

rare books and manuscripts.

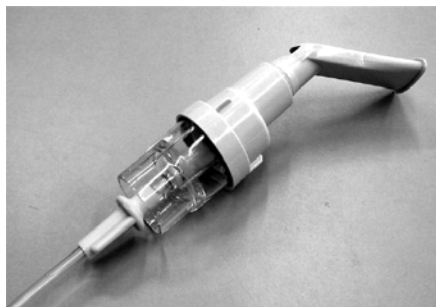
John K. Delaney has joined the staff of the Scientific Research Department of the National Gallery of Art as Senior Imaging Scientist in a position funded by the Andrew W. Mellon Foundation. John will spearhead a research program in which various new imaging techniques for the examination and documentation of works of art will be developed.

## New Materials and Research

### Nebulize It!

The arrival of two pieces with powdery, flaking pigment to the objects lab of The Nelson-Atkins Museum of Art caused us to look into the various tools for nebulizing liquids. While there is a fair amount of literature on various methods of delivering a fine mist of moisture or adhesive to a desired area, many of these modified tools can be frustrating and unreliable. Based on a suggestion from Nancy Odegaard of the Arizona State Museum, we decided to try working with an asthmatic nebulizer.

Asthmatic nebulizers are made to disperse a viscous medicine into a fine mist and they work well with many dilute adhesives. There are many different styles of asthmatic nebulizers available and all require a source of compressed air—some styles are sold with a small air compressor while others are not. Based on Sandra Grantham's experiences described in "Painted Japanese paper screens: the consolidation of paint layers on a paper substrate" published in *Broad Spectrum: studies in the materials, techniques, and conservation of color*



Sample Sidestream nebulizer manufactured by Respironics.

on paper (eds. Harriet K. Stratis and Britt Salvessen), we chose to work with the Sidestream nebulizer manufactured by Respironics.

The Sidestream nebulizer is an inexpensive unit that consists of a hose attachment, a small container, an oscillating unit, a cap, and a removable dispensing component (or mouth piece), and requires a separate air compressor. The hose may require an additional connector depending upon the attachment mechanism for the compressor. In our testing and treatment we used an Air-Medea Silent Compressor model AM-1000 made by Medea Airbrush Products, which allowed for a direct connection of the hose to the compressor.

The "mouth piece" can be limiting—although nice and wide to disperse the nebulized liquid, it can only be used upright. Tilting the container and oscillating unit can cause drips of liquid, but replacing the mouthpiece with Tygon tubing or other hose can create a flexible delivery mechanism. Testing of this modified delivery system consisted of bending the hose to form a U-shape, with the intention of collecting liquid droplets in the tubing curve. However, drops did not appear to collect or be an issue during our testing or use. We found this method of creating and delivering a nebulized liquid simple, inexpensive, and fairly reliable.

*Note: A version of this article first appeared in the WAAC newsletter.*

—Dana Senge  
Seattle, Washington

## Health and Safety

### California Proposes New Regulations Impacting Conservation X-Radiography

The California Department of Health Services has proposed major changes to its regulations governing the conduct of industrial radiography. A cover letter requesting commentary states that the new regulations would not have a significant fiscal impact on business in California, but also adds that small businesses would be affected. The cover letter, summary of proposed

changes and reasons, and texts of the changes may be found through a search for "R-25-03" on the California Office of Regulations website at [www.applications.dhs.ca.gov/regulations](http://www.applications.dhs.ca.gov/regulations). The period for submitting commentary on the proposal has closed.

In both the current and the proposed regulations, industrial radiography is defined as the examination of internal structures of materials other than humans and animals by non-destructive methods using radiation. X-radiography of paintings and three-dimensional art objects as performed in museums is classified as industrial radiography.

The proposed regulations include highly specific qualifications for the radiation safety programs of "businesses" undertaking all industrial radiography. They describe in great detail the requirements for persons performing the x-radiography at all levels of experience. These requirements appear to be based on the assumption that the radiographer works full-time. For example, 2,000 documented hours (equivalent to fifty 40-hour weeks) of hands-on experience operating x-radiography equipment—not counting film development and interpretation—will be required in order to be a trainer or supervisor of an "assistant" who is learning the process. Such an assistant must be personally supervised at all times. In order to serve as a radiation safety officer, an experienced radiographer would need twice as much (4,000 hours) relevant experience. Without a radiation safety officer to oversee a radiation safety program, no x-radiography would be permitted.

Since it would be highly unusual for a conservator or conservation scientist to be able to document this many hours of performing x-radiography, these proposed changes will significantly affect how and whether conservation professionals can use x-radiography in California. The applicability of other professional qualifications and institutional safety records are not considered in the regulations.

