Ladd Research
3 Ewing Place
Essex Junction, VT 05452
Tel: (802) 658-4961
Email: sales@laddresearch.com
Web: www.laddresearch.com

SPURR LOW VISCOSITY EMBEDDING MEDIUM

Catalog Number 21230

Spurr embedding medium is based on ERL 4221, a cycloaliphatic diepoxide. Its compact structure leads to highly crosslinked polymers. ERL 4221 is regarded as non-toxic. Minimum exposure to atmospheric moisture is recommended.

The cure accelerator is dimethylaminoethanol (DMAE) which gives a long pot life to the medium. Benzyl dimethylamine or DMP-30 may be used for a faster cure.

*The embedding medium is readily prepared by measuring each component by weight into any convenient container as follows:

ERL 4221	4.10 grams
DER 736	1.43 grams
NSA	5.90 grams
DMAE	0.1 grams

Variations in these compositions can be obtained by reference to Table I. Exact weight should be used for optimum performance. It is generally desirable to add the DMAE last after gentle mixing of the other three components. If bubbles form, they may be drawn off with a gentle vacuum applied to the mixing container.

NOTE: The anhydride hardener and the accelerator should never be mixed alone together due to the possibility of a rapid exothermic reaction.

Table I

Suggested Modifications of the Medium (Wt. in grams)

Ingredient	**Firm** (Most Common)	**Hard**	**Soft**
ERL 4221	4.10	4.10	4.10
DER 736	1.43	0.95	1.90
NSA	5.90	5.90	5.90
DMAE	0.1	0.1	0.1
Cure Schedule (hr) at 70°C	8	8	8

Dehydration:
The desiccation of biological specimens and some mineral specimens may be achieved by the usual graded series of dehydrating fluids, such as acetone, t-butyl alcohol, dioxane, ethanol, hexylene glycol, isopropyl alcohol and propylene oxide. To minimize lipid loss, hexylene glycol and water (10, 20, 40, 60, 80% and two changes of 100%) have been successfully used.

Infiltration and Cure:
Continuous mild agitation is desirable during the infiltration. In some cases, the changeover from dehydrating fluid to embedding is made in three stages while in others additional intermediate steps are needed. With specimens which are difficult to infiltrate such as mineral specimens, alternate vacuum may help to speed impregnation. It is important to cure the medium in a closed container (e.g. Beem capsule) with the cap sealed to prevent moisture contamination of the hygroscopic medium. Standard cure is 8 or more hours at 70°C in an oven. If the complete embedding medium is over 24 hours old, an hour or two less may be required. Where modifications of cure are required, Table I provides suggestions.

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. The sections are tough under the electron beam and can be used without 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 of the background plastic is observed with electron dense stains. Common fixation techniques for tissue using glutaraldehyde or osmium tetroxide and electron dense techniques for enhancing contrast using lead citrate, uranyl acetate and phosphotungstic acid have given good results with this medium. Excellent staining for light microscopy has been obtained with Azur II-methylene blue.

*These formulas are based on the following reference:
E.A. Ellis, Solutions to the Problem of Substitution of ERL 4221 for Vinyl Cyclohexene Dioxide in Spurr Low viscosity Embedding Formulations, *Microscopy Today,* July, 2006, p.32.