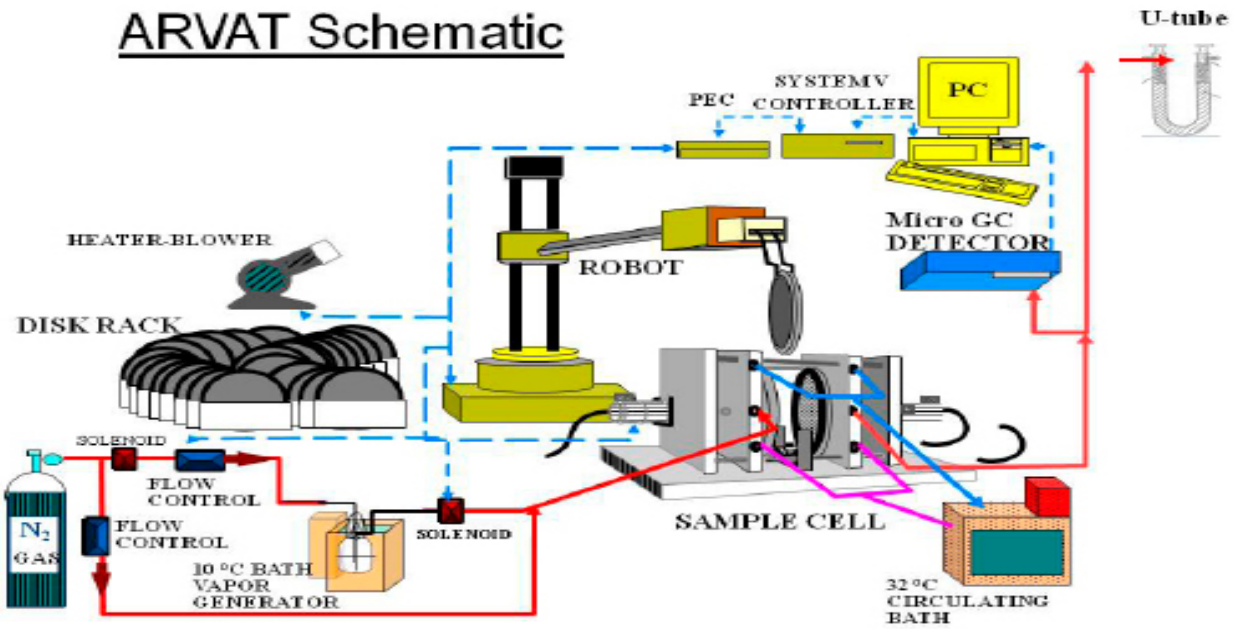
AUTOMATED ROBOTIC VAPOR ADSORPTION TEST (ARVAT)

OVERVIEW:

The ARVAT determines the adsorption capacity of carbon-loaded materials by challenging swatches with a chemical warfare simulant, Vertrel XF. It can be used to assess the shelf-life of fielded items or evaluate developmental items.



DESCRIPTION:

The ARVAT is an enclosed system where a small amount of nitrogen is bubbled through liquid Vertrel XF (2,3-dihydro perfluoro pentane, or HFC43-10) maintained at 10 °C, which is diluted with enough nitrogen to obtain a total flow rate of 1 L/min and a concentration of 10 mg/L. The challenge then passes through fabric specimens sealed in a 4-in. diameter circular cell maintained at a temperature of 32 °C.

The breakthrough time is measured at the point where the effluent concentration is 1% of the challenge concentration. This time is then converted into an adsorption value by multiplying the time by the mass flow rate (10 mg/min) and dividing by the cross-sectional area (83 cm²). For example, a breakthrough time of 24 minutes yields an adsorption value of 2.9 mg/cm² (24*10/83).

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