

## IBUPROFEN - A Green Chemistry success Story (?)

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In 1955 the British company Boots invented Ibuprofen and for the next 30 years it was available only via prescription. The Chemical process used by Boots to make Ibuprofen required 7 stoichiometric steps each producing at least 1 mole of waste and was very costly to produce. In the late 1980's the FDA announced that Ibuprofen could be sold over the counter (OTC) and the demand for Ibuprofen production increased overnight by >10x, but required substantially lower cost production and an environmentally acceptable commercial production process. Dr. Mott led an R&D team at Hoechst Celanese (the predecessor to today's pharmaceutical giant Sanofi) which developed such a clean ("green") process and in 1992 Hoechst Celanese and its new partner Boots introduced OTC Ibuprofen from a chemical plant in South Texas. The Hoechst Celanese process involves only 3 steps, each of which are catalytic and produces essentially no waste. The production cost of Ibuprofen was reduced by about 5x and today approximately half of the global total of 30,000 tons of Ibuprofen are made using the Hoechst Celanese process which won both the EPA President's Green Chemistry Award and the Chemical Industry Kirkpatrick Award. Dr. Mott's presentation will reflect on some of the typical challenges, opportunities facing industrial chemists and chemical engineers.