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# MANIPULATING MATERIALS: PREPARING AND USING PARALOID B-72 ADHESIVE MIXTURES

STEPHEN P. KOOB

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The use of Paraloid B-72 as an adhesive is based primarily on its notable conservation qualities, including stability and reversibility. It has very commendable working properties as well, including excellent adhesion and fast setting time, but these can easily be compromised by improper preparation and improper application. This article reviews the many ways that Paraloid B-72 adhesive should be prepared, modified, or manipulated to obtain easy and efficient application as well as consistent and excellent results.

Preparation is critical to having a dependable solvent-based adhesive, and acetone has proven to be the best solvent, as it makes a low-viscosity mixture and a fast-evaporating adhesive, and has very low toxicity. The ratio or percentage of solvent to resin can be modified to allow the conservator to control the application and setting time for different uses. One additive is recommended in the initial preparation, and that is the addition of a small amount of hydrophobic fumed colloidal silica, which aids in uniform application, stabilization of the mixture, even film formation, and slowed solvent evaporation. It is an inert material, classified as a rheological agent (to control flow characteristics).

For use on glass, a thinner solution of approximately 60% w/v is recommended because glass is non-porous and non-permeable, whereas a thicker solution of 72% w/v works better on more porous substrates, such as low-fired ceramics, porous stone, wood, bone, and ivory. To maintain a consistent fluid mixture and optimize application, the prepared adhesive should be poured into adhesive tubes specifically designed for solvent adhesives. This also improves the ease of use and helps to ensure the accurate assembly of fragments.

KEYWORDS: Paraloid B-72, Adhesive, Solvent, Tubes

## 1. CHOOSING AN ADHESIVE: CHARACTERISTICS OF B-72

Paraloid B-72 is an acrylic copolymer that has proven itself to be an almost ideal adhesive for numerous materials, especially ceramics and glass. It was researched extensively by Dr. Robert Feller, who classified it as a “Class A” resin, with a stability of more than 100 years (Feller 1963; Feller 1984). It has been recommended by the author since 1986, who has used it extensively for ceramics and glass for more than 30 years (Koob 1986; Koob 2009). It provides all of the desired properties of a general-purpose adhesive: stability (resistance to light, oxidation, and moderate heat), transparency, moderate strength, mechanical resistance, and reversibility. It was originally recommended by its manufacturer, Röhm and Haas, for its excellent adhesion to glass, as a finishing for metals, and as coatings over plastics, metals, and wood (Röhm and Haas 1983).

It can be easily dissolved in a variety of solvents, of which the most useful is acetone, as it makes a low-viscosity mixture and a fast-evaporating adhesive, and has very low toxicity. It sets by loss of solvent and can be prepared in thin to thick concentrations for a variety of uses. The proper preparation of the adhesive and application from a tube are key factors to its successful use. For an objects conservator, it is ideal for assembling broken fragments of ceramics or glass and gives consistent and long-lasting results. It fulfills the desired requirements for conservation including not damaging the ceramic or glass, whether during application, curing, or aging; it bonds extremely well; and it is removable or “reversible” without damage (Koob 2006, 46).

## 2. PREPARATION OF B-72 ADHESIVE

The following recommendations have been developed for a simple and quick way to prepare B-72 adhesive. These suggestions can be further modified by any conservator to adjust the consistency of the

adhesive to individual preferences. The initial preparation time can be as little as five minutes, whereas a subsequent longer (typically overnight) period is simply for the resin to dissolve. This simplified method eliminates any need to evaporate off solvent (to thicken the adhesive mixture), as published in early references (Koob 1986, 2006, 2009).

## 2.1 Recipes

*For thin B-72 (~48% w/v)*

Ideal for glass

1. Place a tall or wide-mouthed jar on a digital balance and zero or tare the scale.
2. Pour 81 g (105 mL) of acetone into the jar.
3. Stir in a level teaspoon of hydrophobic fumed silica (Aerosil 200 or Cabosil).
4. Weigh out 50 g of B-72 and tie it up into a tight cheesecloth "ball." Suspend the ball over the acetone so that it just touches the top of the solvent (figs. 1, 2).

*For thick B-72 (~55.5% w/v)*

Ideal for earthenware pottery

1. Place a tall or wide-mouthed jar on a digital balance and zero or tare the scale.
2. Pour 70 g (90 mL) of acetone into the jar.
3. Stir in a level teaspoon of hydrophobic fumed silica (Aerosil 200 or Cabosil).
4. Weigh out 50g of B-72 and tie it up into a tight cheesecloth "ball." Suspend the ball over the acetone so that it just touches the top of the solvent (figs. 1, 2).

