# Leading the way in analysis of 'legal highs'

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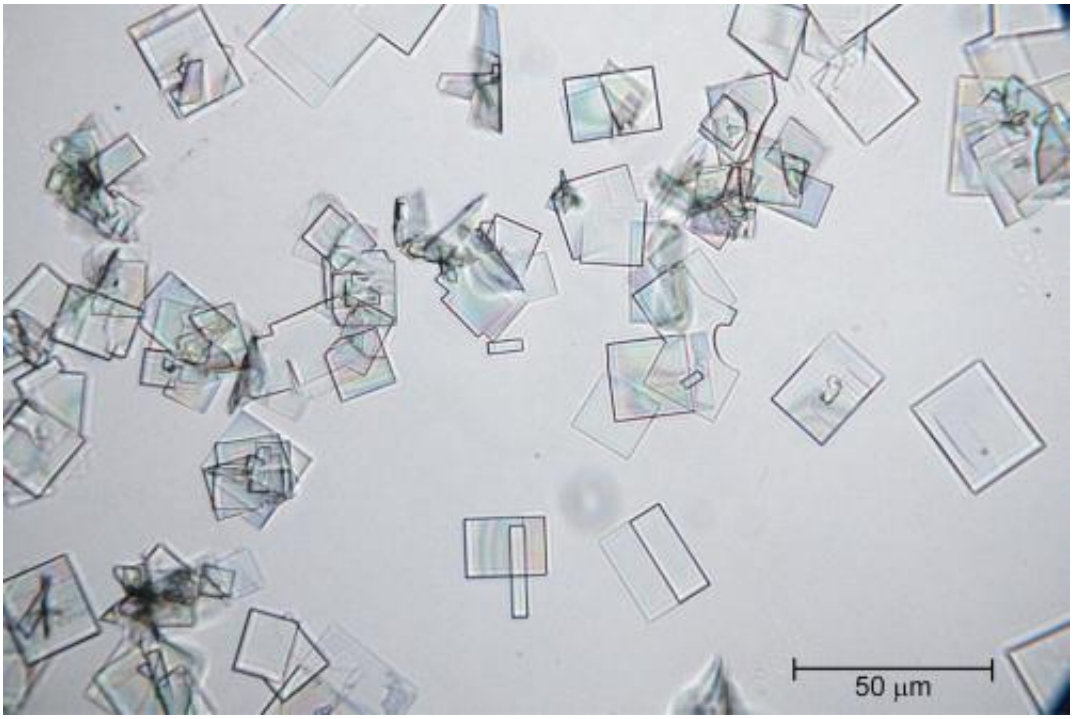


BZP crystals under a light microscope

A team at the University of Lincoln, UK, is leading the way in new research aimed at detecting the vast amount of substances available on the legal highs market. A method developed at Lincoln has now been incorporated into a United Nations manual for use by drug analysis labs all over the world.

A testing method to identify substances in 'legal highs' devised by a research team from the University of Lincoln, UK, is being used in drug

analysis laboratories across the world.

The UK has the largest market for 'legal highs' in the European Union and with new substances constantly being identified, governments across the world are struggling to keep on top of regulation.

The recent World Drug Report from the United Nations Office on Drugs and Crime (UNODC) says new synthetic substances are constantly being spread via the internet.

A research group from the School of Life Sciences at Lincoln is at the forefront of research in this area having developed methods for quick and conclusive analysis of legal highs. They have also published a number of papers that have made an impact in the field.

One of the methods developed at Lincoln has now been incorporated in a UNODC manual for use by drug analysis laboratories across the world. The method describes a microcrystalline test for the analysis of benzylpiperazine (BZP), a modern designer drug often used as a substitute for "ecstasy".

Microcrystalline tests are quick and simple chemical tests which require only a small amount of sample and a microscope to observe the resulting crystals. The test is a simple reaction where small crystals are formed between a drug sample and a reagent - a chemical specifically chosen to react with the suspected drug. The test has been used successfully for decades aiding analysis of seized samples of suspected drugs of abuse, but has been abandoned over the years in favour of more sophisticated analytical instruments.

The University of Lincoln's Leonie Elie investigates microcrystalline testing to improve the technique and modernise it.

The research group published microcrystalline tests for three relatively new substances and legal highs, including mephedrone, MDAI and BZP.

She said: "In microcrystalline testing you compare shapes of crystals obtained from unknown substances to those developed with known standards. Forensic scientists have been using this technique with confidence for many decades but the knowledge is lost when it doesn't get passed on to the newer generations. Unfortunately, nowadays most drug analysis labs seem to prefer using instrumental techniques rather than relying on empirical methods like microcrystalline testing. With our modernising approach we can continue to show how reliable this seemingly simple method is."

Lincoln's Dr Mark Baron added: "One of the problems with this work is that by their very nature doing anything with the very small crystals is a real challenge. You can only see them through a microscope and have little specific data other than when there is a drug present you can see unique crystals forming to indicate that particular drug."

The Lincoln group teamed up with Dr Gareth Cave from Nottingham Trent University and, using X-ray diffraction, revealed the specific molecular arrangement in two of their microcrystals – a technique ideal for crystal analysis but nearly impossible to use on microcrystals due to their small size. Single crystal X-ray diffraction is a complex technique which helps to understand how atoms and molecules are arranged within a crystal by analysing a specific diffraction pattern after the sample was hit by an X-ray beam.

The research group, which also includes Mathieu Elie, were invited by microcrystalline expert Hiram K. Evans to present at the recent meeting of the California Association of Criminalists (CAC).

Following Mrs Elie's presentation detailing her research and presenting

the X-ray diffraction results, CAC Editorial Secretary and retired criminalist John Houde wrote: "What she revealed was of truly historic proportions [...]. We knew our test was reliable, and now we could prove how it worked."

Provided by University of Lincoln

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