, Type B, high viscosity, 120ml each

Very high viscosity (21000cSt), low fluorescence, PCB-free.

19562 Cargille Immersion Oil, Type NVH, very high viscosity, 118ml each

Very high viscosity (21000cSt), low fluorescence, PCB-free.

19564 Cargille Immersion Oil, Type DF, 1 oz. (29.5ml) each

■ Immersion Oil, 5-Pack



One each of type 300, Type NVH, Type B and Two each Type A

□ U; ■ M (all)

19568 Immersion Oil, 5-Pack, 5 x 7.4cc, each

■ JB-4® Embedding Kit

Based on Glycol Methacrylate (GMA) plastic embedding. H◀F

18020 JB-4® Embedding Kit each

■ F, I, T Solution A, 800ml (18023) ■ M

■ F, I, T Solution B, 30ml (18024) ■ M

■ O Catalyst, 12g (18025) ■ M

■ F, I, T Accelerator Solution B, 15ml (18044) ■ M

■ O Catalyst, 8g (18045) ■ M UN3104

■ JB-4 Plus® Embedding Kit



Based on Glycol Methacrylate (GMA) plastic embedding.

18040 JB-4 Plus® Embedding Kit each

■ F, I, T Monomer Solution A, 500ml (18043) ■ M

■ F, I, T Accelerator Solution B, 15ml (18044) ■ M

■ O Catalyst, 8g (18045) ■ M UN3104

■ Cg = Suspected Carcinogen

■ C = Corrosive

■ F = Flammable

■ I = Irritant

■ L = Lachrymator

■ O = Oxidizing

■ R = Radioactive

■ T = Toxic

□ U = Unlisted

■ M = MSDS on web page

■ T = Tech Note on web page

H◀F = HAZARD Fee may apply*

■ Liquid Release Agent

A hydrosoluble mold-release agent for use in flat embedding of micro-organisms, and as a replacement for the PTFE coating of glass slides to produce a smoother, even surface. □ U

18027 Liquid Release Agent, 100ml each

■ LR Gold Resin

Resin (acrylic) only, no catalyst included. Requires Catalyst Prod. No. 18186, see below. UV, benzoin methyl ether MSDS (~365nm) (0.5% w/v); "blue light", benzil MSDS (~460nm) (0.1% w/v); benzoyl peroxide MSDS (1% w/v), cold-cure. Accurate measurements of catalyst are very important. LR Gold can be used at low temperatures (-25°C) and has proven very useful for immunogold procedures. Very low viscosity: 8cP. Applied to both LM (enzyme histochemistry) and EM (immunochemistry) techniques.

18183 LR Gold Resin, 500ml, ■ I; ■ M; ■ T each
UV Catalyst for Prod. No. 18183 LR Gold; use at 0.5% w/v, ~365nm.

18186 UV, Benzoin Methyl Ether, 10g, ■ T; ■ I; ■ M each
[3524-62-7]; MW 226.3

■ LR White Resin, Hard

Resin with catalyst packaged separately. Accelerator 18185 can be used for cold-cure (room temperature). Heat cure is 24 hours between 50°C and 65°C. Gelatin capsules are recommended for temperatures below 60°C. Tightly close BEEM® Capsules and PTFE Molds with ACLAR® as cover (Prod. No. 10506 or 10508) work well at 65°C. Widely used because of excellent immunolabeling results. ■ I; ■ M; ■ T

18182 LR White Resin, Hard, 500ml each

■ LR White Resin, Medium



Resin with catalyst packaged separately. Accelerator 18185 can be used for cold-cure (room temperature). Heat cure is 24 hours between 50°C and 65°C. Gelatin capsules are recommended for temperatures below 60°C. Tightly closed BEEM® Capsules and PTFE Molds with ACLAR™ as cover (Cat. No. 10506 or 10508) work well at 65°C. Widely used because of excellent immunolabeling results. LR White is a polar, monomer polyhydroxylated aromatic acrylic resin (see PTFE Molds).

