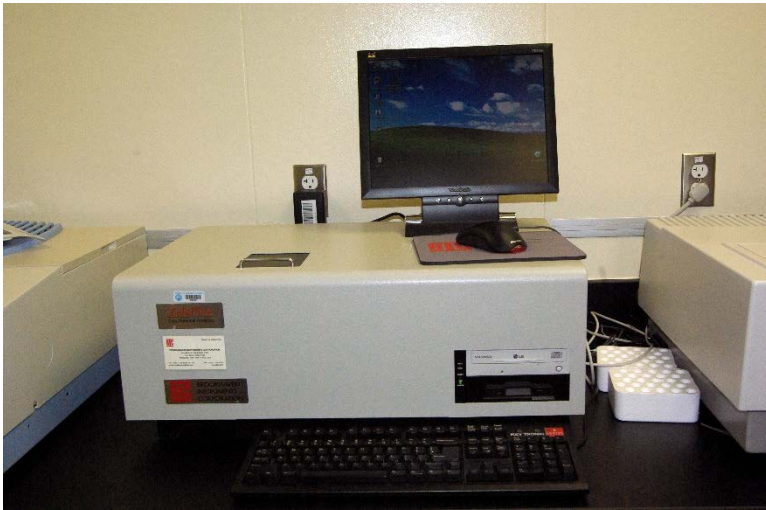


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1. Instrument Name: Zetameter

Manufacturer and Model#: Brookhaven Instrument Corporation ZetaPlus Zeta Potential Analyzer

Room No.: Criss III 273

Description: The ZetaPlus combines dynamic light scattering measurement of particle size (for particles 1nm to 100um) with electrophoretic mobility distributions (zeta potential measurements) which allow the measuring of both particle size and estimate particle surface charge.



2. Instrument Name: 20-ton chiller

Manufacturer and Model#: HBC-2

Room No.: Criss III 271

Description: This 20,000btu chiller is used to maintain stable ambient sample temperature for our RF induction furnace. It can maintain temperatures as low as 5°C with a 40 liter refrigerated coolant reservoir.



3. Instrument Name: Benchtop Autoclave

Manufacturer and Model#: Tuttnauer Brinkman
2340E Benchtop Autoclave

Room No.: Criss III 273

Description: This benchtop autoclave is used for the everyday sterilization of small items such as glassware, pipettes, surgical tools, and solutions.



4. Instrument Name: Ball Mill

Manufacturer and Model#: Retsch PM100

Room No.: Criss III 271

Description: This single station rotary ball mill is used for the timed fine pulverization of wet or dry sample using balls of a fixed hardness and size. It can deliver a fineness of 0.1 to 1um with a fully programable timed grinding at up to 650rpm (33.3g rcf).



5. Instrument Name: Benchtop Centrifuge

Manufacturer and Model#: Jouan CR412

Room No.: Criss III 272

Description: Refrigerated-benchtop-bucket centrifuge. Temperature range from 0-40C, speed from 0-10k RPM, and 0-30 minute or infinite timer.



6. **Instrument Name:** Benchtop Centrifuge

Manufacturer and Model#: Sorvall Legend RT

Room No.: Criss III 273

Description: Programmable refrigerated-benchtop-bucket centrifuge. Temperature range from 0-40C, speed from 0-10k RPM (4200 with current rotors).



7. **Instrument Name:** Biosafety Cabinet

Manufacturer and Model#: Nuair LF BSC Class II type A2 Biosafety Cabinet BH12-M1314

Room No.: Criss III 273

Description: Laminar flow biological safety cabinet for the safe handling of cells and bio-hazardous materials.



8. **Instrument Name:** Biosafety Cabinet

Manufacturer and Model#: Nuair Class II type A/B3

Room No.: Criss III 269

Description: This laminar flow biological safety cabinet is used for the safe handling of cells and bio-hazardous materials such as cell/tissue culture.



9. Instrument Name: Biosafety Cabinet

Manufacturer and Model#: Nuaire Class II tybe A/B3

Room No.: Criss III 367

Description: This laminar flow biological safety cabinet is used for the safe handling of cells and bio-hazardous materials. such as cell/tissue culture, or sensitive procedures such as DNA/RNA prep where contamination is of particular concern.



