A Green Synthesis of 1,2,3-Triazoles Catalyzed by Cu(I) on Powdered Oyster Shells

‘Click’ chemistry was originally a concept from the Huisgen Cycloaddition Process. This method uses a Copper(I) catalyst with robust reaction conditions to form a regioselective high yielding product.[1] Popularized by Valery V. Fokin and K. Barry Sharpless[2] from the Scripps Research Institute in 2002, this process is now used in hundreds of labs with thousands of related publications. The products of this process have many useful properties like: anti-allergenic, anti-bacterial, anti HIV activity, and antitumor activity. They are used in herbicides, fungicides, and dyes. In addition, it is simple to construct large biological libraries for drug discovery using ‘click’ chemistry. Although these reactions have so many benefits, there are a few drawbacks: the Cu(I) catalyst contaminates the product in high concentrations and is difficult to recover.

The scientists at Huaqiao University in China have come up with a creative sustainable solution for solid state recovery of the Cu(I) catalyst.[3] Oysters are a delicacy in many coastal Chinese cities, consequently there is a surplus of oyster shell waste. These shells are left without any treatment, causing toxic vapors for the local population. The experiment is to use the oyster shell powders as a solid support in comparison with the current calcium carbonate to determine catalytic efficiency, recovery, and product yield. The oyster shell powder keeps high product yields from the original synthesis, can be used up to eight times without significant loss in catalytic activity, and can be recovered with negligible mass loss.

REFERENCES

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