

# REMOVAL OF SILICONE ADHESIVES

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REMOVAL OF SILICONE ADHESIVES is a problem which conservators are encountering more and more often. Silicones are thermally stable and difficult to dissolve. Mechanical removal is one possibility. For certain substrates, chemical degradation of the silicone can also be considered.

Silicone resins are decomposed by strong acids such as sulfuric or concentrated hydrochloric acid. Decomposition can be accelerated by swelling the resin, which can be done with polar organic solvents. Swelling and acid attack can be combined by mixing an alkylbenzenesulfonic acid, which is comparable in strength to sulfuric acid, with non-ionizing polar organic solvents such as dichloromethane, toluene or xylenes. Alkylbenzenesulfonic acid in non-ionizing solvents is rather unreactive to many metals but aluminum, iron, lead, copper and tin are slowly etched, probably due to traces of water which allow the acid to ionize. Stainless steel seems unaffected, as are the glasses and ceramics we have tested. Some glasses or low fired ceramics which contain carbonates may react, although the mixture can be applied to limestone with no visible reaction unless water is added. Plexiglas, Lexan, Mylar and polyethylene show no effects after contact, although one suspects that the solvents could cause effects like delayed crazing. The mixture should not be used on porous, acid sensitive materials like paper or textiles.

Either organic solvents or water can be used to rinse off the degraded silicone. Water works because the alkylbenzenesulfonic ion is a good surfactant which serves to emulsify the mixture. The choice of rinse will depend on the substrate. Water is the best choice on materials like Plexiglas, but solvents should be used on acid-sensitive materials like metal and ceramics.

The following formula has been used in this lab to remove old silicone repairs from glass objects:

10 mL dodecylbenzenesulfonic acid, available in kg bottles from:

Pfaltz and Bauer  
375 Fairfield Avenue  
Stamford, CT

8 mL dichloromethane (methylene chloride)

5 mL toluene

18 mL xylenes

The fumes should not be inhaled nor the liquid be allowed to contact skin.

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