Sections from LR White appear "bumpy" in contrast to Epon resin sections. It is possible that Epon links covalently to tissue proteins while LR White links more weakly. "LR White appears to act in a manner similar to ice in a freeze-fractured specimen."* A. Ya-

mamoto and Y. Tashiro, using AFM, found a strong relief surface on LR White sections, 3-4nm on average. Depressions ranged from 6 to 30nm. Protrusions could be seen on the complimentary surface. Epon sections show relatively smooth surfaces.** Micrographs appear similar to freeze-etched images but scaled to nm instead of µm. Viscosity = 8cP.

■ I; ■ M; ■ T

18181 LR White Resin, Medium, 500ml. each

References for LR White Medium

* Carmichael SW, 1995. Down the resolution road: freeze-fracture revisited? Microscopy Today, 95-1: 3.

** Yamamoto A, Tashiro Y, 1994. Visualization by an atomic force microscope of the surface of ultra-thin sections of rat kidney and liver cells embedded in LR White. J Histochem Cytochem, 42: 1463-1470.

Newman GR, 1987. Use and abuse of LR White. J. Histochem, 19: 118.

Newman GR, 1989. LR White embedding medium for colloidal gold methods. In: Colloidal Gold: Principles, Methods, and Applications, V. 2, (Hayat MA, ed).

■ LR White Cold Cure Accelerator

18185 Accelerator for LR White, 10ml ■ I; ■ M each

■ Lead Citrate

Handle with care. Read hazard warnings. ■ I, T; ■ M (all)

19312 Lead Citrate, Trihydrate, 10g each

19314 Lead Citrate, Trihydrate, 50g H◆F each
Pb₃(C₆H₅O₇); 3H₂O; [512-26-5]; FW 1053.82; UN2291

Reynolds ES, 1963. The use of lead citrate at high pH as an electron-opaque stain in electron microscopy. J. Cell Biol., 17: 208-212.

■ Lowicryl® HM-20 MonoStep® (non-polar)

Pre-mixed, ready to use embedding media. ■ I, O, T; ■ M; H◆F

18174 Lowicryl® HM-20 MonoStep® (non polar),
225g each

27215 Tissue-Tek® Mold Release, 4 oz. . . each

■ Methylamine Tungstate

An excellent negative stain. Unlike phosphotungstic Acid, it does not damage virus particles and it is consequently valuable for staining delicate viruses. □ U; ■ M

18353 Methylamine Tungstate, 1g each

Faberge AC, and Oliver RM, 1974. Methylamine Tungstate, a New Negative Stain. J. Microscopy 20: 241-246.

■ Cg = Suspected Carcinogen	■ O = Oxidizing
■ C = Corrosive	■ R = Radioactive
■ F = Flammable	■ T = Toxic
■ I = Irritant	□ U = Unlisted
■ L = Lachrymator	

■ M = MSDS on web page
■ T = Tech Note on web page
H◆F = HAZARD Fee may apply*

CHEMICALS

Electron Microscopy and Light Microscopy Tissue Processing

■ Mold Release, Tissue-Tek®



A mold release concentrate used to coat base molds for easy release of paraffin blocks. Dilute 5ml of concentrate with 95ml of ethyl or isopropyl alcohol. Dip molds and dry before use.

For sale in U.S.A. only.

27215 Tissue-Tek® Mold Release, 4 oz. . . each

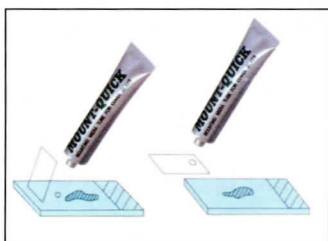
■ Mount-Quick Aqueous Mounting Medium



Mount-Quick has been developed for mounting stained sections for lipoid and immune staining, especially when soluble chromogen solution, i.e. AEC, is used with an organic solvent. 30ml bottle. Refractive Index: 1.41; Specific Gravity: 0.88 so; viscosity: 33 cP (25°); pH: 7.0. □ U

19477 Aqueous Mounting Medium,
one bottle of 30ml each

■ Mount-Quick, Mounting Medium



Total control over dispensed drops. No change in density. Mount-Quick dries quickly with high transparency and no bubbles. It will not fade or deteriorate. It is soluble in xylene. A tightly capped tube will give long term storage without leaking. 30ccm.