10. Instrument Name: Carver Press

Manufacturer and Model#: Carver Laboratory Press Type C

Room No.: Criss III 271

Description: This hydraulic press is used for compression of pills and other materials. It is adjustable to press up to a 0 to 24" sample and is capable of providing up to 15,000psi accurate in 200psi increments.



11. Instrument Name: Coulter Counter

Manufacturer and Model#: Coulter Z1 Coulter Counter

Room No.: Criss III 273

Description: This counter is equipped with a 100um probe and can count particles from 2-60um and is ideal for counting cell culture samples.



12. Instrument Name: Density Meter

Manufacturer and Model#: Mettler Toledo DM40 Density Meter

Room No.: Criss III 271

Description: The DM40 density meter provides density measurements of liquid samples as small as 1.5ml to an accuracy of 0.0002g/ml. In addition to the low sample volume the sample is 95-100% recoverable depending upon the specific flow properties of the sample.



13. Instrument Name: Dissolution Apparatus

Manufacturer and Model#: Hansen Vison Classic 6

Room No.: Criss III 273

Description: This programmable dissolution apparatus is set up for USP type 1 and type 2 dissolution with 1L and 300ml volume vessels. It has a paired heating circulator allows for direct control of temperature in programming.



14. Instrument Name: Differential Scanning Calorimeter

Manufacturer and Model#: Shimadzu DSC 60

Room No.: Criss III 273

Description: The differential scanning calorimeter is used for detecting energetic changes in samples such as melting and freezing temperatures.



15. Instrument Name: EZ Tester

Manufacturer and Model#: Shimadzu EZ Test

Room No.: Criss III 273

Description: The EZ Test stress tester is useful for measuring physical properties of tablets, gels, and other items. It measures compressibility, elasticity, crushing force, shear stress, and a number of other measurements that can be made on a linear plane. We have used this extensively for the measurement of the mucoadhesion properties of a formulation to an intestinal membrane.



16. Instrument Name: Fluorescent Hot/cold stage polarized Microscope

Manufacturer and Model#: Lieca DM2500M, Linkham TMS 94, and Linkham LNP 95

Room No.: Criss III 273

Description: This compound microscope features a fluorescent light source and filter cube wheel, cross polarizers, 10,20, and 50x objectives, and a 10 mega pixel digital camera. It also has a Linkham hot/cold thermal stage capable of programmed thermal cycling from -196 to 600°C.



17. **Instrument Name:** Franz Diffusion Cells

Manufacturer and Model#: PermeGear

Room No.: Criss III 271

Description: These top down (Franz) diffusion cells are useful in determining permeability through skin and biological matrices as well as drug release from a fixed area for thick ointments and creams. The cells are water jacketed and may be maintained at any relevant temperature.



18. **Instrument Name:** Freeze Dryer

Manufacturer and Model#: Labconco Freezezone 4.5

Room No.: Criss III 273

Description: This small 4.5 liter freeze dry system allows for the fast drying of small pre-frozen samples. It has a -55C condenser making it suitable for all aqueous samples.



19. Instrument Name: Freeze Dryer

Manufacturer and Model#: Millrock LD85 Freeze Dryer

Room No.: Criss III 273

Description: The Millrock LD85 Freeze dry system features fully computer programmable freeze drying cycles with thermally controlled shelves and sample thermocouples the freezing sequence can be modified to best suit an individual product for both structural integrity and drying efficiency. The large 3 shelf system can dry up to 9 liters of sample in a given run. The condenser coils reach as low as -85C, the shelves can be set from 90 to -65C, and pressure can be set from atmospheric to 5 millitorr and under secondary drying will go as low as 0.1 millitorr.



20. Instrument Name: FTIR

Manufacturer and Model#: Shimadzu IR Prestige-21

Room No.: Criss III 273

Description: Fourier transform infrared spectroscope is used to obtain an infrared spectrum of a solid or liquid collecting a high spectral resolution over a wide spectral range.



