

## Photocatalytic oxidation process to produce phenol

CSIC, through the Institute of Materials Science of Barcelona ICMAB, and Universitat de Girona have developed a new photocatalytic process to produce phenol.

Industrial partners are being sought to collaborate through a patent license agreement.

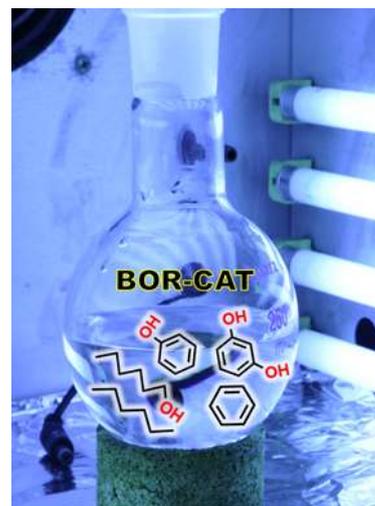
### *An offer for Patent Licensing*

#### Photocatalytic oxidation of benzene to produce phenol

Phenol is an industrial commodity as precursor to many materials, such as, epoxies, nylon, detergents, pharmaceutical drugs, etc. Phenol market in 2022 was 23 billion \$.

Cumene process is the standard method to obtain phenol and acetone as a by-product, in a proportion 60:40. The process needs high pressure and high temperature in some of the steps.

We present a new method. With a photoredox reaction in water, catalysed by metallocarboranes at room temperature and atmosphere pressure, we obtain phenol with an over 90% yield. Increasing the time of the reaction we can obtain other products as pyrocatechol, resorcinol, among others. This photocatalytic process can be used to obtain other alcohols from aliphatic and aromatic hydrocarbons, such as hexane, heptane, cyclohexene, toluene, etc.



Photoreactor

#### Main innovations and advantages

- Easily scalable and organic solvent free synthesis.
- High yield, no by-products.
- Versatile process that can use different starting materials to obtain different final products.
- “green and simple process”, water, light and oxygen or air

#### Patent Status

Patent application filed suitable of international extension

**For more information, please contact:**

Alfonso del Rey

Institute of Materials Science of  
Barcelona ICMAB

Spanish National Research Council  
(CSIC)

Tel.: +34 935801853

E-mail: adelrey@icmab.es

comercializacion@csic.es