Density: 40% solids; Specific Gravity: 0.89SP; Viscosity: 33cP (25°)
□ U

19478 Mounting Medium in a tube, 30ccm each

■ Nadic Methyl Anhydride (NMA)

Ethyl-5-norbornene-2,3-dicarboxylic anhydride. Moisture sensitive. Viscosity 225-275cp, density 1.24g/ml. Hardener for epoxy resins. ■ C, I; ■ M; H◆F

18032 NMA, 450g each
C₁₀H₁₀O₃; [25134-21-8]; FW 178.19

Mollenhauer HH, 1964. Plastic Embedding Mixtures for Use in Electron Microscopy, Stain technology, 39: 111.

■ Nonenyl Succinic Anhydride (NSA)

Double-distilled. Epoxy resin hardener. ■ I; ■ M

18301 Nonenyl Succinic Anhydride, (NSA), 450g. . . . each
[28928-97-4]; UN1760

■ OCT Compound, Tissue-Tek®



No residue or background staining. Freezes specimen matrix for cryostat sectioning at temperatures <-10°C. Formulation of water soluble glycols and resins. No residue on slides during staining procedure. 4 oz. bottle.

For sale in U.S.A. only.

27050 OCT Compound each

■ Osmium Tetroxide



Solid vaporizes by sublimation. Should be used only under the hood. Affects eyes. Use eye protection. EM Grade, glass ampoules in

black paper. No sticky labels. Osmium purity >99.95%. Light sensitive.

"Great care must be taken with osmium tetroxide. The crystals melt at 40°C and are extremely slow to dissolve in water. Both the crystals and diluted aqueous solutions give off fumes of osmium tetroxide, even at 0°C. It has an extremely low TLV (0.0002ppm). Osmium fixatives must therefore always be handled in a fume hood, and because they act so rapidly, skin contact must be avoided at all times."

TLV= Eight hour average Threshold Limit Value measured in milligrams per cubic meter of air.

■ O, T (highly); ■ M for all 4% aqueous and crystal

18459 Osmium Tetroxide, 4% aqueous, 10 x 2ml . . . each
18463 Osmium Tetroxide, 4% aqueous, 10 x 5ml . . . each
18465 Osmium Tetroxide, 4% aqueous, 10 x 10ml . . each
18450 Osmium Tetroxide, ¼ gram crystal, pkg/10 . . . each
18451 Osmium Tetroxide, ½ gram crystal. each
18456 Osmium Tetroxide, 1 gram crystal. each
FW 254.20; [20816-12-0]

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■ F = Flammable
■ I = Irritant
■ L = Lachrymator

■ O = Oxidizing
■ R = Radioactive
■ T = Toxic
□ U = Unlisted

■ OTE EM Stain

Substitute for Uranyl Acetate in staining of ultrathin sections.

■ I; M T

19483 OTE EM Stain, 10g each

Sato S, Sasaki Y, Adachi A, Dai W, Liu, X-L and Namimatsu S, 2003. Use of oolong tea extract (OTE) for elastin staining and enhancement in ultrathin sections. *Med Electron Microsc* 36 (3): 179-182.

■ Paraformaldehyde, EM Grade, Prill, Purified

Fixative. Polyoxymethylene. White free-flowing solid prill with strong, pungent formaldehyde odor. Avoid strong oxidizing agents and temperatures above 38°C. ■ T, F, I, Cg; M

18501 Paraformaldehyde, EM Grade, Prill Purified, 1kg each
(HO(CH₂O)nH; [30525-89-4]; FW~600; UN2213

Karnovsky MJ, 1965. A formaldehyde-glutaraldehyde fixative of high osmolarity for use in electron microscopy. *J Cell Biol*, 27: 137A.