21. Instrument Name: Spray Coater

Manufacturer and Model#: Glatt Mini-Glatt fluid-bed spray coater

Room No.: Criss III 267

Description: The Mini-Glatt spray coating system allows for both granulation and Wurster process coating. This process can improve shelf life and stability of a formulation as well as imbue other favorable properties such as intestinal coating.



22. Instrument Name: Gross Dissection microscope

Manufacturer and Model#: AmScope AM250

Room No.: Criss III 273

Description: This dissection microscope features a 16 mega-pixel digital camera and a programmable ring LED light source. With alternate lens attachments it can create images with a functional 250x magnification. It is ideal for use in dissection and collecting images of objects too large to be visualised on other microscopes but too small to be examined without magnification.



23. Instrument Name: High Pressure Homogenizer

Manufacturer and Model#: Microfluidics M-110P

Room No.: Criss III 264

Description: This high pressure homogenization system forces a solution through a superfine metal mesh at up to 15,000psi shredding particles and emulsions into nano-sized components. This unit can be used in a recirculating manner allowing multiple passes through the fine sieve. The minimum sample size for homogenization is 100ml which can all be collected with a simple flush to remove the dead volume solution.



24. Instrument Name: High Performance Liquid Chromatograph (HPLC)

Manufacturer and Model#: Shimadzu SCL-10ATvp, SIL-10ADvp, LC-10ATvp, CTO-10ATvp, RF-10AXI, SPD-10ATvp

Room No.: Criss III 273

Description: This Shimadzu 10A class HPLC features binary pumps, auto-sampler, column oven, and full range fluorescent and UV/visible detection. The photodiode array allowing continuous full UV/visible spectrum detection as well.



25. Instrument Name: HPLC

Manufacturer and Model#: Shimadzu 20A and 10A class HPLCs and ESA Coulochem III electrochemical detector.

Room No.: Criss III 264

Description: These HPLCs feature autosamplers, binary pumps, low pressure gradient mixers, photodiode array, fluorescence, and electrochemical detectors. This allows the user to detect separated compounds by absorbance, fluorescence, or shifts in solution conductivity.



26. Instrument Name: HPLC

Manufacturer and Model#: Shimadzu 20A class HPLC and ESA Coulochem III electrochemical detector.

Room No.: Criss III 266

Description: This HPLC features an autosampler, binary pump and electrochemical detector. This allows the user to detect separated compounds by shifts in solution conductivity.

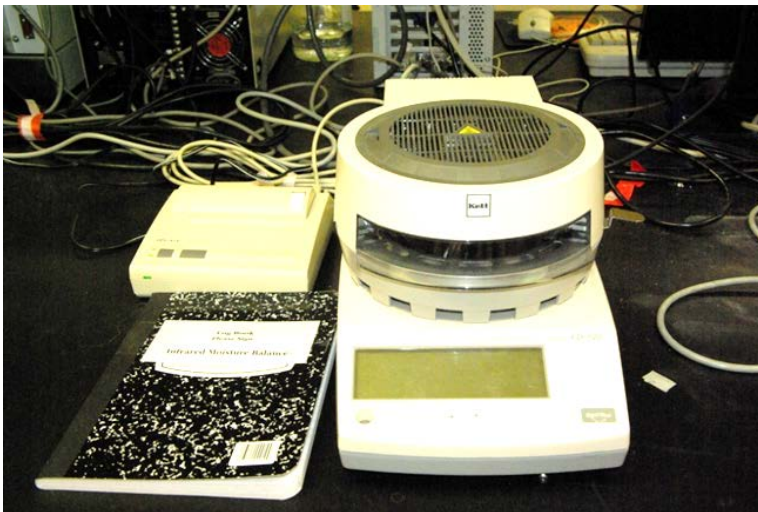


27. Instrument Name: HPLC

Manufacturer and Model#: Shimadzu 10A class HPLC

Room No.: Criss III 267

Description: This HPLC features a manual injector, binary pumps, a Column oven and a UV visible detector.

