



Hazards from Fire: Quantification of Fire Behaviour, Fire Retardancy and Fire Toxicity

This intensive 4-day course has been designed to introduce scientists and engineers to the fundamentals of fire behaviour.

What is the need?

Unwanted fire costs economies in the developed world around 1% of GDP each year. The layout of cities and infrastructure are designed to ensure fire safety. Construction products, electrical and electronic equipment, mass transport vehicles and in some cases toys, upholstered furniture and furnishings can only be sold if they comply with flammability regulations.

WHEN:

Monday 17th – Thursday 20th April
2023

8:45am – 5:15pm

WHERE:

Novotel Melbourne Preston
215 Bell Street, Preston VIC 3072

CONTACT:

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Richard Hull, Professor of Chemistry and Fire Science, School of Natural Sciences, University of Central Lancashire, Preston, PR1 2HE, United Kingdom

Apart from Fire Safety Engineering, which concentrates on building safety and structural resilience, fire science is very sparsely covered in the science and engineering curricula of modern universities, yet scientists and engineers are expected to design products meeting varied and often hard-to-understand fire safety regulations and pass industry specific tests.

What will be covered?

The course starts with an **introduction to fires and fire science** covering ignition, fire growth, flames and their radiation, and flame reactions.

This is followed by a discussion of **polymer decomposition mechanisms**. Most unwanted fires are fuelled by natural or synthetic polymers, yet these cannot become fuels for flaming fires without decomposing from their long polymer chains into volatile gas phase fragments.

Techniques for understanding polymer decomposition, with and without flame retardants, are essential tools for flame retardant development. A discussion of the main techniques, thermogravimetric analysis (TGA), TGA coupled with gas analysis, pyrolysis-GC-MS and rheology will be given. The first day finishes with a **workshop on the interpretation of thermal analysis data**.

Measurement of flammability covers the theory and principles behind the main fire test methods, making a distinction between regulatory tests, and scientific measurements which provide quantitative data on fire behaviour.



The **workshop on interpretation of cone calorimeter data** will give hands on experience, based on real cone calorimetric data, for interpreting experimental results with and without the presence of fire retardants.

Large scale fire tests. Objective truth in much of fire testing can be quite elusive as we rarely know about real fire incidents and therefore must rely on large-scale tests to generate useful data about fire behaviour in likely fire scenarios.

Fire safety regulations have driven the fire safety industry, but very often originate from historical accidents and disasters. Regulators have only rarely been proactive in responding to a fire threat before it results in tragedy.

Introduction to fire retardants covers the main types of fire retardants and explains the different mechanisms involved.

The **workshop on the interpretation of fire-retardant performance** uses specific case studies to investigate how particular fire retardants work alone and in combination, and how in some cases they fail to work.

Polymers, fire retardants and sustainability address the environmental pressures on the industry which are currently driving changes in order to address environmental and climate problems.

Lessons from real fires gives examples of the kind of fire catastrophes which have led to new fire safety regulations.

Fire hazards includes the effects of heat, smoke, asphyxiant and irritant gasses together with the longer-term hazards from fire contamination such as exposure to carcinogens and particulates on the human population.

Acute fire toxicity measurement describes the main bench and large-scale methods for quantification of smoke and its toxicity.

The Grenfell Tower fire will look at the causative factors and the events occurring on 14th June, 2017 in London, from a material's chemist perspective.



Grenfell Tower fire, 14th June 2017

REGISTRATION FEES:

Course fees include catering for all days and the Course Dinner on Wednesday 19th April, as well as all lecture notes and a certificate of attendance on completion over the four days. These rates are per person and do not include GST.

Non-Members Standard Rate	\$2,470
VCA Members	\$1,870

Spaces are strictly limited – REGISTER NOW!

<https://events.humanitix.com/hazards-from-fire-quantification-of-fire-behaviour-fire-retardancy-and-fire-toxicity>

**Book your Company's One-on-One Opportunity**

There are only **two opportunities** for a personal One-on-One with Richard on Friday 21st April: A morning session from 8.30am – 12.30pm or afternoon session from 1.30pm – 5.30pm. This is based on a first-in first-served basis at a cost of \$2300 exc gst per half day. Please email carol.hassan@vinyl.org.au to take this opportunity up and you will be advised on confirmation if you are successful.

Course Dinner: Join Richard for an informal course dinner on Wednesday 19th April 2023, venue to be advised. (The dinner is optional at \$120 exc gst per person, which includes a 2-course meal and beverages).

COURSE PRESENTER: Professor T. Richard Hull

Professor of Chemistry and Fire Science, School of Natural Sciences, University of Central Lancashire, Preston

Richard is a chemist who spends most of his time understanding the behaviour of unwanted fires, particularly the effects of fire retardants and the toxicity of the smoke. He teaches physical chemistry and has given lectures on his work all over the world.

He has over 100 published papers on the assessment of flammability, the influence of fire retardants on flammability, the toxicity of fire smoke and the effects of fire retardants on the smoke toxicity. He has published two major books titled *Fire Toxicity* (with UCLan's Prof Anna Stec) and *Fire Retardancy: New Strategies and Mechanisms*.

Originally graduating in Chemistry with first class honours and course prize from the University of Salford, Richard went on to study for a PhD using a laser pyrolysis time-of-flight mass spectrometer to investigate fire retardant behaviour. He then made a sideways move to electrical engineering where he used "electron beam stitching" to attach thin gold films to silicon and quartz for the emerging micro-electronics industry. Then he spent 10 years away from universities, teaching chemistry to hairdressing trainees, chemical plant operators, fire station officers as well as industry-based and full-time chemistry students.

He ended up spending most of his time teaching industry-based chemistry laboratory technicians before being appointed to a university lectureship, where he returned to his fire retardancy research and started to work in fire toxicity. He also taught physical chemistry at every stage of the chemistry degree programmes. He wanted to focus full-time on research and was appointed to a Readership at the University of Bolton. In 2007, he was appointed to the first Chemistry Professorship at the University of Central Lancashire (UCLan).

He has continued to pursue his interest in teaching physical chemistry and undertaking fire research and has twice been co-chair of the world's leading Fire-Retardant Polymers FRPM07 and FRPM17 conference. Following the tragic Grenfell tower fire his expertise in material flammability and smoke toxicity has been particularly in demand. He has been interviewed on the BBC's Panorama, Newsnight, Breakfast (on the red couch) and World at One, Channel 4's Dispatches, as well as many major news programmes and he has been invited to speak on his work in both the UK and European parliaments.