DO NOT STIR OR AGITATE! The B-72 will dissolve faster by just taking advantage of gravity. As the resin dissolves and sinks toward the bottom of the jar, pure acetone at the top is made available to continue the dissolution of the resin in the cheesecloth ball.

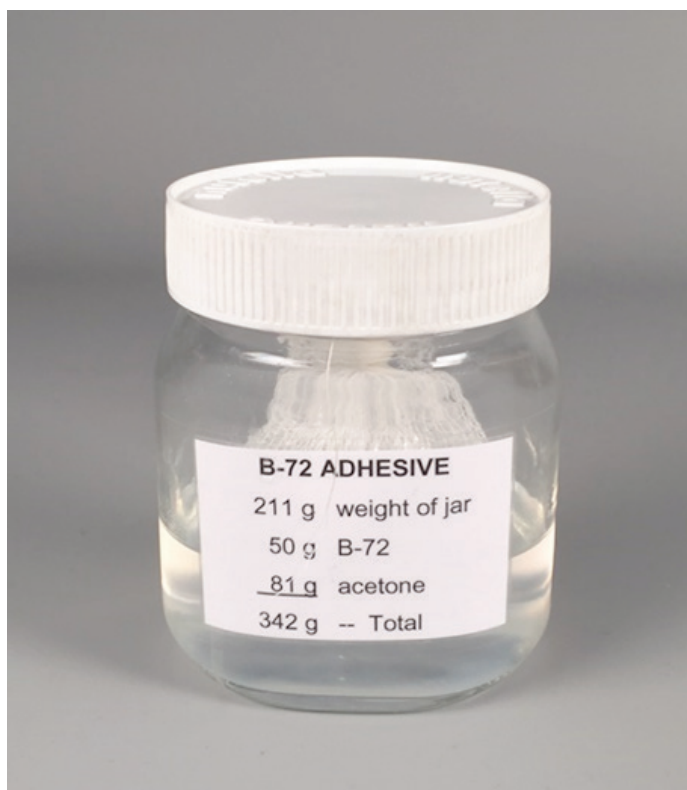


Fig. 1. Preparation of B-72 adhesive



Fig. 2. Bag just touching acetone

Leave the jar alone until the resin is totally dissolved (usually six to eight hours), preferably overnight. Once it is completely dissolved, remove the cheesecloth bag, stir with a glass stirring rod to homogenize the mixture, and pour into aluminum adhesive tubes. No further evaporation is necessary (fig. 3).

## 2.2 Using Adhesive Tubes

The preceding recipes each fill seven aluminum adhesive tubes, 4 1/4 in. long  $\times$  3/4 in. in diameter, available from Conservation Resources. The tubes should be filled only about two-thirds of the way up to allow enough room for flattening the end and making accordion-like folds that can be crimped tightly with small pliers (figs. 4–6). Unopened tubes will keep at least 10 years.

## 2.3 Smaller Batches

For smaller batches, simply divide the numbers above by half. For example, to make a smaller batch of thin B-72, use 40 g of acetone (52 mL), half a teaspoon of fumed colloidal silica, and 25 g of B-72. For a smaller batch of thick B-72, use 35 g of acetone (45 mL), half a teaspoon of fumed colloidal silica, and 25 g of B-72.

## 3. ADDITION OF FUMED COLLOIDAL SILICA

Fumed colloidal silica, or simply “fumed silica,” is an amorphous, inert silica that is commonly added to industrial adhesives. It acts as a rheological agent that:



Fig. 3. All dissolved



Fig. 4. Pouring into tubes





Fig. 5. Crimping ends of tubes with pliers



Fig. 6. Finished tubes

- Controls flow
- Helps in maintaining even distribution of B-72 molecular chains in the solvent
- Provides for:
  - More even film formation
  - More uniform solvent evaporation
  - Less bubbling
  - Less stringiness
  - More even strength distribution.

Because it is amorphous and non-toxic, fumed silica can be safely used without any special precautions. However, it is a very light and fluffy powder, so it should not be used with strong air movement (in front of a fan or in a fume extractor). Wearing gloves and a dust mask is recommended when handling.

