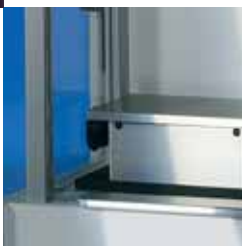


The Thermo Electron Corporation Radian DCA Series Analyzers offer powerful and versatile approaches to the comprehensive understanding of the complex interactions at liquid-liquid and liquid-solid surfaces.

## Cahn Radian DCA Analyzers

Simple Solutions  
for Complex Surfaces



### Applications:

- Films/Fibers
- Textiles
- Powders
- Composites
- Adhesives
- Biomedical Polymers
- Inks
- Paints
- Oil Recovery
- Shampoos
- Detergents
- Pharmaceuticals
- Eye-Care Products
- Moisture Barriers

Whether you need to improve adhesion, apply a coating or modify a surface, a Cahn Radian DCA system provides solutions for:

- Surface energies, wettability, cleanliness and topographical homogeneity of solid sheets, films, and fibers
- Surfactant analysis with the automatic Critical Micelle Concentration (CMC) program
- Dry material absorption, wicking rate
- Contact angle of powders, Washburn Method

### Dynamic Contact angle

Automated dynamic contact angle (DCA) instruments overcome the limitations of static contact angle measurement devices by measuring much larger surfaces on liquid solutions rather than single drops on a plate. This eliminates the risk of concentrated contaminants or incomplete profiles. DCAs operate by holding a plate in a fixed vertical

position, attaching it to a microbalance and moving a probe liquid contained in a beaker at constant rate up and down past the plate. A unique contact angle hysteresis curve is produced by the microbalance as it measures the force exerted by the moving contact angle in advancing and receding directions.

The dynamic contact angle is then calculated from the modified Young's equation (Wilhelmy equation):  $\cos \theta = \text{Force} / (\text{surface tension} \times \text{wetted perimeter})$ .

This system can be applied to most solid surfaces including single fibers as small as 1  $\mu\text{m}$  in diameter. Contact angle measurements obtained by Thermo DCA range from 0° to 180° with a precision of  $\pm 0.001$ .

Wetting is an effect commonly characterized by a zero, or close to zero, contact angle that allows a liquid to easily spread over a solid surface.

## Auto CMC – (Automatic Critical Micelle Concentration Accessory)

### Features and Specifications

- Fully automated "smart" system operation
- Programmable serial or fast dosing
- Bi-directional (clockwise and counterclockwise) stirring
- Unique direct contact circulation
- Closed loop temperature control via remote sensor
- Real-time statistical analysis and control

Specifications	Radian 322	Radian 315
<b>Measurement Range:</b>		
Surface Tension	0.1-500 mN/m	1-1000 mN/m
Contact Angle	0-180 degrees	0-180 degrees
<b>Measurement Precision:</b>		
Surface Tension	$\pm 0.0001$ mN/m	$\pm 0.001$ mN/m
Contact Angle	$\pm 0.001$ degrees	$\pm 0.01$ degrees
<b>Balance Precision:</b>	0.1 $\mu\text{gram}$	1 $\mu\text{gram}$
<b>Sample size:</b>		
Max Weight	3.5 grams	100 grams
Max Diameter	75 mm	75 mm
Min Fiber Diameter	0.001 mm	0.1 mm
<b>Stage Travel:</b>		
Total Range	70 mm	70 mm
Programmable Range	40 mm	40 mm
Resolution	0.0001 mm	0.0001 mm
Max Speed	264 $\mu\text{m}/\text{sec}$	264 $\mu\text{m}/\text{sec}$
Min Speed	2 $\mu\text{m}/\text{sec}$	2 $\mu\text{m}/\text{sec}$
<b>Temperature Range:</b>	-10 °C to 100 °C	-10 °C to 100 °C

## Surfactant Analysis

The unique ability of a surfactant or "surface active agent" to diffuse to the surface of a liquid, adsorb to the surface and subsequently lower the surface tension of the solution has resulted in the widespread use of surfactants as additives in many products. A surfactant molecule works by orienting its polar and apolar head and tail groups at the air/liquid interface. When present in sufficient quantities, surfactant molecules can aggregate to form clusters or "micelles" which prevent further changes in the surface tension of the liquid solution.

The concentration of the surfactant when micelle formation occurs is characteristic of the "critical micelle concentration" (CMC) of the solution. Adding more surfactant past the CMC can not only destroy the effectiveness, but also significantly increases the cost of the formulation. Many products benefit from the addition of surfactants including shampoos, detergents, pharmaceuticals, eye-care products, paints, inks. Surfactants can even be impregnated into the non-woven inner liner of a baby's diaper to increase and accelerate the absorbency of the diaper while creating an effective moisture barrier.

