



Inverse Gas Chromatography (iGC) Surface Energy Analyser

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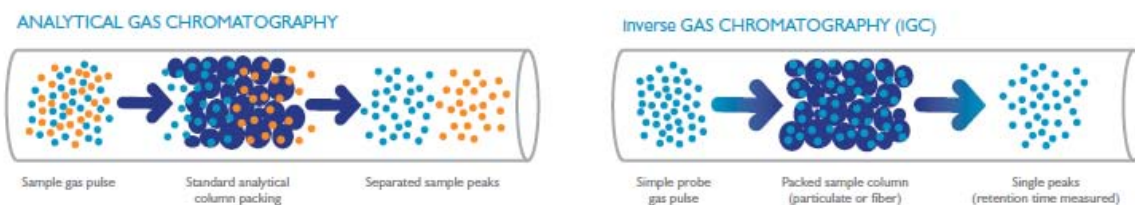
The Surface Energy Analyser (SEA) is a new Inverse Gas Chromatography (iGC) instrument for the characterisation of surface and bulk properties of particulates, fibres and thin-films. The SEA from **Surface Measurement Systems** provides the following physico-chemical properties of a wide range of solid materials in a controlled humidity environment:

- Dispersive and Polar Surface Energies
- Heats and Entropies of Adsorption
- Acid/Base Interactions
- Phase Transitions
- Sorption Isotherms
- Permeability, Solubility and Diffusion
- Micropore and Mesopore Distributions
- Competitive (Multicomponent) Adsorption
- Surface Energy heterogeneity mapping.



iGC Surface Energy Analyser

The principle of iGC is the reverse of conventional gas chromatography (GC). A chromatography column is uniformly packed with the solid material of interest, typically a powder, fibre or film. A vapour pulse or gas is then injected down the column at a fixed carrier gas flow rate. The time taken for the pulse or gas front to elute down the column is measured by a detector.



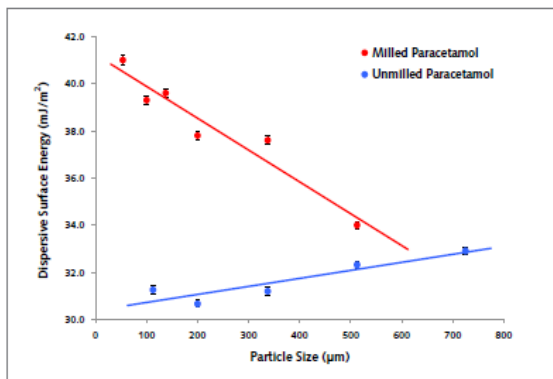
The vapor's retention time is measured by a Flame Ionisation Detector (FID).

A series of measurements with different vapour/gas probe molecules allows access to the physico-chemical properties of the solid sample. Facilities include in-situ sample preconditioning, up to 12 Different Probe Gas Molecules and operation over a wide temperature range.

Typical SEA Applications

- Pharmaceuticals
- Cosmetics and Personal Care Products
- Food Products and Ingredients
- Minerals and Coals
- Building Materials
- Flavourings and Perfumes
- Natural and Artificial Fibres
- Biopolymers
- Coatings and Thin Films
- Supported Catalysts
- Polymers, Fillers and Composites
- Microporous Materials

Application example – dispersive surface energy.



Dispersive surface energy values for milled and unmilled paracetamol vs. particle size. The data shows a strong dependence of surface energy on particle size for the milled sample. Unmilled paracetamol shows a much weaker correlation.

SEA Software

The SEA wizard-based software facilitates the set-up of experimental conditions such as temperature variation, change of probe molecules, flow rates, and background humidity. On-the-fly method and sequence editing allow real-time changes. Automated peak and data analysis significantly reduces data processing time for the determination of thermodynamic parameters including:

- Surface Energy- the principle characteristic measured
- Surface Energy Heterogeneity Mapping
- Free Energy of Desorption

