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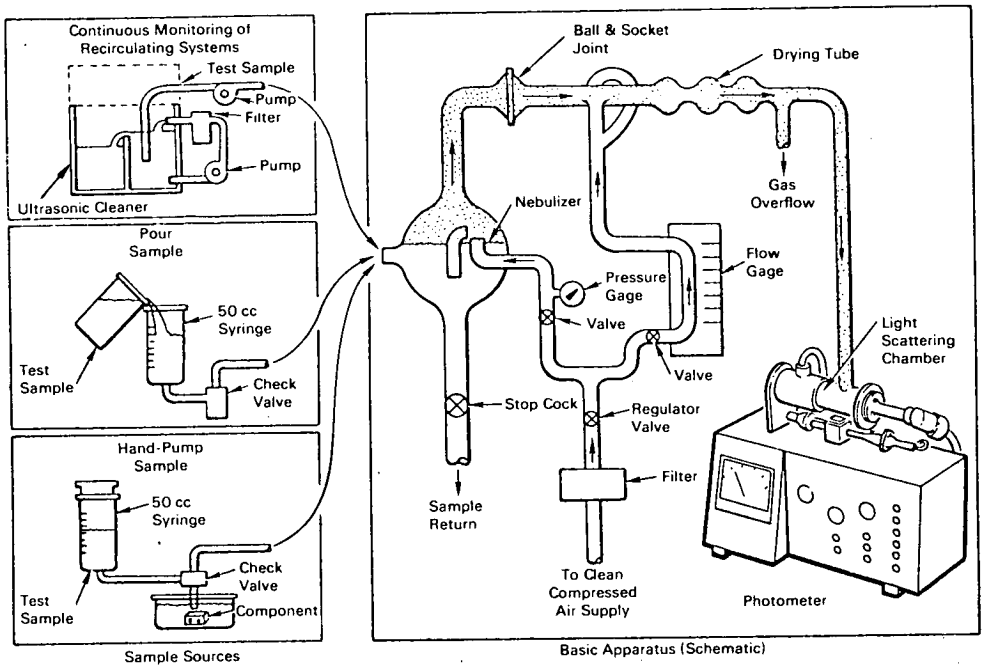
Apparatus Automatically Measures Soluble Residue Content of Volatile Solvents



Evaluation of the effectiveness of a production cleaning process is difficult. Methods to detect small amounts of contamination are time-consuming and inaccurate, and attempts to assess the effectiveness of a particular process are usually only qualitative. To a large extent, this is due to the difficulty in obtaining a quantitative description of the cleanliness of a part or the relative effectiveness of a cleaning solvent or process.

A solvent purity meter (SPM) has been developed which automatically measures the soluble residue in volatile solvents used in cleaning or extraction of oils, greases, and other relatively nonvolatile materials. The SPM is capable of giving an instantaneous and continuous readout of soluble contaminant residues in concentrations as low as one part per million of solution. It may be used either for batch analysis or as a continuous production-line monitor for recirculating solvent systems.

The SPM provides a direct measure of the purity of a volatile extractant, cleaning solvent stock, or reclaimed supply, and an indirect measure of component cleanliness or the relative effectiveness of a cleaning solvent or process. A nonvolatile residue determination can be made from as little as 10 ml of solution.

The major components of the SPM are a solvent-sampling system, an all-glass nebulizer to atomize

(continued overleaf)

the sample, a drying tube to evaporate the solvent, various air meters and gauges, and a light-scattering photometer which can be calibrated to provide readings of from 1 to 1000 parts of nonvolatile residue per million of solution. The system provides for three modes of sampling: (1) by pouring directly from a bottle or beaker, (2) by pumping through a tube or with a syringe hand pump, or (3) by continuous recirculation from a pressurized solvent source.

The test solvent is introduced into the nebulizer reservoir where it is dispersed into a fine aerosol spray. Filtered air is then mixed with the solvent droplets, causing rapid evaporation of the solvent from the droplet. The resulting solvent-residue aerosol is sampled with the photometer, which responds in relation to the mass concentration of the aerosol. The photometer reading can then be converted to parts of nonvolatile residue per million of solution by using calibration curves derived from standard solutions.

Note:

Inquiries concerning this innovation may be directed to:

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Patent status:

No patent action is contemplated by AEC or NASA.

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