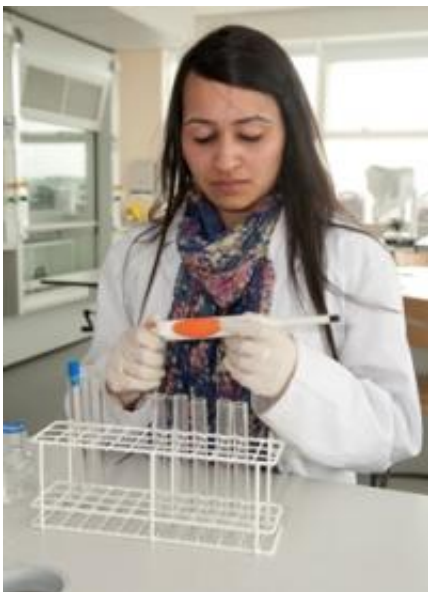


Ultra-Sensitive Cocaine Detection

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Sonica Devi testing collected samples in the lab.

(PhysOrg.com) -- Forensic science student Sonica Devi has found minute traces of cocaine at a number of public phone boxes in the city of Derby, UK - thanks to a new development in forensic analysis.

The development of an ultra sensitive Gas Chromatographic technique - enabled the University of Derby science team to detect [cocaine](#) at picogram levels - one million millionth of a gram from forensic swabs.

Gas Chromatography linked to a [mass spectrometer](#) (GCMS) is an established technique for separating complex mixtures of compounds

and detecting them down to very low amounts. This breakthrough at Derby makes the detection of cocaine possible even at a million millionth of a gram.

Sonica, a final year student at the University of Derby, developed this novel technique to help identify minute traces of cocaine at all six phone boxes she tested. A standard method would have easily missed the presence of this drug at these low levels.

Her study entitled: 'Real world detection of cocaine at the picogram (one trillionth of a gram) level in an urban environment' is now being presented at a number of [forensic science](#) conferences across the UK.

Sonica, 22, from Littleover, said: "I had no idea what I would find through this study as no trace of drugs could be seen in the phone booths with the naked eye - I was surprised at what the research found.

"I am keen to take this research forward and would be keen to work with other agencies or organisations to develop this further."

Using her novel approach, Sonica was able to see even the smallest of traces of cocaine within samples collected from around the city. The lowest amount Sonica was able to detect was fifty parts per million million - fifty picograms.

In terms of the size of matter, a picogram is one thousand times smaller than a nanogram and a thousand thousandth times smaller than a microgram (a millionth of a gram).

The study revealed that, in one phone box, cocaine was present at a much higher level of ten nanograms and in the other five phone boxes tested, cocaine was detected at varying levels approaching the limit of detection established using this approach - fifty picograms.

For the study, sterile swabs were used to collect samples from different areas of each phone box including: the dial; handset; key pad and coin slot.

Samples were taken using a variety of swabs: wetted with ethanol; wetted with water and dry swabs to maximise how much cocaine could be lifted from the surfaces of the phone box.

The swabs were taken back to the University's Kedleston Road laboratories for analysis and each of the swabs were placed in tubes containing a solvent called Dichloromethane (DCM). The solvent dissolves the cocaine and allows it to enter the Gas Chromatograph.

After separating the cocaine from other materials lifted by the swabs the mass spectrometer detector provides a means to detect the cocaine - using the method developed by Sonica this was performed with extremely high sensitivity.

Dr Alan-Shaun Wilkinson who is a senior lecturer at the University of Derby supervised Sonica during this project which was also aided by Joe Waldron who is an expert in the use of GCMS at the University.

Alan said: "Without the dedication and expertise of our technical staff like Joe who advises on and operates the GCMS, these exciting student projects would not be possible.

"By improving the sensitivity of our GCMS technique we can now see cocaine and other closely related materials down to incredibly low levels which would not have been possible previously. This important piece of work opens the door to analysing a whole range of different drug types with similar sensitivities."

Provided by University of Derby

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