



## Physical Chemistry and Spectroscopy

The Physical Chemistry and Spectroscopy Group provides physical and chemical characterization of API or Drug Product during all phases of the drug development process.

### Physical Chemistry Characterization

- Thermal Properties
- X-Ray Powder Diffraction
- Complete Polymorphism Screens
- Development/Validation of Polymorphic Control Tests
- Salt Screening/Selection
- Particle Size and Surface Area Analyses
- Hygroscopicity
- Solid-State NMR Spectroscopy
- Solid State Stability Prediction
- Intrinsic Dissolution
- Heats of Solution
- pKa Determination/Prediction
- pH-Solubility Profiles
- Solubility Product Constant Determinations
- Association Constant Determinations
- Complexation Constant Determinations
- Solubilities in Selected Solvents/Co-solvents
- pH-Partition Profiles
- Hydrolysis as a Function of pH
- Solution Phase and Solid State Reaction Kinetic Studies

### Spectroscopy

- Analytical Reference Standard Qualification
- Heavy Metal Analysis (AA and ICP)
- Ion Chromatography
- Remote Oxygen Detection
- Oxidation/Reduction Solution Decomposition Studies
- Structural Elucidation (NMR and MS)
- Identification of Process Impurities/Degradation Products
- Protein and Peptide Structural Characterization

### Troubleshooting

- Identification of Process Impurities/Degradation Products

- Product Contamination
- Polymorph Changes
- Deformulation
- Counterfeit Product Detection
- Unknown Identification
- E-Tongue Bitterness Prediction & Taste Masking
- Patent Litigation Support
- Customer Complaint Sample Analysis

### Chromatographic Instrumentation

- HPLC
- GC
- GC/MS
- LC/MS, LC/MS/MS, LC/MS<sup>n</sup>
- Ion Chromatograph

### Spectroscopy Instrumentation

- FTIRs
- Solution-State/Solid-State NMR Spectrometer
- Mass Spectrometers
- Polarimeters
- ORD/CD
- UV-Vis Spectrophotometers
- Atomic Absorption Spectrophotometers
- Inductively Coupled Plasma Spectrometer
- Electrochemical Analyzer
- Florimeter
- NIR
- Trace Oxygen Sensor
- Capillary Electrophoresis

### Physical Chemistry Instrumentation

- Differential Scanning Calorimeters (DSC)
- Standard, Capillary Spinner and Variable Temperature/Humidity X-Ray Powder
- Diffractometers
- Thermogravimetric Analyzers
- Hot Stage Microscope



## Pharmaceutical Sciences

### FACTSHEET



### Physical Chemistry and Spectroscopy cont'd

- Light Microscopes
- Scanning Electron Microscope w/ EDXS
- FTIR Microscope
- Surface Area Analyzer
- Hygroscopicity Analyzers
- LALLS Particle Size Analyzers
- Tronac Isoperibol Solution Calorimeter
- Sirius GLpKa Titrator
- Thermal Activity Monitor (Microwatt Calorimeter)
- a Astra Liquid and Taste Analyzer (E-Tongue) w/ Solid Dosage Form Dissolution Apparatus

- Intrinsic Dissolution Apparatus
- Powder Dissolution Apparatus

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**Engineering a better drug development process.**