



**Chemical Safety**

# **Module 1**

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Health & Safety  
**Essentials**

Registered charity number 207890

# Use, storage, handling and transport in the laboratory

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## Introduction

Chemical safety and dangerous substances have always been a focus of attention as peoples' lives have been put at risk or lost due to fires, explosions and chemical releases.

Common causes of incidents, resulting in fatalities and injury have arisen from:

- Lack of awareness of the properties of materials (their storage requirements, use, handling, decanting or disposal arrangements)
- Inadequate design of storage facilities (such as location, ventilation, segregation, spillage containment)
- Inadequate selection, design, installation or maintenance of equipment which could create an ignition source
- Poor control of ignition sources (such as hot work, electrical equipment, electrostatic discharges, and heating materials above their auto-ignition temperature)
- Exposure to heat from a nearby source such as a fire or heating system
- Lack of understanding of the process energetics, controls, by-products, or hazardous intermediates generated (so that loss of control results in an incident, such as a fire or explosion, and injury) during reactions
- Human error due to lack of training, awareness, supervision or experience

The risks most likely to be realised are related to fire, as well as radiated heat, explosions resulting in missiles, smoke, fumes and violent decompositions when materials are engulfed in flames.

You should also visit Health & Safety Essentials: Fire Safety, which looks at the practical aspects of fire safety from a risk assessment, safe person and buildings perspective.

In this module on Chemical Safety, we will develop the underpinning knowledge related to chemical safety from a small scale upwards within the laboratory environment. We will look at issues related to safe chemical processing, design, and process risk assessments to control hazardous operations. We will also examine issues related to substance identification, classification, hazardous areas identification, labelling, packaging and issues related to storage, handling, and transport within the laboratory environment.

## Legal framework

The requirements of health and safety law covering the general duties are given in the 'Health and Safety at Work etc. Act'<sup>1</sup>, which requires 'so far as is reasonably practicable'<sup>2</sup>, safety and the absence of risks to health in connection with the use, handling, storage and transport of articles and substances. The requirement for a risk assessment is given in the 'Management of Health and Safety at Work Regulations'<sup>4</sup>, and fire risk assessment in the 'Regulatory Reform (Fire Safety) Order'<sup>5</sup>.

However, the principal legislation applied to the control of substances in the laboratory workplace that can cause fires and explosions is the 'Dangerous Substances and Explosive Atmospheres Regulations 2002'<sup>3</sup> (DSEAR). This requires a risk assessment, and consideration of eliminating or reducing the risk 'so far as is reasonably practicable.'<sup>2</sup> Dangerous substances include substances, preparations and dusts with the potential to give rise to fires, explosions and similar energetic (energy releasing) events (such as runaway exothermic reactions) that can affect the safety of laboratory persons and others.

