

# Scientists make hydrocarbon breakthrough using gold catalyst

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Researchers from Cardiff University are opening up a new way of using hydrocarbon feedstocks to make a range of valuable products.

Hydrocarbons are an extremely important energy resource but, although widely available from fossil fuels, are extremely difficult to activate and require very [high temperatures](#) in current industrial processes.

For the first time, the Cardiff study has shown that the primary carbon-hydrogen bonds in toluene, a hydrocarbon widely used as an industrial material, can be activated selectively at low temperatures.

Professor Graham Hutchings FRS, one of the study's co-authors and Cardiff University's Pro Vice-Chancellor for Research, said: "One of the key challenges facing chemists today is to activate primary carbon-hydrogen bonds in hydrocarbons to make more valuable and reactive molecules. This is crucial for the sustainable exploitation of available industrial feedstocks.

"Our research resulted in unprecedented yields of a single product of over 90%. We achieved this using a gold catalyst, an unexpected result as gold is the most noble of the elements."

This opens up the possibility of using [hydrocarbon](#) feedstocks in a new way to form intermediates and final products for use in the chemical, pharmaceutical, and agricultural business sectors.

The research was carried out by a large team at the Cardiff Catalysis Institute, in collaboration with researchers at Lehigh University, Pennsylvania. It was funded by a major research grant won by Cardiff University's School of Chemistry in 2008, when it was selected from hundreds of international bids as part of the Dow Methane Challenge.

The challenge was initiated by the Dow Chemical Company to identify collaborators and approaches in the area of methane conversion to chemicals.

**More information:** The paper, 'Solvent-Free Oxidation of Primary Carbon-Hydrogen Bonds in Toluene Using Au-Pd Alloy Nanoparticles', is published in the most recent edition of *Science*.

Provided by Cardiff University

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