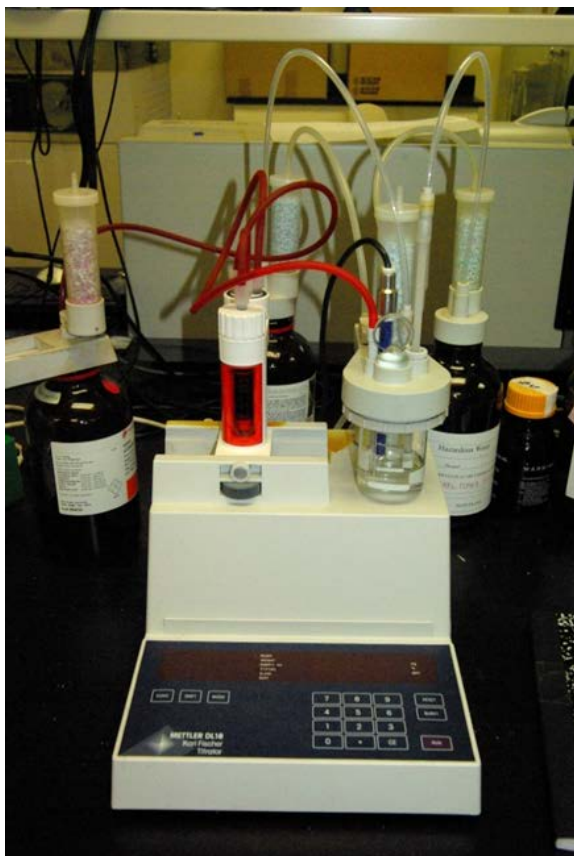


28. Instrument Name: Infrared Moisture Determination Balance

Manufacturer and Model#: Kett FD-720

Room No.: Criss III 273

Description: The infrared(IR) moisture balance heats a sample (500mg or larger) up to a pre-programmed temperature (up to 185C) quickly using a pair of IR lamps and holds until there is no longer mass lost, it then displays the moisture content calculated from the change in mass.



29. Instrument Name: Karl Fischer Titrator

Manufacturer and Model#: Mettler DL18 Karl Fisher Titrator

Room No.: Criss III 273

Description: The Karl Fischer titrator allows for the sensitive detection and quantification of even tightly bound water in a small sample (10-50mg).



30. Instrument Name: LC/MS/MS

Manufacturer and Model#: Applied Bioscience 3200 QTrap LC-MS-MS, Agilent 1200 Series LC, and Parker Source 5000 Gas Generator

Room No.: Criss III 273

Description: The 3200 QTRAP LC/MS/MS System provides excellent sensitivity, superior dynamic range, and reliability across a range of identification and quantitation applications. The 3200 QTRAP System brings true hybrid triple quadrupole/linear ion trap capabilities. An LC-MS is an HPLC system with a mass spec detector. The HPLC separates chemicals in a

sample by conventional chromatographic separation on a column. After separation they enter the mass detector, where the solvent is removed and the analytes are ionized. The mass detector then scans the molecules it sees by mass and produces a full high-resolution spectrum, separating all ions that have different masses. This mass spec has a functional mass range up to 1700m/z.



31. Instrument Name: Mastersizer Particle Size Analyzer

Manufacturer and Model#: Malvern Mastersizer 2000, Sciroco 2000, Hydro2000s

Room No.: Criss III 273

Description: The Mastersizer is a laser diffraction particle size analyzer uses a detector array and a flow through cell to allow the rapid measurement and characterization of a large number of particles. The combination of Sciroco and Hydro attachments allows the system to measure both from liquids and dry powder samples. It is best for use in larger particles from 0.1 to 2000 μm , but can detect particles as small as 10nm.



32. Instrument Name: Modulated Differential Scanning Calorimeter

Manufacturer and Model#: TA Instruments DSC Q100 and Refrigerated Cooling System 90

Room No.: Criss III 272

Description: Don't have one yet.

