

Web Based Resources for Forensic Science

Summary

The aim of this work was to produce four web-based problem-solving activities in the areas of arson, drug smuggling, poisoning and horse doping. Much of the work was carried out by four MChem students as part of their final year projects. As these were students on chemistry programmes, the content was based within chemical analysis aspects of forensic science, with additional coverage of related areas such as, for example, fingerprinting, forensic psychology etc.

Subject area: Chemistry

The aim of the project was to produce interactive web-based packages which would present students with a problem scenario within forensic science. The students solve the problem by working through the information given in the resource, by bringing additional information to the problem and by carrying out an experiment in the laboratory. All of the web-based aspects of the packages are interactive, requiring students to answer questions of retrieve information.

Fire Investigation

This package is based on a real life case of arson at a nightclub. The website consists of background information on arson, arsonists, accelerants, methods of laying fires etc. The detailed chemistry and methods of detection of some common accelerants are also included. The students read interviews and witness statements and can compare fingerprints in order to determine possible motive and opportunity. They are then directed into the laboratory. There, they analyse specimens of samples taken from the scene: carpet and curtains soaked in the accelerant used. They must extract the sample and analyse by chromatography in order to determine the identity of the accelerant or mixture of accelerants. This information should enable the students to identify the culprit/s.

Horse Doping

This package is based around a true case in which a trainer was banned after his horse failed a drugs test for caffeine after he fed the horse chocolate M&M's. There is sufficient caffeine in chocolate to give a false positive result if enough are ingested. The package contains background information on doping and methods of detection and analysis. It operates by engaging students in the investigation of 'suspect' race results. Once suspect winners or losers are identified the students are directed into the laboratory where they analyse several samples of 'horse urine' for caffeine levels. The results of this analysis enable them to determine which, if any, of the horses may have been doped.

Drug Smuggling

This package is based upon the identification of white powders smuggled into Hull via a car on the ferry. The package contains background information on common

illegal drugs, their biological effects and methods of detection and analysis. The scenario is based around the search of three vehicles leaving the North Sea Ferry terminal. The students are able to 'search' the boot of the car and the contents of any luggage. One car contains excessive amounts of vodka. On closer investigation this is seen to contain a white sediment, which the students can identify as cocaine by interpretation of the results of instrumental chemical analysis.

Death by Poisoning

The package is based on the suspected murder by poisoning, of an industrial chemist. The site contains background information of many organic poisons, along with details of methods of detection and analysis. The scenario is based around the discovery of the body of a chemist in his office. Students must examine the scene of crime, fingerprint evidence and evaluate interviews and statements in order to identify possible motives and opportunities of those close to the deceased. The results of the chemical analysis of the contents of the deceased medicine bottles and toxicology results enable the students to determine the cause of death, method of administration of poison and suggest possible perpetrators.

All of the resources have been trialled with undergraduates with very positive results. They enjoyed the forensic science applications and engaged with the web resource enthusiastically. The two packages with the laboratory element within them have been adopted in the department. They provide an alternative means of making experimental chemistry more relevant and act as effective pre-lab exercises.

Type of activity

Web-based problem solving. Students work individually or in small groups.

Content covered

Analytical chemistry in a forensic context

Application

These resources could be used within forensic science or analytical chemistry modules. Two of them (Horse Doping and Fire Investigation) have optional laboratory activities and can be used as a pre-lab, experimental and post-lab package.

Further comments

The arson, horse doping and poisoning package have been mounted on the chemistry department's web page under resources for UCAS students. The level is such that students at the secondary/tertiary interface should be able to tackle some of the problems.

I am grateful to the creative efforts of Liam Hook (Exemplarchem award winner), Iain Howland, Martin McMahan and Helen May in producing these resources and Stephen Summerfield for technical advice.

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