



## 2011 Process Safety Training Courses: Chemical Reaction Safety, Electrostatics, Dust & Flammability April 11-14, 2011

### Course Overview

Fauske & Associates, LLC (FAI) offers a series of four (4) individual courses designed to identify hazards and control strategies that allow for the safe development and scale-up of batch and semi-batch chemical processes. The topics are:

- 1) Preliminary hazard assessment and quantification of the desired reaction(s);
- 2) Characterization of the unwanted chemical/decomposition hazards;
- 3) Flammability and electrostatic hazards; and
- 4) Dust/flammable explosion hazards, prevention and protection practices including OSHA Combustible Dust National Emphasis Program.

Each one-day course runs from 9 am to 5 pm daily over four consecutive days and can be attended individually or as a series. A continental breakfast, lunch, and snacks are provided.

### Who Should Attend?

FAI have designed these courses for personnel in R&D, Process Development, and Full-Scale Production in the chemical, petrochemical, food, cosmetic, detergent, plastic, paper, agro-chemicals and pharmaceutical industries. Eligible personnel include but are not limited to chemists, engineers, technicians, and operational staff.

### Course Design and Objectives

Scaling-up at any level in a safe and compliant manner requires technical understanding of all critical process issues and implementation of the right level of safety measures in the plant. FAI has developed a series of courses to train engineers, chemists, and operational personnel to work with their process safety laboratories to systematically identify and assess hazards in a quantitative manner to develop inherently safer processes .

It is critical to have a process safety strategy in place to identify hazards associated with raw materials, solvents, by-products, chemical reactions, and various work-up unit operations that produce intermediates, bulk product and final product form. Once hazards are identified and understood, appropriate safeguards or redesigning of the process is needed to eliminate a hazard. As a chemical process scales up, it is essential to understand what the safety baseline is and how the process can be maintained within safe limits to avoid an incident. If needed, adiabatic tests can be conducted to simulate a worst-case scenario and design appropriate explosion protection for new/existing reactors. When working with flammable solids, liquid and gases it is necessary to have a practical understanding of fire/explosion hazards, electrostatic issues and what control measures are needed. As the solid product is produced, it is worked up in various unit operations thereby generating powders and dust. It is necessary to quantify the sensitivity and amount of powder or dust needed to be a dust explosive hazard, and the severity of the explosion. Knowing these properties allows for the right the right level of explosion prevention, electrical classification, and management of electrostatic issues. A scientific calculator is recommended for these courses.

### Day 1 – Monday

#### Preliminary Hazard Assessment and Characterization of the Desired Reaction (Chemical Reaction Hazards)

##### Course Objectives

This course will demonstrate the need for process safety testing and management strategies to allow for a safe and compliant scale-up of batch and semi-batch processes. It will take a step-wise approach to this safety evaluation. The first step is a preliminary assessment strategy for conducting a literature review and screening tests (calorimetry, calculations) to identify highly-energetic materials. The next step is conduct a quantitative assessment of the desired and quench reaction to determine heat of reaction, adiabatic temperature rise, heat-flow/off gas rates, and determination of the risks associated with the current reaction.

##### Content- Power Point Slide Presentation

- Introduction
- Suggested tests at each stage of production
- Theoretical calculations (Predictions)
- Process redesign
- Case studies
- Quiz
- Review of significant incidents
- Small-scale tests
- Quantification of the desired & quench reactions
- Inherent safety
- Workshop
- Course Evaluation

### Day 2 – Tuesday

#### Characterization of the Unwanted Reactivity

##### Course Objectives

Every chemical process needs to be assessed in order to identify unwanted reactivity. If no adverse reactivity is observed, then the process can be safely scaled-up. However, if adverse reactions (thermal runaway reaction, decomposition, or generation of off-gases) are detected, it is necessary to quantify the energy, pressure, and temperature parameters including their respective rates. The need and choice of specific tests, data interpretation, and examples of calculations will be provided for a variety of different systems. Commonly used protective measures for safeguarding personnel and plant equipment will be discussed.

