

## SYLLABUS

### Surface Area, Porosity, & Physical Adsorption with applications in the Tristar II 3030, ASAP 2420, & ASAP 2460

#### INSTRUCTIONAL GOALS

This course introduces students to the components, operation, and theory of the TriStar II 3030, ASAP 2420, & ASAP 2460 for surface area and porosity analysis.

At the end of this course, you will:

- Be able to identify and power up the system, including installation of the operating program.
- Be able to properly weigh the sample tube with and without sample, determine sample amount required, properly load a sample into a sample tube, determine required degas time and temperature, prepare the sample using the appropriate degas system, and introduce the sample preparation 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 TriStar II, ASAP 2420/2460 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 containing presentations, relevant application notes and Study Guide

##### 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	Time
-	<b>LECTURE</b>	Introduction	8:00 - 8:10 AM
1	<b>LECTURE</b>	General Overview, Basic Applications, Similar Instruments	8:10 – 8:45 AM
2	<b>LAB</b>	System and Software overview; Blank tube analysis; Carbon sample prep	8:45 – 10:30 AM
3	<b>LECTURE</b>	Surface Area: Theory, Isotherms, BET	10:30 – 11:30 AM
	-	<b>LUNCH</b>	<b>11:30 – 1:00 PM</b>
4	<b>MICROACTIVE</b>	Introduction to software, Carbon Data Analysis	1:00 – 1:30 PM
3	<b>LAB</b>	Carbon .smp files, initiate carbon analyses. Units, Prep Si/Al samples for overnight degas. Si/Al .smp files	1:30 – 3:00 PM
4	<b>LECTURE</b>	Pore Size & Volume: Thickness Equations, BJH, t-plot	3:00 – 4:15 PM

### Day 2

Session	Room	Activity	Time
-	<b>LECTURE</b>	Day 2 Introduction and Brief Questions	8:00 - 8:10 AM
1	<b>LAB</b>	Initiate Si-Al analysis. Prep Alumina samples & create .smp files	8:10 – 9:00 AM
2	<b>MICROACTIVE</b>	Si/Al Data Analysis	9:00 – 9:45 AM
2	<b>LECTURE</b>	Mesoporous Materials	9:45 - 11:30 AM
-	-	<b>LUNCH</b>	<b>11:30 – 1:00 PM</b>
-	-	<b>FACILITY TOUR</b>	<b>1:00- 2:00 PM</b>
3	<b>LAB</b>	LAB: Prep Alumina w/delayed degas, Initiate full Si/Al samples to run overnight	2:00 – 2:45 PM
4	<b>LECTURE</b>	Introduction to DFT	2:45 - 4:15 PM

### Day 3

Session	Room	Activity	Time
-	<b>LECTURE</b>	Day 3 Introduction and Brief Questions/Review of Day 1 & 2	8:00 – 8:15 AM
<b>1</b>	<b>LAB</b>	Initiate Alumina .SMP with Kr gas.	8:15 – 8:30 AM
<b>2</b>	<b>LECTURE</b>	A review of Report Options, Data Reduction, and Class-Generated Results.	8:30 – 11:30 AM
-	-	<b>LUNCH</b>	<b>11:30 – 1:00 PM</b>
<b>3</b>	<b>CASE STUDIES</b>	Group work: Build specific .smp files, solutions for bad data, etc.	1:00 – 2:00 PM
<b>4</b>	<b>SERVICE</b>	A discussion of installation, calibration, and operator maintenance	2:00 – 3:30 PM
<b>5</b>	<b>ASSESSMENT</b>	Class assessment & survey	3:30 – 4:00 PM

## 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

- Kara Bailey, MLC Training Coordinator
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