#### 4. ADJUSTMENTS FOR APPLICATION IN VERY HOT CONDITIONS

The adhesive mixture can be further modified to be effective in hot (and dry) conditions. After the initial preparation in acetone, a small amount of ethyl alcohol (ethanol) can be added to the mixture. This can be between 5% and 15%, by volume, and it is simply added to the mixing jar and stirred with a glass stirring rod before pouring the adhesive into tubes. The addition of ethanol significantly slows the rapid evaporation of the acetone. Ethanol concentrations higher than 15% by volume are not recommended, as ethanol is extremely hygroscopic and can adsorb water into the adhesive mixture, interfering with the adhesive's working properties.

Paraloid B-72 is not recommended for outdoor use, or in storage conditions that are extremely hot (50°C, or 120°F), which is above B-72's softening point.

#### 5. APPLICATION METHODS

Many methods can be used for applying B-72. The small nozzles on the adhesive tubes are ideal for even and thin applications, and the nozzles are also easily cut to a larger diameter for application on large substrates. The simplest method for assembling broken vessels is to assemble fragments piece by piece, usually starting with the base, or the largest piece. Often the object can be taped together first to determine the proper order of assembly.

Glass and high-fired china do not require any special preparation before joining. The B-72 can be directly applied to one of the break edges and the pieces immediately joined together. They should be then set down in a stable position while the adhesive sets. Setting time can vary with the thickness of the fragments and the ambient temperature and humidity, and can be anywhere from several minutes to several hours.

Low-fired earthenware, terracotta, and pottery require that the edges be sealed or "primed" prior to any adhesive application so that the solvent is retained in the adhesive long enough for the adhesive to set. This is similar to priming the wood on a house before painting or sealing wooden furniture before varnishing. A solution of 5% to 10% w/v B-72 in acetone works extremely well for this and

can be applied to the break edges with a brush. Diluting from one percentage to another is a simple matter—if one wanted to have both 5% and 10% dilutions on hand for priming, a 10% solution can be prepared, and then a portion of that could be diluted by half with acetone to provide a 5% solution. Ideally, the priming adhesive should be completely dry before any additional adhesive is applied.

Joins can be adjusted or moved, even after the adhesive has set, using acetone or moderate heat from a hair dryer to reactivate the adhesive. Some practice is needed with both of these methods, as too much acetone or heat may cause the joint to separate. Warming with a hair dryer is easier because B-72 is thermoplastic, and after a few minutes of warming, the joint can be moved and realigned. It should then be held in its new position until the adhesive has cooled. Turning the hair dryer to cool or just holding the joint for 30 seconds is usually sufficient.

Other more complicated assembly methods include wicking in (injection of the adhesive into a joint and having it be drawn further in by capillary action). This only works with non-porous materials such as glass and porcelain.

## 6. CONCLUSIONS

Paraloid B-72 has been widely accepted as an excellent adhesive for many materials, particularly ceramics and glass, and should be in almost every conservation laboratory. It is a strong, dependable adhesive that is easily prepared, used, and removed (if necessary). Any difficulties in workability are easily overcome by proper preparation and application out of adhesive tubes.

These new recommendations for preparation make it available to any conservator, and easily adjusted or modified to suit individual needs.

## REFERENCES

- Feller, Robert L. 1963. "New Solvent-Type Varnishes." In *Recent Advances in Conservation*, edited by G. Thomson. London: Butterworths. 171–175.
- . 1984. "Thermoplastic Polymers Currently in Use as Protective Coatings and Potential Directions for Further Research." *AICCM Bulletin* 10 (2): 5–18.
- Koob, Stephen P. 1986. "The Use of Paraloid B-72 as an Adhesive: Its Application for Archaeological Ceramics and Other Materials." *Studies in Conservation* 31: 7–14.
- . 2006. *Conservation and Care of Glass Objects*. London: Archetype Publications in association with the Corning Museum of Glass.
- . 2009. "Paraloid B-72: 25 Years of Use as a Consolidant and Adhesive for Ceramics and Glass." In *Holding It All Together: Ancient and Modern Approaches to Joining, Repair and Consolidation*, edited by J. Ambers, C. Higgitt, L. Harrison, and D. Saunders. London: Archetype Publications Ltd. 113–119.
- Röhm and Haas. 1983. *ACRYLOID Thermoplastic Acrylic Ester Resin for Industrial Finishing*. Philadelphia, PA: Röhm and Haas.



## SOURCES OF MATERIALS

Paraloid B-72 resin, Plain aluminum (unlined on the interior) empty adhesive tubes, Cabosil M-5  
Conservation Resources LLC  
8000-H Forbes Pl.  
Springfield, VA 22151  
<https://www.conservationresources.com>

Aerosil 200  
Evonik  
<https://www.coatino.com/en/product/aerosil-200>

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