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Factors Affecting the Appearance of Picture Varnish

Among the factors that affect the appearance of a picture varnish of the spirit type, one might consider that the refractive index of the resin would play a major role. Refractive index has entered the literature regarding picture varnishes, yet I do not recall that its role has ever been demonstrated. There has certainly not been sufficient discussion of oil (linoxyn) (2).

Particular attention is drawn to variations in the refractive index of the varnish. On the surface of paintings, varnishes on the surface of paintings, with the hand, and yet it was porous to the applied varnishes. When the coat of varnish had dried, the value of the blue was noted simply as "dark" or "light." Table 1 shows that varnishes prepared with resins of high viscosity grade apparently do not form an intimate contact with the paint, with the result that the color appears light irrespective of the refractive index. Practical applications immediately come to mind when one does not wish to darken colors in pastels and porous paints.

The truly outstanding difference between the properties of the traditional picture varnishes, dammar and mastic, and those of many proprietary polymers is not in their refractive indices, but in the viscosity of their solutions. In place of intrinsic viscosity, we have used the viscosity at 20 percent solids by weight in toluene at 70°F as a convenient measure to characterize resins, giving the name "viscosity grade." A similar measurement has been used to classify chlorinated rubber (6). On this scale, dammar, mastic, and resin AW-2 (Badiac: Anilin und Soda Fabrik) have a viscosity grade between 1.2 and 1.3 centipoises (cp) whereas Bedacryl 122 X (I.C.I.) and Lucite 44 (du Pont) n-butyl polymethacrylate have values about 48. Compared with dammar resin, polymers of high viscosity grade resist flow at a relatively low concentration of solids. As the solvent evaporates beyond this point, the film tends to conform to the contours of the paint surface (7). In this manner, a

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Table 1. Color of lean polyvinyl acetate-ultramarine paint when varnished.

<table>
<thead>
<tr>
<th>Varnish resin</th>
<th>Solvent</th>
<th>Color</th>
<th>Viscosity grade (centipoise)</th>
<th>Refractive index of resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental polymethacrylate</td>
<td>Cycloparaffins</td>
<td>Light</td>
<td>22</td>
<td>1.48</td>
</tr>
<tr>
<td>Experimental polymethacrylate</td>
<td>Cycloparaffins</td>
<td>Dark</td>
<td>8</td>
<td>1.48</td>
</tr>
<tr>
<td>AW-2</td>
<td>Cycloparaffins</td>
<td>Dark</td>
<td>1.2</td>
<td>1.52</td>
</tr>
<tr>
<td>Dammar</td>
<td>Turpentine</td>
<td>Dark</td>
<td>1.3</td>
<td>1.53</td>
</tr>
<tr>
<td>Bakelite polyvinyl acetate AYAB</td>
<td>Toluene</td>
<td>Dark</td>
<td>9</td>
<td>1.467</td>
</tr>
<tr>
<td>Bakelite polyvinyl acetate AYAT</td>
<td>Toluene</td>
<td>Light</td>
<td>114</td>
<td>1.467</td>
</tr>
<tr>
<td>Polynyl alcohol</td>
<td>Water</td>
<td>Light</td>
<td>~400*</td>
<td>1.51</td>
</tr>
</tbody>
</table>

* Value determined in water.
varnish formulated with a resin of high viscosity grade tends to be less glossy than the dammar type, which is able to remain fluid, continuing to level itself, until much more of the solvent has departed.

Among museum authorities, interest in refractive index has centered about the appearance of coatings of polyvinyl acetate. The polymer long used in America, Bakelite vinyl resin AYAF (similar to the earlier Vinylite A), is one of relatively high (80 centipoises) viscosity grade. The formulation of Reid, originally presented by Stout and Gettens, (8) was tested in our laboratory and found to give poor distinctness-of-image gloss when it was sprayed on window glass, with the spray gun at a distance of 10 to 20 inches from the glass. In a control test, the gun emitted 35 to 70 ml of toluene per minute. Changes in formulation of the solvent markedly altered the gloss. This laboratory has for several years drawn the attention of museums to polyvinyl acetate polymers of 40- and 9-centipoise viscosity grade (9, 10).

ROBERT L. FELLER*  
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References and Notes

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10. I am indebted to A. E. A. Werner, Research Laboratory, British Museum, London, for the sample of resin AW-2, and to R. Snebry, Lab. Central des Musées de Belgique, Brussels, for the sample of Bedacryl 122X.

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