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Product Information

Spurr Low-Viscosity Embedding Kit

Catalog Number **EM0300**
Store at Room Temperature

TECHNICAL BULLETIN

Product Description

The introduction of Spurr[1] resin provided the microscopist with a resin of exceptional penetration qualities. Unlike the other epoxies, Spurr resin with a viscosity of 60 cps will readily penetrate membrane walls, hard tissue, rocks, and other minerals. It has also been used successfully in preparations of specimens with high lipid content, tissues with hard and lignified walls, and highly vacuolated parenchymatous tissue.[2]

Components

- ERL 4221 250 g
  Catalog Number E8659
  ERL 4221 is a cycloaliphatic epoxide resin which, because of its compact structure, yields highly cross-linked polymers with good high temperature resistance.

- Diglycidyl ether of polypropylene glycol (D.E.R. 736) 250 g
  Catalog Number D5944
  An epoxy resin flexibilizer

- Nonenyl succinic anhydride (NSA) 450 g
  Catalog Number N9538
  Hardener specially purified for EM usage.

- Dimethylaminoethanol (DMAE) 100 g
  Catalog Number D6069
  Accelerator

Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Preparation Instructions

	Standard Medium	Suggested Modifications of the Medium	
	Firm	Hard	Soft
Components			
ERL 4221	4.10 g	4.10 g	4.10 g
D.E.R. 736	1.43 g	0.95 g	1.90 g
NSA	5.90 g	5.90 g	5.90 g
DMAE	0.10 g	0.10 g	0.10 g
Cure schedule at 70°C	8 hours	8 hours	8 hours
Pot life	3.4 days	3.4 days	3.4 days

Note: Cure for minimum hours indicated or longer, generally overnight. Pot life is the time between initial mixing and the endpoint for convenient use. Store the prepared epoxy at room temperature in a closed container.

- To avoid hydrolysis of epoxide or anhydride bonds, we recommend minimum exposure of NSA to atmospheric moisture.
- Curing time can be shortened by increasing the percentage of DMAE. Decreasing the percentage of DMAE will give longer pot life to the resin and a lighter color.
- The amount of D.E.R. 736 may be regulated to provide embedments with a variety of hardness characteristics. Reducing the amount of D.E.R. 736 may slightly improve the amount of color.

The epoxy is prepared by weighing the components singly into a tared disposable plastic beaker. Exact weights should be used for optimum performance. The DMAE should be added last after mixing other components. The complete medium should now be mixed thoroughly by stirring. The resin mix should then be placed in a desiccator for storage during specimen dehydration and infiltration time.

The embedding medium should be freshly prepared. Measured aliquots containing ERL 4221, D.E.R. 736 and NSA can be stored, tightly sealed, at -20 °C. For use, thaw, add DMAE and mix thoroughly.

Dehydration of biological and some mineral specimens is achieved by the usual graded series of dehydrating fluids. The medium is compatible in all preparations with ethanol, methanol, acetone, *tert*-butyl alcohol, dioxane, hexylene glycol, isopropyl alcohol and propylene oxide. To minimize lipid loss, water and hexylene glycol (10, 20, 40, 60, 80% and 2 changes of 100% hexylene glycol) have been successfully used by Spurr.

Use the complete medium for infiltration. Continuous mild agitation is desirable during the infiltration using a rotator or shaker. Several variations of the infiltration procedure have been used. In some cases, the changeover from the dehydrating fluid to embedding fluid is made in three stages, while in others additional intermediate steps are needed. With larger specimens, it is beneficial to infiltrate in the afternoon and soak overnight in the embedding medium.

A rapid method useful for biopsies[3] can be employed which requires only 2 hours to complete embedments. With mineral specimens, alternate vacuum may help to speed impregnation. Specimens generally sink to the bottom of liquid media. Blocks can be cured in 8 hours in a 70°C oven, 16 to 24 hour cures will not damage embedments. If modifications of cure are required, the table provides suggestions. Spurr's resin has also been used as an embedding medium for immunohistochemical stains at the light microscopy level.[4]

Trimming and Polishing of Embedments

The castings have good trimming, sectioning and polishing qualities. The block faces are hydrophobic and are not wetted easily by distilled water during sectioning. Sections are tough under the electron beam and can be used without a supporting membrane on a 200 mesh grid. Mineral specimens can be easily polished on a lapping wheel. Castings are relatively inert and are resistant to $KMnO_4$ or $Ba(MnO_4)_2$. No noticeable effect of the electron transmission on the background plastic is observed with electron dense stains.

Grid staining for some tissues with uranyl acetate and lead citrate may require longer periods than usual or mild heat may be employed during staining. En bloc with uranyl acetate is recommended.

Hydrogen peroxide may be used to accelerate staining of Spurr sections,[5] and Seligman Osmiophilic Stain Techniques.[6] Excellent staining for light microscopy has been obtained by the Azur II methylene blue method of Richardson, et al.,[7]

References

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4. Mason, D.L., et al., *Lab. Med*, **17**, 213 (1986).
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6. Seligman, A.M., et al., *J. Histochem. Cytochem.*, **15**, 1 (1967).
7. Richardson, K.L., et al., *Stain Technology*, **35**, 313 (1960).

MF,PHC 05/10-1