



## Depositing explosive and chemical materials on relevant surfaces for use as calibration test standards

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Materials deposited on manmade or natural surfaces are frequently utilized as calibration standards for chemical or biological detecting systems. To determine threshold sensitivity of systems which detect chem/bio agents and explosives, precise accurate quantities must be deposited. Present drop-and-dry deposition systems produce a largely non-uniform distribution of particles with an overall sample spread shape and area that is difficult to control or predict.

ECBC has developed an on-demand inkjet printing and aerosol sprayer method that allows precise control of droplet volume, droplet size and dots-per-inch, for accurate material deposition.

The Direct Jet 1309 flat bed inkjet printer is used to deposit various chemicals on surfaces such as substrates of bare aluminum, Teflon, aluminum car panels, microscope slides, etc. Concentrations from 1  $\mu\text{g}/\text{cm}^2$  to 100  $\mu\text{g}/\text{cm}^2$  are deposited in a single pass with increased amounts using multiple coatings.



For concentrations from 1  $\mu\text{g}/\text{cm}^2$  to 100  $\mu\text{g}/\text{cm}^2$

The following are characteristics of the 1309 printer:

- Prints directly on concrete, metal, glass, plastic, etc.
- Maximum substrate size, 13" x 9" x 2"
- Maximum substrate weight: 10 pounds
- Resolution range from 720 dpi to 5760 dpi
- Droplet size from 1.5 to 21 picoliters
- Print head hole diameter: approximately 23 microns



For concentrations from 100  $\mu\text{g}/\text{cm}^2$  to 1000  $\mu\text{g}/\text{cm}^2$

To prepare test samples with concentrations from 100  $\mu\text{g}/\text{cm}^2$  to 1000  $\mu\text{g}/\text{cm}^2$  ECBC developed a aerosol spray deposition method. This method incorporates accelerated droplet evaporation to uniformly deposit the sample. A simple airbrush spray is used to generate an aerosol plume. The aerosol plume is deposited on the sample surface and is rapidly dried to prevent liquid smearing. The process results in evenly distributed solid sample residue on the surface.

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