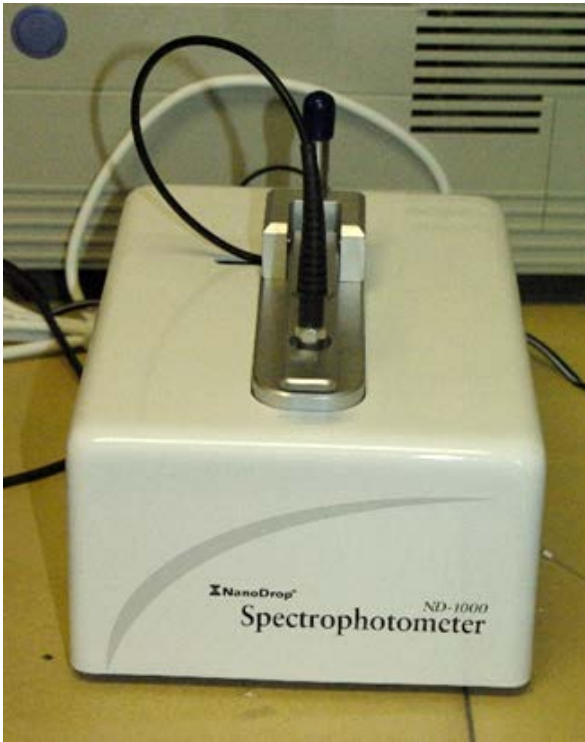


33. Instrument Name: Microcalorimeter

Manufacturer and Model#: MicroCal VP-DSC MicroCalorimeter

Room No.: Criss III 267

Description: The microcalorimeter measures small energetic changes in a liquid sample. These are frequently used to examine protein binding and folding kinetics.

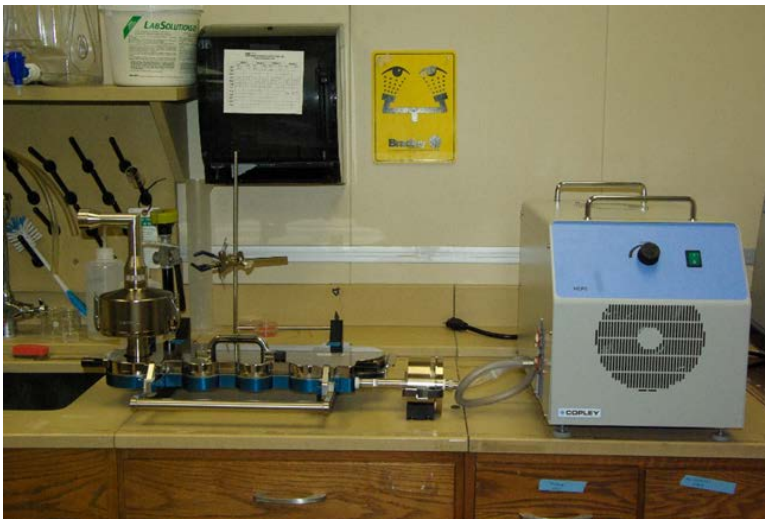


34. Instrument Name: NanoDrop Spectrophotometer

Manufacturer and Model#: NanoDrop Instruments NanoDrop 1000

Room No.: Criss III 367

Description: This is a low volume spectrophotometer capable of reading samples from 1-5ul at 200-800nm UV/Vis. The samples are fully recoverable and does not require the use of a cuvette or other consumables. Through the use interpolation at 1 and 0.1mm wavepaths.

