

Can Environmental Protection save Millions?

Odunlade Dapo

The big surprise from *benzophenone* (BP) an ultraviolet (UV) light stabiliser is that it is the most powerful free radical generator known to man. Though, BP protects us from the harmful UV rays of the Sun, it may in itself be a most dangerous additive found in sun tan lotions.

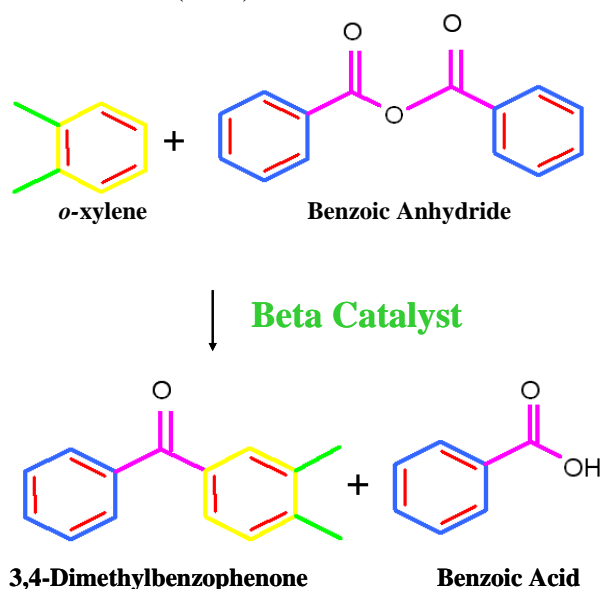


3,4-dimethylbenzophenone (DMBP), a derivative of *benzophenone* (BP), is produced by mixing *o*-xylene and benzoic anhydride using a catalyst called *aluminium trichloride* (AlCl_3). DMBP is used in dyes, fragrances, coatings, sunscreens, fertilizers, pharmaceuticals and products like lipstick and toothpaste.

However, using AlCl_3 catalyst produces tonnes of waste which are, non-recyclable, have no economic value and are hazardous to the environment.

Several research groups have reported new production routes by switching catalyst. Researchers at the University of

Manchester have found a 'cleaner' way of producing *3,4-Dimethylbenzophenone* (DMBP), by switching from AlCl_3 to zeolite Beta (Beta).



The switch in catalyst was necessary because of the expensive cost of waste treatment in the traditional AlCl_3 catalyst used for DMBP production.

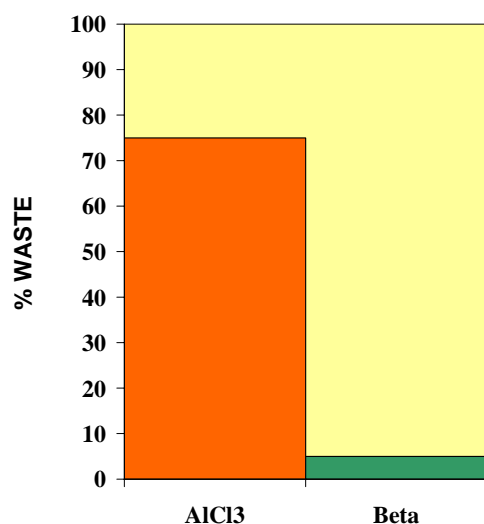
A similar switch (from AlCl_3 to Beta) is found in the production of *ibuprofen* (an anti-inflammatory drug).

This resulted in a 35 million pound a year reduction in waste as well as reduction in the cost of plant infrastructure and plant operation.

Before the switch, for every 30 million pounds of *ibuprofen* produced, 45 million pounds of waste was created, which was dumped in landfills. Efforts to eliminate land filling 5 tons of waste, avoids the

liberation of 400 to 2,000 pounds of methane, a potent greenhouse gas. (Calculation source: [Canada's Climate Change Solutions](#)). Helping a company reduce energy consumption by 5,000 kWh, avoids liberating 976 pounds carbon dioxide, another greenhouse gas.

It is therefore, imperative to reduce energy and raw materials consumption as well as minimise waste generation.

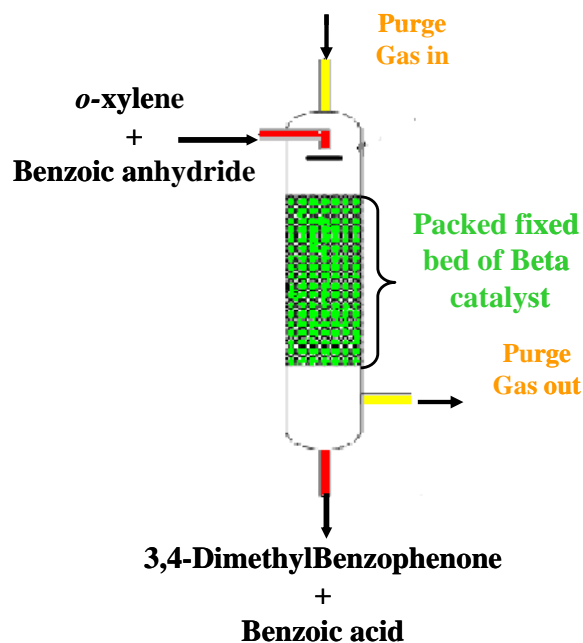


The current challenge facing researchers is increasing the production rate of DMBP when using Beta. The AlCl₃ route being 10 times faster than the Beta, makes it hard convincing manufacturers to switch catalyst.

However, the advantages of using Beta are numerous. Very small waste is generated, the catalyst is reusable, the cost of separating products is lower and very pure DMBP is produced.

To overcome problems associated with DMBP production rates, researchers at the University of Manchester have designed a

reactor, with Beta suspended in a packed fixed bed.



This novel reactor is expected to improve DMBP production rates considerably. Early studies have shown that some problems earlier encountered can be eliminated, by changing the rate at which the reactants enter the reactor.

This Beta route may convince manufacturers, to switch and stop polluting the environment.

Recycling 1 Ton of *aluminium* saves the equivalent of 2350 gallons of *Fuel*, the amount of electricity used by a typical home over a period of 10 years. (Source: [Indiana Department of Education. 1992.](#))