Note: Karnovsky's 1965 fixative contains 5% glutaraldehyde and 4% formaldehyde in a sodium cacodylate buffer and is very hypotonic (p. 5:1.17, alternative solution strength and formulation suggested) 5. (Reference 5, p. 64)

Robertson JD, 1963. The occurrence of a subunit pattern in the unit membranes of club endings in Maunther cell synapses in gold fish brain. *J Cell Bio*, 19: 201.



■ PELCO CryO-Z-T™

Embedding matrix for frozen sections. Freezes specimen matrix for cryostat sectioning at temperatures <-10°C. Formulation of water soluble glycols and resins. No residue on slides during staining procedure.

27055 PELCO CryO-Z-T™, 4 oz. each

■ Phosphotungstic Acid, Reagent (PTA)

■ T, C; M

19402 Phosphotungstic Acid, Reagent (PTA), 25g . . . each
12WO₃H₃PO₄·xH₂O; [12067-99-1]; FW 2880

■ Pioloform™ Powder

Substrate component. Water-insoluble. Good thermal and mechanical stability. Because of small mass thickness, electron scattering within the film is low 0.3-1.5% solution in chloroform, filtered through filter paper. ■ I; M

19244 Pioloform™ Powder, 10g each
[28928-97-4]

Madden V, 1998. Pioloform instead of formvar as a support film for TEM. *Microscopy Today* 98(10): 22.

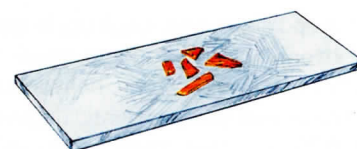
M = MSDS on web page
T = Tech Note on web page
H = HAZARD Fee may apply*

■ Poly-L-Lysine Solution

0.1% w/v aqueous solution; preservative. Adhesive for tissue sections on glass slides. Immunohistochemical techniques, gold labeling, microwave procedures. □ U; M

18021 Poly-L-Lysine solution, 500µl each

18026 Poly-L-Lysine solution, 10ml each



■ President SEM Replication Kit



Kit contains Base, Catalyst, 6 ea 30ml Mix-ing cups and 6 Wooden stirring sticks.

The President SEM Replication kit is a two component silicone based molding material with excellent low viscosity forming properties for high definition of fine structures. Polymerization time is only 5-7 minutes;

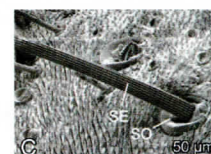
molds can be removed from samples directly after polymerization to obtain a negative mold. Applications can vary with replication of biological materials to achieve a stable surface or replication of processes like damage, wear or strain on large structures. The President replication kit can be used easily in the field and replaces the need to use fixative on suitable biological material. The silicone molds can be filled with Spurr to obtain a positive mold of the original surface and coated with Au or Au/Pd using a sputter coater. We advise use of modified Spurr since it has a low viscosity and provides excellent structure definition. The President Replication Kit yields good results with relatively long 10-30µm microstructures with aspect ratios from 1-20, and is capable of resolving small structures down to 20nm.



Positive mold of the Ommatidia surface of the eye of the sphindid moth Amorpha populi



Positive mold of the microtrichia of the damselfly Pyrrhosoma nymphula



Positive mold of the Head setae of the fly Calliphora vicina

44870 President SEM Resolution Replication Kit (2 tubes of 53ml) each

Garb SN, 2007. Visualization of native surfaces by two-step molding. *Micros Today* 15 (2): 44-46.

■ Cg = Suspected Carcinogen	■ O = Oxidizing
■ C = Corrosive	■ R = Radioactive
■ F = Flammable	■ T = Toxic
■ I = Irritant	□ U = Unlisted
■ L = Lachrymator	

■ Propylene Oxide, EM Grade

1,2-epoxypropane. Must use under hood, and with **all** caution. **Extremely low vapor pressure.** "Since epoxy resins are soluble in ethanol and acetone, dehydration is commonly carried out with one of these solvents. Because epoxy resins are more readily soluble in propylene oxide, this solvent is frequently used immediately prior to infiltration with the resin. Most resins are not readily miscible with ethanol". Propylene Oxide does not separate from the epoxy resin during curing, thus small amounts left in the resin do no harm.

