

# Process Analytical Technology (PAT) Applications

## RTA Application Note # 06a

The **Industrial Raman Analyzer** has been designed specifically for operation in demanding production facilities and is an ideal Process Analytical Technology (PAT) tool for drug manufacturing applications, such as:

### Raw Materials Identification

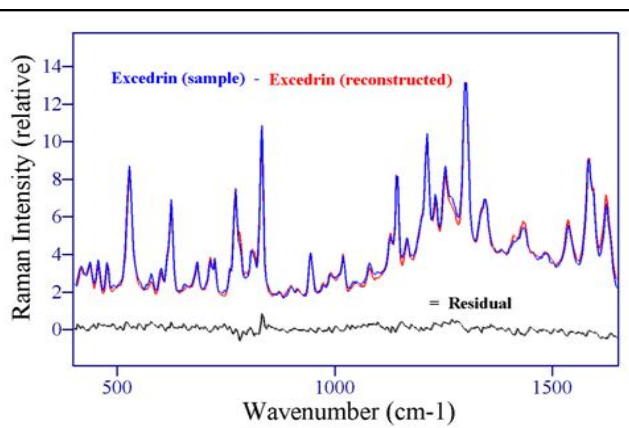
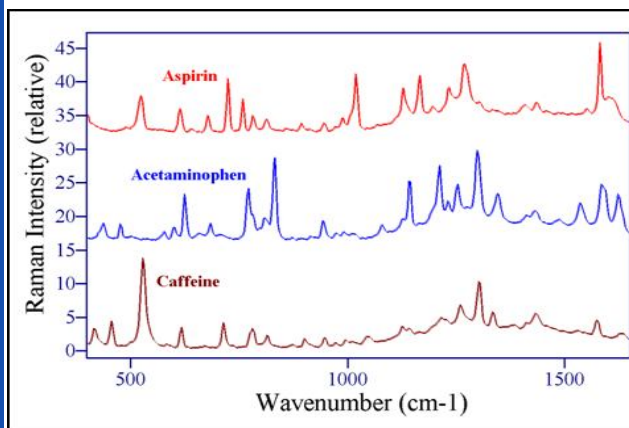
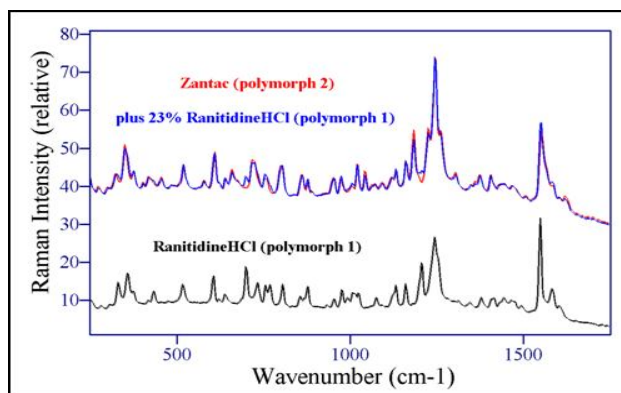
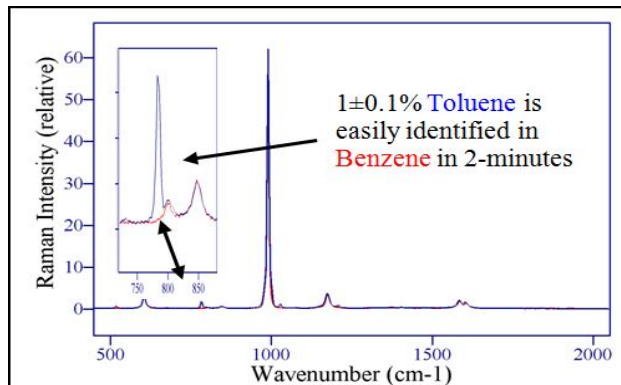
As true with all compliant manufacturing processes, raw materials used to manufacture drugs must be identified and certified. The contents of a 55 gallon drum can be identified as benzene in 5 seconds using our hand-held fiber optic probe. And within 2 minutes, toluene as a contaminant is also identified and quantified to  $1 \pm 0.1\%$ .

### Polymorph Analysis During Crystallization

Many chemicals can crystallize out of solution into one or more crystallographic forms depending on solvents used, cooling rates, and other parameters. In the case of pharmaceutical drugs, these polymorphs may have different physicochemical properties that alter therapeutic effectiveness (e.g. dissolution rate, bioavailability, etc.). A fiber optic probe integrated into a crystallizer could monitor the presence of 2% polymorph 2 (18% shown here) in polymorph 1 during **ranitidine** crystallization.

### Content Uniformity

Critical to meeting Federal Drug Administration guidelines is the assurance that shipped solid-dosage units contain the correct amount of active and excipient ingredients. For example:



In the case of an Excedrin tablet, the main components can be identified within 1 second following a 20 second scan, and quantified in another 1 second. The non-uniformity of the pill is obvious as the single-point analysis yields 34% caffeine, 55% acetaminophen, and 11% aspirin, as opposed to the desired quantities of 12, 44 and 44%, respectively. A point-by-point map performed in 10 minutes yields a surface distribution 20, 28, and 52%, respectively, and further suggests incomplete mixing during blending operations.

### Real-Time Analyzers, Inc.

362 Industrial Park Road Suite #8

Middletown, CT 06457

www.rta.biz