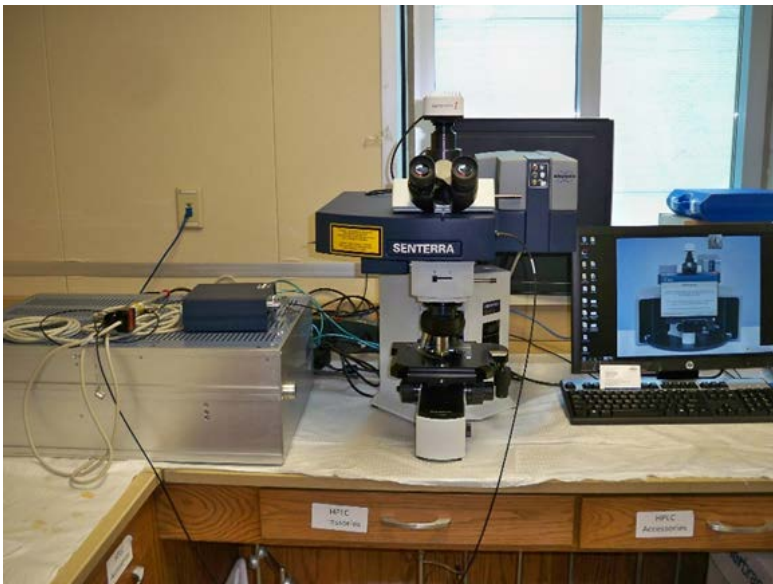


35. Instrument Name: Next Generation Impactor

Manufacturer and Model#: MSP Corp Model 170 Next Generation Impactor and Copley HCP5 Compressor

Room No.: Criss III 270

Description: The next generation impactor (NGI) is designed for testing the aerodynamic properties of airborne pharmaceuticals such as dry-powder inhalers and nebulizers.



36. Instrument Name: Raman IR Microscope
Manufacturer and Model#: Bruker Senterra Raman with Olympus BX51M Microscope
Room No.: Criss III 272
Description: Raman Microscope with high powered laser for detection of IR spectra within samples.



37. Instrument Name: Induction Furnace
Manufacturer and Model#: RDO 5kw Induction Furnace
Room No.: Criss III 271
Description: This induction furnace increases the temperature of magnetizable and electron dense materials such as metals through stimulation by radio frequency focused at the center of a small coil. In our lab this is used for the excitation of paramagnetic nanoparticles and microparticles. To maintain ambient sample temperature the system is linked to a 20,000 btu chiller and has a air purged jacket surrounding the sample. The system uses a ceramic fiber-optic thermocouple to measure sample

temperature.



38. Instrument Name: Rheometer
Manufacturer and Model#: TA Instruments AR-G2 Rheometer
Room No.: Criss III 273
Description: The AR-G2 rheometer offers versatile semi-automated system for examining the physical properties of liquids such as flow and viscoelastic properties. Our AR-G2 has a 2° cone and flat plate geometry.



39. Instrument Name: Rotavapor

Manufacturer and Model#: Buchi Rotavapor R-215

Room No.: Criss III 272

Description: Rotary evaporation system for the slow removal of solvents from sample often under vacuum and with heat.



40. Instrument Name: Scintillation Counter

Manufacturer and Model#: Beckman Coulter LS 6500 Multi-Purpose Scintillation Counter

Room No.: Criss III 266

Description: The liquid scintillation counter is the standard laboratory method to quantify the radioactivity of low energy radioisotopes, mostly beta-emitting and alpha-emitting isotopes. The low energy radiation can then be detected in a sensitive method using a scintillation cocktails to absorb the energy and emit it as detectable light pulses.



41. Instrument Name: Side-By-Side Diffusion Chambers

Manufacturer and Model#: PermeGear and Fisher Scientific Isotemp 90 refrigerated circulator

Room No.: Criss III 273

Description: These side-by-side water jacketed diffusion chambers allow for both the examination of basic drug mechanics (such as drug release from particles) as well as more complicated interactions such as diffusion/permeation across cellular or tissue barriers. With the refrigerated circulating bath samples can be run from -40 to 99C.



42. Instrument Name: Spectrofluorophotometer

Manufacturer and Model#: Shimadzu RF-5301 PC

Room No.: Criss III 273

Description: This spectrofluorophotometer is used for the measurement of the fluorometric (fluorescent) properties of a liquid sample. This unit can be used to scan excitation and emission ranges to determine the peak parameters for a known sample or the any parameters of an unknown sample. The system allows for quick rough scans and fine detailed scans. Additionally it can be used for the quantification of experimental fluorescent samples.