Luft (reference under "Eponate" Kit) introduced Propylene Oxide into epoxy mixtures with his landmark paper and helped bring about improved embedding cures, better ultrastructural research results with blocks that would more reliably section and give better performance under the EM beam by reducing viscosity and increasing penetration. ■ Cg, F, I **Special Caution**; ■ M

18601 Propylene Oxide, EM Grade, 450ml each
CH₃CHCH₂O; [75-56-9]; FW 58.08

■ Ruthenium Red

Fixitive / Stain ■ I; ■ M

19421 Ruthenium Red, 1g. each
[(NH₃)₅ RuO₂(NH₃)₄ ORu(NH₃)₅]Cl₆ · 4H₂O
[11103-72-3]; FW 786.36



■ SHUR/Mount™, Water Based

Liquid Coverglass & Mounting Medium

SHUR/Mount™ Aqua-Poly/Mount, designed for coverslipping slides directly from water. As it is water based and non-fluorescing, it is applicable for immuno-fluorescent techniques as it enhances and retains fluorescent stains. ■ I; ■ M

27212 SHUR/Mount™ Aqua-Poly/Mount, 20ml. each



■ SHUR/Mount™, Toluene-Based

SHUR/Mount™ Toluene-Based Liquid Mounting Medium, for mounting and preservation of microscope slide specimens. ■ I; ■ M; H◀F

27214 SHUR/Mount™ Toluene-Based Liquid Mounting Medium, 4 oz. each

■ Sodium Hydroxide, Pellets

Reagent. For use during lead staining. ■ C, T; ■ M

19539 Sodium Hydroxide, Pellets, Reagent, ACS, 450g each
NaOH; [1310-73-2]; FW 40; UN1823

■ Sodium Hydroxide, 2N Solution

For making paraformaldehyde and lead staining. ■ C, T; ■ M

19540 Sodium Hydroxide, 2N Solution, carbonate-free, 225ml each
NaOH; [1310-73-2]; FW 40; UN1824

Normality 1.98 2.02, pH 8.6. Recommended: Bils RF, 1992. Electron Microscopy Laboratory Manual and Handbook, 2nd ed.: 154.

■ Sodium Phosphate, dibasic

Buffer. ■ I; ■ M

19545 Sodium Phosphate, dibasic, heptahydrate, Reagent, ACS, 450g each
Na₂HPO₄ · 7H₂O; [7782-85-6]; FW 268.07

■ Sodium Phosphate, monobasic

Buffer. Hygroscopic. ■ I; ■ M

19542 Sodium Phosphate, monobasic, anhydrous, Reagent, ACS, 1000g each
NaH₂PO₄; [7558-80-7]; FW 119.98

■ Sodium Sulfite

Hygroscopic. Photographic negative clearing agent. ■ I; ■ M

19437 Sodium Sulfite, Reagent, ACS, 500g each
Na₂SO₃; [7757-83-7]; FW 126.04

■ "Spurr" Kit

18300-4221 "Spurr" Kit ■ I; ■ M
(Note: See kits for info) each

■ Tissue-Tack™ Adhesive

Permanent attachment of sections to glass slides during caustic or prolonged washes. For routine, immunofluorescent, immunoperoxidase staining. ■ I; ■ M

19250 Tissue-Tack™ Adhesive, 100ml each

■ Toluidine Blue O, certified

For epoxy sections: 0.5% toluidine blue in 0.1% sodium carbonate solution at pH 11.1

For methacrylate/acrylic sections: 0.05% toluidine blue in benzoate buffer pH 4.4 (benzoic acid 0.25g, sodium benzoate 0.29g, water 200ml). ■ I, T; ■ M

19451 Toluidine Blue O, certified, 25g. each
C₁₅H₁₆CLN₃ S; [92-31-9]

■ Uranyl Acetate

Positive or negative stain, EM. May cause adverse mutagenic or teratogenic effects. ■ T, R (depleted); ■ M; H◀F

19481 Uranyl Acetate, 25g each
UO₂(CH₃COO)₂ · 2H₂O; [6159-44-0]; FW 424.14; UN2910