

## SYLLABUS

### 3Flex/ASAP 2020 Physisorption Operator Training

#### INSTRUCTIONAL GOALS

This course introduces students to the components, operation, and theory of the 3Flex and ASAP 2020 physisorption for surface area and porosity analysis.

At the end of this course, you will:

- Be able to properly weigh the sample tube with and without sample, determine the sample amount required, properly load a sample into a sample tube, determine required degas time and temperature, prepare the sample using the SmartPrep degas system, and introduce the sample to the instrument .
- Understand the basic fundamentals of physisorption and basic operation of a volumetric analysis system.
- Be able to use the computer and operational software to perform an analysis on a reference material.
- Be able to properly configure any report format, a combination of reports, and obtain analysis information according to your laboratory requirements.
- Be able to make all user level repairs, adjustments and checks, and locate equipment problems using the Troubleshooting section of the Operator's manual.

#### NEEDS AND RESOURCES

##### Required Background

To successfully complete this course, you must:

- Have some minimal exposure to a 3Flex 3500 or ASAP 2020 in a laboratory environment.
- Have reviewed the Operator's manual.

##### Required Materials

The following provided materials will help you successfully complete this course:

- Operator Training Study Guide with Lecture Presentations
- Notepad
- Pen
- Highlighter
- Micromeritics Thumb Drive

##### Additional Print Resources

The following publications will also be provided:

- Webb, Paul A. and Clyde Orr. *Analytical Methods in Fine Particle Technology*. Norcross, Georgia, U.S.A.: Micromeritics Instrument Corporation, 1997.
- Related Application Notes and Technical Tips.

##### Online Resources

- Additional information can be found at: [www.micromeritics.com](http://www.micromeritics.com)

## COURSE SCHEDULE

### Day 1

| Session  | Room           | Activity  | Approximate Time           |
|----------|----------------|---|----------------------------|
| -        | <b>INTRO</b>   | Meet & Greet with guests  | 8:00 AM to 8:15 AM         |
| <b>1</b> | <b>LAB</b>     | Carbon and Si-Al sample prep / Units / Carbon and Si-Al .smp files and begin degas            | 8:15 AM to 9:15 AM         |
| <b>2</b> | <b>LECTURE</b> | Theory of Operation   | 9:15 AM to 11:30 AM        |
| -        | -              | <b>LUNCH</b>  | <b>11:30 AM to 1:00 PM</b> |
| <b>3</b> | <b>LECTURE</b> | Gas Adsorption: Surface area, Standard Isotherms and characterization of mesoporous materials | 1:00 PM to 3:00 PM         |
| <b>4</b> | <b>LAB</b>     | Prepare Y-Zeolite and build parameter files degas and micropore analysis                      | 3:00 PM to 4:00 PM         |
| <b>5</b> | <b>LAB</b>     | Initiate Si/Al and Carbon analyses and degas Y-Zeolite overnight                              | 4:00 PM to 4:15 PM         |

### Day 2

| Session  | Room           | Activity  | Approximate Time           |
|----------|----------------|---|----------------------------|
| -        | <b>LECTURE</b> | Day 2 Introduction and Brief Questions/Review of Day 1                                      | 8:00 AM to 8:15 AM         |
| <b>1</b> | <b>LAB</b>     | Build smp file for Y-Zeolite and initiate analysis  | 8:15 AM to 9:30 AM         |
| <b>2</b> | <b>LECTURE</b> | Microporous materials (Dubinin, HK and intro to DFT) Special CO <sub>2</sub> applications   | 9:30 AM to 11:45 AM        |
| -        | -              | <b>LUNCH</b>  | <b>11:45 AM to 1:00 PM</b> |
| -        | -              | <b>FACILITY TOUR</b>  | <b>1:00 PM to 2:00 PM</b>  |
| <b>3</b> | <b>LECTURE</b> | MicroActive and Report Options  | 2:00 PM to 3:30 PM         |
| <b>4</b> | <b>LAB</b>     | Build smp file for Alumina Kr analysis / Prep Alumina Initiate Y-Zeolite micropore analysis | 3:30 PM to 4:00 PM         |

### Day 3

| Session  | Room           | Activity   | Approximate Time           |
|----------|----------------|--|----------------------------|
| -        | <b>LECTURE</b> | Day 3 Introduction and Brief Questions/Review of Day 1 | 8:00 AM to 8:15 AM         |
| <b>1</b> | <b>LAB</b>     | Initiate Alumina Krypton Analysis                      | 8:15 AM to 8:30 AM         |
| <b>2</b> | <b>LECTURE</b> | Data Reduction & Results Review                        | 8:30 AM to 10:30 AM        |
| <b>3</b> | <b>LECTURE</b> | Introduction to NLDFT                                  | 10:30 AM to 11:30 AM       |
| -        | -              | <b>LUNCH</b>   | <b>11:30 AM to 1:00 PM</b> |
| <b>4</b> | <b>SERVICE</b> | Installation/Calibration/Serviceable items             | <b>1:00 PM to 3:00 PM</b>  |

## POLICIES AND PROCEDURES

### **General Rules:**

Attendance to all scheduled lectures and labs is very important due to the length of the course. Please make every attempt possible to avoid tardiness. If you do come in late, please enter through the rear door of the classroom so as to not disrupt or distract your fellow students. If you are unable to attend a day or part of a day due to emergency, please notify the Training Coordinator immediately.

Remember, you and/or your company have a business need for you to attend and complete this course to insure that you are getting the most out of your/your company's investment in your Micromeritics instrument.

### **Grading Policies:**

You will be periodically evaluated throughout the course during oral discussions and demonstrations. There are also questions in your Operator Training Study Guide that will be discussed at the completion of each unit. Please be prepared to answer questions about the previous lessons content. A brief assessment exam will be given at the end of the course to verify that learning objectives are met by each student.

### **Grading Scale:**

There is no grading scale for this course and you will not fail. Again, you and/or your company have a business need for you to attend and complete this course to insure that you are getting the most out of your/your company's investment in your Micromeritics instrument .

## ADDITIONAL INFORMATION

Lunch will be provided by Micromeritics. Please inform the Training Coordinator of any special dietary needs.

## CONTACT INFORMATION

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