The proposed California regulations do not provide any exceptions to these requirements and appear to be based on similar regulations in force in Texas. However, the Texas regulations do include an exemption for shielded room radiography performed under circum-

stances that arts institutions could meet in most cases. Several California museums with conservation departments have filed commentaries calling attention to the professional qualifications and training of conservation staff and the excellent safety records of conservation x-radiography in arts institutions. They have urged consideration of inclusion of a similar exemption in the new California regulations.

It should be noted that OSHA has recently conducted a series of stakeholder meetings on occupational exposures to ionizing radiation. The agendas included consideration of the uses of ionizing radiation, controls utilized to minimize exposures, available exposure data, and training. Currently, OSHA allows agreement states to set their own regulations for the use of ionizing radiation in industrial processes as long as these regulations require adherence to certain federal standards.

Thanks to Scott Fife, senior safety officer, The J. Paul Getty Trust, for his invaluable help in evaluating the proposed regulations and writing commentary.

—Terry Schaeffer

Los Angeles County Museum of Art

## Some Chemical Things Considered: Acetone

Conservators have typically used acetone as a solvent in a variety of treatment applications, such as surface cleaning. It is also widely used as a thinner for commonly used adhesives, consolidants, and coatings. Because acetone is one of the most widely used chemicals in conservation, it is important to not take the health and safety considerations for granted.

### Characteristics

Chemical formula: C<sub>3</sub>H<sub>6</sub>O

CAS#: 67-64-1

Molecular weight: 58.08

Synonyms: Dimethyl ketone, 2-propanone, beta-ketopropane

Selected trade names: Acetone

Acetone is a clear, colorless liquid with a pungent, fruity odor. It is highly

flammable and potentially explosive. Acetone is a chemical that is found naturally in the environment and is normally found in the body in low levels from the breakdown of fat. It appears normally in the blood, urine, and breath.<sup>1</sup> It is derived by fermentation as a by-product of butyl alcohol manufacture, or by chemical synthesis from isopropanol (isopropanol dehydrogenation) or from cumene (cumene peroxidation).<sup>2,3</sup>

Industrially acetone is used as a solvent for fats, oils, waxes, resins, rubber, plastics, lacquers, varnishes, and rubber cements. It is also used as a component in methacrylates and in some paint, varnish, and nail polish removers.<sup>3</sup> Conservators have typically used acetone as a solvent and thinner in a variety of treatment applications.

### Hazards

Acetone is listed by the EPA as a Group D chemical, which means that it is considered not classifiable as a human carcinogen. However, a list of symptoms of varying degrees of severity that can result from exposure to acetone is listed below, as well as the targeted organs and systems.

Exposure routes: inhalation, dermal absorption, ingestion

Target organs and systems: eyes, skin, respiratory system, central nervous system, liver, kidneys

### Acute Symptoms:<sup>1,5</sup>

(inhalation) cough, sore throat, dizziness, drowsiness, headache, unconsciousness. At high concentrations: CNS depression, cardio-respiratory failure, death

(eyes/skin) irritated eyes, redness, blurred vision, possible corneal damage, dry skin, possible dermatitis

(ingestion) nausea, vomiting

### Exposure Limits:

LD50(rats): 10.7 ml/kg (ingestion)<sup>3</sup>

LD50(rats): 5800–7138 mg/kg (ingestion)<sup>1</sup>

NIOSH REL: TWA 250 ppm (590 mg/m<sup>3</sup>);<sup>5,6</sup>

OSHA PEL: TWA 1000 ppm (2400mg/m<sup>3</sup>) (inhalation)<sup>5,6</sup>

ACGIH TLV: TWA 500 ppm (inhalation); STEL 750 ppm (inhalation)<sup>6</sup>

IDLH (immediately dangerous to life and health) concentration: 2500 ppm [10% LEL]<sup>5</sup>

### Odor Threshold Values:<sup>2</sup>

Water: 20 ppm (w/v)

Air (absolute): 13–20 ppm (v/v)

100% recognition: 100–140 ppm

### Personal Protection:

For skin: prevent exposure to skin by wearing protective gloves and protective clothing. Neoprene, Latex, and Butyl gloves are recommended by the Ansell glove guide for immersion and Nitrile, Neoprene, PVC, Natural, and Polyethylene gloves for splash protection.<sup>7</sup>

For eyes: prevent exposure by wearing protective eyewear such as goggles

For ingestion: do not drink, eat, or smoke while working

For potential exposures up to IDLH levels of 500 ppm, NIOSH recommends wearing one of the following:

- A chemical cartridge respirator with organic vapor cartridges
- A powered, air purifying respirator with organic vapor cartridges
- A supplied air respirator
- A self-contained breathing apparatus with a full face piece.<sup>5</sup>

—Marilen Pool, objects conservator  
AIC Health & Safety Committee

### Sources

1. National Library of Medicine, Toxnet, Hazardous Substances Data Bank: Acetone. <http://toxnet.nlm.nih.gov>

2. Agency for Toxic Substances and Disease Registry (ATSDR). 1994.