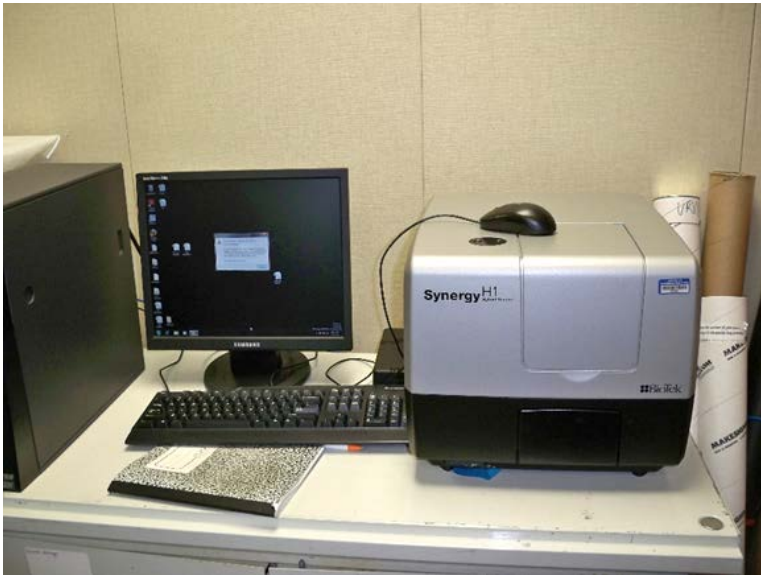


43. Instrument Name: Spray Drier

Manufacturer and Model#: Buchii B290 Spray Drier

Room No.: Criss III 270

Description: This Buchi spray drier with solvent trap allows for bulk drying of micro-sized particles. Suitable for generating particles for aerosol delivery or to dry a product for other packaging.



44. Instrument Name: Hybrid Plate Reader

Manufacturer and Model#: BioTek Synergy H1 hybrid reader

Room No.: Criss III 272

Description: This microplate reader is capable of UV visible, Fluorescent, and Luminescent reading of samples in microplates from 384 and fewer wells. Additionally it has specialized plate inserts for sampling droplets cuvettes and microscope slides.



45. Instrument Name: Surface Tension Meter

Manufacturer and Model#: Krüss K100 and Metrohm 711 Liquino

Room No.: Criss III 271

Description: The Krüss K100 tensiometer is used for making both basic surface tension measurements as well as programmed surface tension measurements and calculation such as critical micelle concentration (CMC) and contact angle measurements for liquid samples and suspensions.



46. Instrument Name: Thermogravimetric Analyzer

Manufacturer and Model#: Shimadzu TGA50

Room No.: Criss III 273

Description: The thermogravimetric analyzer measures changes in mass over time with the application of temperature. This is useful in determining solvent loss, water content, and degradation temperatures of chemicals, compounds, and particles. It requires only a small sample (2-10mg) but can use samples as large as 1g and can run temperatures up to 1000°C at rates from 0.1°C/hour to 99.9°C/min with up to a 99 step temperature program.



47. Instrument Name: Ultracentrifuge

Manufacturer and Model#: Beckman J2-21 centrifuge

Room No.: Criss III 272

Description: Slower ultracentrifuge capable of 21,500RPM (~50,000xG with our current rotor).



48. Instrument Name: Ultracentrifuge

Manufacturer and Model#: Sorvall Discovery 90SE

Room No.: Criss III Room 273

Description: This ultracentrifuge can run at a speed of up to 100,000rpm well surpassing our current rotor capacity (max 100,000g at 48,000 rpm). This versatile unit is useful in the removal of nano-sized particles, viruses, and large proteins from solution. New Sorvall rotors may be added with automatic speed to gravitational force adjustment. Programmed runs and temperature control are also features.



49. Instrument Name: -80 Freezer

Manufacturer and Model#: Fisher IsotempBasic

Room No.: Criss III Room 273

Description: -80 Freezer for storage of sensitive samples and reagents.

