

ASTM Adopts Method to Measure Volatiles from UV/EB Coatings

After more than 20 years in development, RadTech's efforts have led to the adoption of ASTM D7767-11, "Standard Test Method to Measure Volatiles from Radiation-Curable Acrylate Monomers, Oligomers, and Blends and Thin Coatings Made from Them." The method was adopted in November 2011 and is now available on the ASTM website at www.astm.org/Standards/D7767.htm.

The new method gives product formulators the means to compare emissions data on raw materials using information provided on a Material Safety Data Sheet and to assure product consistency using a standard cure and testing methodology.

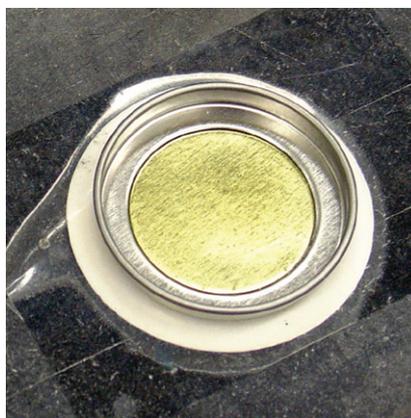
"The acceptance by ASTM of this method culminates a 20-year joint effort between RadTech, ASTM and our industry to develop an emissions test method for thin UV-curable acrylate coatings," said Robin Wright of 3M. "It's a huge success for RadTech and the radiation-curing industry."

Wright led RadTech's recent efforts to develop the new method, which is



Robin Wright

an extension of Test Method D5403. While ASTM D7767-11 does not provide a direct method for measuring emissions from thin acrylate coatings that may contain pigments and other known interferences such

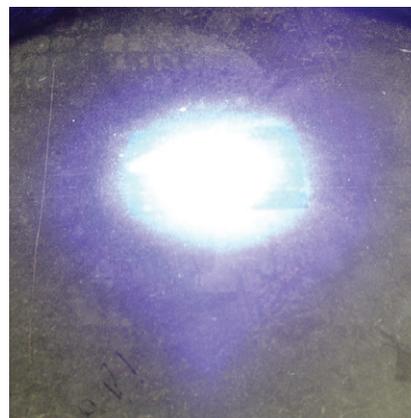


Exposed sample.

as UV blockers designed to absorb UV radiation and protect underlying layers from UV degradation, it does provide a means to measure emissions data from these blends in the absence of those interferences.

RadTech first tried to develop a test method more than 20 years ago when the South Coast Air Quality Management District (SCAQMD) and the Environmental Protection Agency (EPA) requested that industry propose an acceptable test method for thin coatings. Those efforts stopped in 2007 when the joint ASTM-RadTech task force disbanded without having achieved repeatable results. At that point, the SCAQMD arbitrarily set a default of 50 g/L (5%) for UV-curable inks and thin radiation-cured coatings that contained no solvent. The SCAQMD conceded that a direct test method was not possible and stated that a calculation would be deemed acceptable.

With the default a source of concern for many in the industry, RadTech decided to restart its efforts to come



Irradiated sample.

up with a more precise method to assess some of these emissions. That's when Wright initiated a totally different approach in which volatiles from individual raw materials could be measured and the results used to calculate volatile content of a thin coating. At about the same time, the SCAQMD funded California Polytechnic State University, San Luis Obispo, to test UV coatings using a Gas Chromatography (GC) method that the state Air Resources Board had already endorsed for other non-radiation cured coatings. While the GC method received ASTM approval for some low-VOC coatings, it has not received approval for UV/EB products.

The original UV test "Method A" in which acrylate monomers, oligomers and blends are cured using a common photoinitiator and UV exposure concerned ink suppliers because most inks use multiple photoinitiators, some of which can generate volatile photodecomposition products. That led Wright to begin looking at measuring the volatiles for fully formulated,

solvent-free, UV-curable coatings with everything present, including surfactants, flow aids, matting agents, defoamers and the full photoinitiator package except pigment or known interferences.

“Based on some of our early results during the development of D7767 and GC results from Cal Poly, it was apparent that the volatiles from thin, radiation-cured coatings were considerably less than 50 g/L,” said Wright.

In the fall of 2008, as a result of RadTech’s efforts, the SCAQMD reduced the default for thin radiation-cured coatings (no solvent) from 50 g/L to 20 g/L. Although this is not formally stated in a district rule, an official policy memorandum was issued by the agency. Generally speaking, tests performed with both GC and the RadTech method gave VOC numbers of around 20 g/l or less. RadTech continues to work with the district to incorporate the policy in actual district rules in order to provide clarity to regulated businesses.

At this point, the results from Wright’s early development work on the method at 3M were shared and openly discussed with the RadTech Technical Committee and the RadTech Printing and Packaging Focus Group at a series of RadTech member meetings. When it became necessary to run a “Round Robin” for ASTM, representatives from 3M, BASF, Cognis, Sartomer, Nazdar and Cytec stepped forward to participate.

Now that the ASTM has adopted D7767-11 and the SCAQMD has accepted the method for air permitting purposes, RadTech members are hoping the SCAQMD will focus on providing incentives and reduced regulatory burdens for companies that go above and beyond their required emission reductions.

“As advocates for the UV/EB industry, we continue to urge the district to adopt measures that provide incentives to those companies who have invested their resources to benefit air quality in the region while keeping jobs in California,” said Rita Loof, RadTech director of Environmental Affairs. “We are encouraged that the SCAQMD recently proposed overhauling their permit streamlining process. We believe it will result in a healthy environment and a healthy business climate.”

The National Association of Printing Ink Manufacturers (NAPIM) also supports ASTM D7767-11 and is holding follow-up discussions with the EPA. NAPIM hopes to have D7767-11 incorporated into EPA Method 24 for thin radiation-curable coatings. This would eliminate the need for manufacturers to test and report volatiles data on thousands of different inks, many of which use a similar base composition.

A simple change in the type of pigment or a pigment loading would constitute a new formulation and require testing. If data were available on the individual components of an ink or on a formulated ink (less pigment and interferences), then a composition-based calculation could be done to essentially provide volatiles data for the ink with pigment. Depending on the size of the company, acceptance of D7767-11 could save them several million dollars.

“Responsible manufacturers are always refining sustainable manufacturing processes,” adds Gary Cohen, RadTech executive director. “It’s what’s going to help drive business development. The adoption of D7767-11 is just one more tool for advancing sustainable manufacturing.”

This new method may also help the SCAQMD achieve its dual function—to

protect the health of residents, while remaining sensitive to businesses. “The SCAQMD is the toughest air pollution control agency in the country. Everyone looks to them to lead the way when it comes to air pollution control measures,” added Wright. “Verification of emissions numbers is a necessary step in the regulatory process and clarity will ensure the process goes smoothly for businesses.”

Manufacturers are doing a better job of protecting the environment, noted Wright. “This method will help groups such as the SCAQMD more accurately assess those efforts.”

If you’d like to learn more about ASTM D7767-11, Wright will present the method at the upcoming RadTech UV/EB Technology Expo & Conference 2012, April 30-May 2, 2012, at the Hyatt Regency Chicago, Chicago, Ill. Details are available at www.radtech.org.

For more details on the method itself, visit www.astm.org/Standards/D7767.htm. ■