##### Content- Power Point Slide Presentation

- Introduction
- Adverse testing strategy
- Data interpretation
- Protective measures
- Workshop
- Course Evaluation
- Review of significant incidents
- Calorimetric testing
- Process redesign
- Case studies
- Quiz

### Day 3 – Wednesday

## Understanding and Controlling Flammability and Electrostatics Hazards

#### Course Objectives

This course will allow engineers and process safety personnel to identify hazards of conducting process with combustible and flammable solvents. A review of common flammable and electrostatic properties will be discussed in terms of batch and semi-batch process and work-up operations. We will present case studies which will help to focus attendees on critical data needed to conduct a proper assessment to determine safeguards that are needed to conduct scale-ups in a safe and compliant manner.

#### Content- Power Point Slide Presentation

- Introduction – Basic Theory and Definition
- Conditions for a Fire & Explosion
- Theoretical calculations (Predictions)
- Ignition Factors including Electrostatics
- Case studies
- Quiz
- Review of significant incidents
- Small-scale tests
- Special conditions
- Explosion control
- Workshop
- Course Evaluation

### Day 4 – Thursday

## Dust Explosion Hazards, Prevention and Protection Practices

#### Course Objectives

This course will make all participants aware of important issues associated with OSHA's Dust National Emphasis Program, NFPA 654 and other relevant Standards/Codes. There will be a logical approach presented on how to characterize a powder's hazardous dust properties. Once the hazards are identified and quantified, there will be a description of various techniques used to control and/or avoid dust explosions in a safe and compliant manner. Worked examples will be presented to demonstrate ignition sensitivity, explosion severity, and the Class II test relative to a "standard" dust. The workshop will allow student to understand and practice various dust calculations.

#### Content- Power Point Slide Presentation

- Introduction – Basic Theory and Definition
- OSHA Dust National Emphasis Program
- Hazard Analysis (Dust Pentagon)
- Laboratory Testing
- Explosion Control Strategies
- Workshop
- Course Evaluation
- Review of Significant Dust Explosions
- NFPA Standards, International Fire Codes
- Data Collection and Process Modeling
- Mitigating Factors including Electrostatics
- Case studies
- Quiz

### In-Company Training\*\*

All of the above mentioned courses can be presented as in-house courses at a location convenient to our client. FAI subject matter experts will travel to the client's venue and present the courses. When there are between 10-30 attendees, it is generally more cost effective to have FAI personnel present the course at a company facility. In addition, the course can be customized.

**2011 Process Safety Training Courses**  
**Chemical Reaction Safety, Electrostatics, Dust & Flammability**  
**REGISTRATION FORM**  
**April 11-14, 2011**

Chicago Marriott Southwest at Burr Ridge  
 1200 Burr Ridge Pkwy  
 Burr Ridge  
 (630) 986-4100

Fauske & Associates, LLC Headquarters  
 16w070 83rd Street  
 Burr Ridge, IL  
 1+-877-FAUSKE1

First Name: \_\_\_\_\_

Last Name: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_

Payment Method:

ZIP: \_\_\_\_\_

Visa  MC  Amex  Company Check

Tel.: \_\_\_\_\_

Account Number: \_\_\_\_\_

Cell: \_\_\_\_\_

Expiration Date: \_\_\_\_\_

Fax: \_\_\_\_\_

Name on Account: \_\_\_\_\_

Email: \_\_\_\_\_

Signature: \_\_\_\_\_

Please choose which day(s) you will be attending:

Day 1: Monday - Preliminary Hazard Assessment Quantification of the Desired Reaction Hazards

Day 2: Tuesday - Characterization of the Unwanted Reactivity

Day 3: Wednesday - Understanding and Controlling Flammability and Electrostatics Hazards

Day 4: Thursday - Dust Explosion Hazards, Prevention and Protection Practices

Prices:

\$ 489.00 each day      \$ 1,956.00 for all four days

Fees include hotel room, breakfast, lunch and 2 snack breaks

All fees must be received prior to course commencement.

We accept Visa, MC, Amex or company check.



Cancellation Policy: Cancellations will be accepted up to April 11, 2011.

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