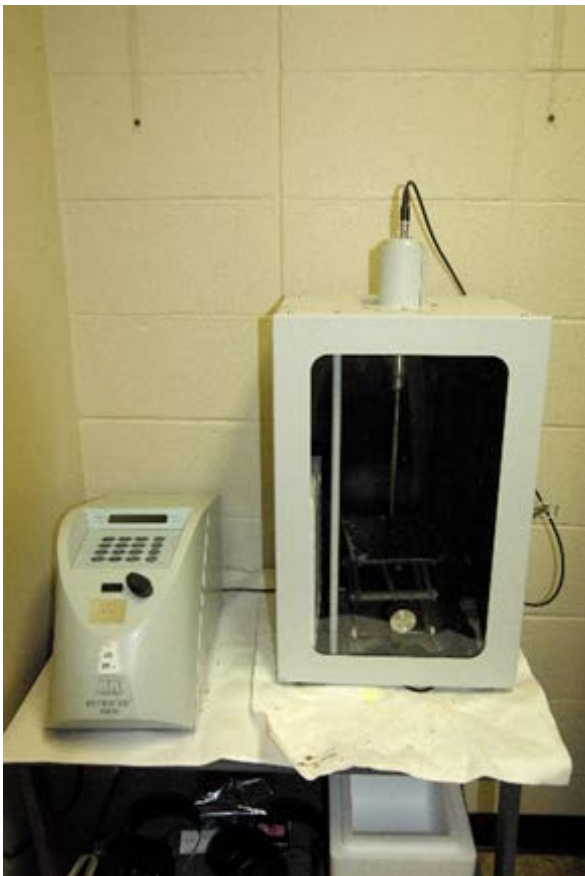


50. Instrument Name: Ultrasonic Probe

Manufacturer and Model#: Misonix Microson XL2000 Ultrasonic Cell Disruptor

Room No.: Criss III 273

Description: This small portable probe ultrasonic homogenizer provides 22.5kHz at 100watts (rms) maximum and is ideal for quick ultrasonication of small samples. Because it is portable it can be moved to samples that must be kept in a fume hood or biosafety cabinet.



51. Instrument Name: Ultrasonic Probe

Manufacturer and Model#: Misonix Sonicator 3000

Room No.: Criss III 273

Description: This probe ultrasonicator provides 22 khz ultrasonics at 600watts (rms) maximum and is ideal for the sonication of samples that require a large amount of energy such as the reduction of particle size. This sonicator features a noise reduction cabinet making it safe to be in the room while the probe is running without the use of special hearing protection..



52. Instrument Name: Ultrasonic Probe

Manufacturer and Model#: Qsonica Sonicator q700

Room No.: Criss III 271

Description: This probe ultrasonicator provides 22 khz ultrasonics at 700watts (rms) maximum and is ideal for the sonication of samples that require a large amount of energy such as the reduction of particle size. This sonicator features a noise reduction cabinet making it safe to be in the room while the probe is running without the use of special hearing protection..



53. Instrument Name: Ultra performance liquid chromatograph (UPLC)

Manufacturer and Model#: Waters Acquity H-Class

Room No.: Criss III 271

Description: This UPLC system features a temperature controlled autosampler, a 4 column multi-temperature controlled column manager, a quaternary pump system (up to 4 solvents at once) a photodiode array detector (180-800 UV/visible) and a Fluorescence detector. The high pressure system allows samples to be run at 2-3 times the speed of a conventional HPLC system saving time, money, and solvent.



54. Instrument Name: Ultra performance liquid chromatograph (UPLC)

Manufacturer and Model#: Waters Acquity

Room No.: Criss III 270

Description: This UPLC system features a temperature controlled autosampler, a 4 column multi-temperature controlled column manager, a quaternary pump system (up to 4 solvents at once) a photodiode array detector (180-800 UV/visible) and a Fluorescence detector. The high pressure system allows samples to be run at 2-3 times the speed of a conventional HPLC system saving time, money, and solvent.



55. Instrument Name: UV/Visible Spectrophotometer

Manufacturer and Model#: Shimadzu Pharmaspec UV-1700, and Shimadzu CPS-240A cell controller

Room No.: Criss III 273

Description: This standard UV/visible light spectrophotometer delivers absorbance data from 180 to 800nm. It features a temperature controlled automated 6 well chamber with features for programming automated kinetics experiments.