



Pyrotechnic Chemistry Course Outline

Module I – Basic Chemical Principles

- Atomic Structure
- Chemical Bonds and Bond Types
- Chemical Names
- Chemical Formulae and Equations
- Common Pyrotechnic Materials

Module II – Pyrotechnic Chemistry, Ignition and Propagation

- Chemical Oxidation States
- Oxidation Reactions
- Reaction Energy Considerations
- Thermal Run-Away
- Pyrotechnic Ignition and Propagation

Module III – Pyrotechnic Primes and Priming

- Shimizu Energy Diagrams
- Ignition and Propagation Problems
- Prime Formulations and Application Techniques
- Alternatives to Priming

Module IV – Factors Affecting Burn Rate

- Choice of Fuel and Oxidizer and Their Ratio
- Degree of Mixing and Consolidation
- Particle Size and Shape
- Additives and Catalysts
- Temperature, Pressure and Confinement
- Physical Form and Consolidation
- Geometry, Crystal and Environmental Effects

Module V – Aspects of Pyrotechnic Burning

- Pyrotechnic Delays
- Parallel vs. Propagative Burning
- Black Match and Quick Match Mechanisms
- Rocket Performance / Malfunctions
- Burning, Deflagration and Detonation

Module VI – Physical Basis for Coloured Light Production

- Nature of Light
- Line, Band and Continuous Emissions
- Chromaticity Diagrams
- Additive Colour Laws
- Colour Theory Applied

Module VII – Chemistry of Coloured Flame

- Mechanism of Coloured Light Production
- Colour Agents and Colour Species
- Colour Enhancers
- Optimizing Colour Quality
- Use of Metal Fuels
- Special Topics

Module VIII – Chemistry of Sparks, Glitter and Strobe

- Light Emission from Sparks
- Control of Spark Chemistry
- Mechanism of Glitter
- Influence of Metal Fuels on Glitter
- Control of Glitter Delay
- Mechanism of Strobe Burning
- Control of Strobe Rate

Module IX – Pyrotechnic Smoke and Noise

- Physical Smoke
- Chemical Smoke
- Whistles
- Salutes and Reports

Module X – Approaches to Formulation Development

- Add or Substitute a Component
- Mix Compositions
- Triangle Diagrams
- Stoichiometric Approaches
- Other Approaches

Module XI – Pyrotechnic Sensitiveness

- Water Sensitiveness
- Auto-Ignition Temperature
- Friction Sensitiveness
- Impact Sensitiveness
- Electrostatic Sensitiveness

Module XII – Hazard Management

- Elements of Hazard Management
- Chemical Toxicity Hazards
- Pyrotechnic Hazards
- Hazardous Chemical Combinations
- Measures to Control Hazards

Booking Form

Course Title	Pyrotechnic Chemistry		
Venue	Grafham Water Sailing Club		
Dates	Tuesday 13 th , Wednesday 14 th , Thursday 15 th March 2017		
Time	09:30 – 16:30		
Course Fee	£495.00 + VAT per attendee		

Attendee's Name	
Company	
Position	
Address	
Telephone	
Email	
Any Special Dietary Requirements	
Signed	
Date	

Please return your form by post to the address below, or alternatively email the form to avril@carndu.com and make BACS payment to CarnDu Limited, a/c 21869260, sort code 77-72-09 using your initials and "PY1" as a reference.

We will acknowledge your place on the course by email, but places cannot be reserved until payment is received in full.

Office Use Only

Deposit Received	Full Payment Received	Invoice	Confirmed on Course
£	£	No.	