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Industrial Surface Energy Measuring Instrument

Introduction:
Surface energy quantitation is a powerful tool in determining the behavior at the solid liquid interface.

Method:
Using a dual liquid probe the surface is characterized for it's polar and dispersive component.
The polar component characterizes the physical forces while the dispersive characterizes the chemical forces.

Benefit:
The operator will know if the liquid surface interface will perform for his application

Why is surface energy important?

The polar component of a surface will manifest itself differently with different liquids.

For example: A liquid such as a dyne pen solution could show the same contact angle on two different surfaces.

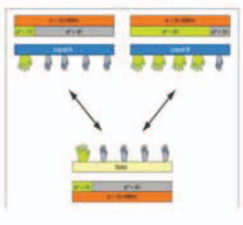
But the liquid used would show different contact angles on the same surface.

Surface energy measurement properly characterizes the two dimensional nature of solid surfaces.

Example of Sample Surface energy Dispersive Polar

Sample	Surface energy	Dispersive	Polar
1	50	10	40
2	50	40	10

Both have the same surface energy but sample 1 is more active chemically than sample 2



CONTACT ANGLE & SURFACE TENSION ANALYZER

Features:

Lowest cost model
USB powered
Laptop capability
Drop size, 0.5-40µl
Manual drop formation,
2cc micrometer syringe
Manual drop touch-off, 50 mm Z precision movement
Large specimen table
Camera, 15fps at 640x480 resolution
Fixed mag lens, 5 mm FOV
High quality mechanical construction

Price: $5,999.00 (Semi-Automatic)
Price: $8,749.00 (Full Application Software)

(Model can look different than the picture)

Ontario
1-800-683-6546

Quebec & Eastern Canada
1-800-767-9695

Western Canada
1-403-291-6685

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Problems with Dyne Pens - Example

Surface Energy And Adhesion

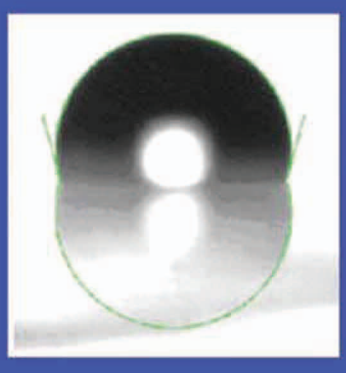
It certainly makes sense that if the fluid does not wet the substrate, it can not have good adhesion. But the question is raised that if the proper surface energy exists, "Why do we not get good adhesion?"

The simple answer is that the total surface energy (as measured with a Dyne Pen) only addresses wetting. Adhesion, although related, is more complicated. Generally, when a surface is treated by corona, ozone or some other means of raising the surface energy, several things can happen. Besides "burning off" surface contaminants as the substrate is treated, there are many polar sites created that assist in producing "bonding" sites for the ink or coating. It is these bonding sites that assist with the actual adhesion of the ink/coating, especially when the substrate is non-porous where mechanical adhesion is not possible. (Corona treatment does actually increase surface roughness in many cases, so this can be a secondary assistance in achieving adhesion.)

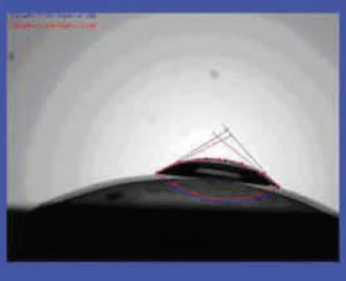
Again, without going into the gory mathematics,according to the current theory, surface energy is composed of both specific (polar) and non-specific (dispersive or non-polar) forces. The sum of these forces is equal to the total surface energy.

As a simple example, consider two substrates with a surface energy of 40 dyne/cm. It is possible that one substrate could have a polar component of 20 and dispersive component of 20 while the other substrate has a polar component of 5 and a dispersive component of 35. In each case the sum of the polar and dispersive forces is 40 dyne/cm.

The simple check with the dyne pen would tell the printer that both substrates would perform equally, assuming that the 40 dyne/cm is an acceptable level for surface energy. With energy curing materials, higher polar energy is very desirable. It is doubtful that an energy curing ink or coating would adhere to the substrate with only 5 for a polar component even though the ink/coating would wet the substrate. When dealing with non-porous substrates, it is important to understand the difference between wetting and adhesion when it comes to surface energy. It is also important that the suppliers of the materials are knowledgeable in this area. Beyond the above comments, several other factors can influence adhesion.



LB ADSA method above and Drop snake method below



Pendant drop surface tension calculation below

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