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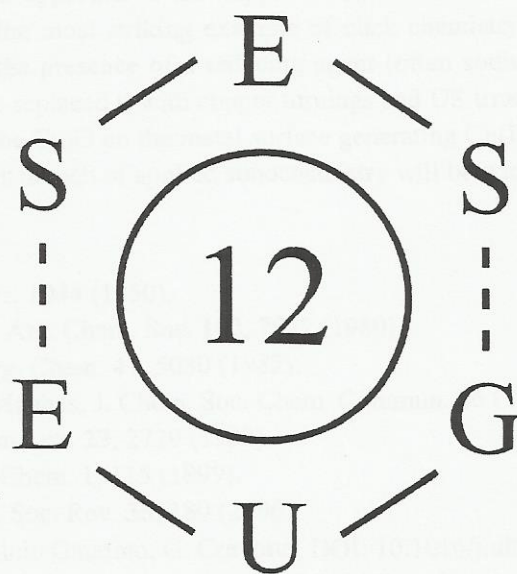
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PL-4: Power Ultrasound in Organic Synthesis: From Reformatsky and Barbier Reactions to Click Chemistry

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Synthetic protocols involving metals and organometallic reagents are the favourite domain in sonochemistry. The field was pioneered sixty years ago by Renaud [1], who reported that certain organometallics could be quickly prepared in undried solvents using a simple cleaning bath. Luche described the facile sonochemical preparation of organolithium and Grignard reagents and their Barbier-type coupling with carbonyls [2]. The same group studied a variety of sonochemical organometallic reactions involving Ni, Li, Zn and Cu. Han and Boudjouk dramatically increased the yields and rates of Reformatsky reactions under sonication [3], a finding that was subsequently exploited to prepare β -lactams from ethyl bromoacetate and a diaryl Schiff base [4]. Among several other examples that could be cited, the sonochemical variation of the Zn-mediated Simmons-Smith cyclopropanation of alkenes deserves attention [5]. US has been recognised as a key technique for green and sustainable synthetic processes [6], allowing the use of non-activated metals and crude reagents as well as aqueous media [7]. In the case of large scale and high-throughput applications, US-flow reactors are definitely required [8]. We thoroughly studied Pd-catalyzed reactions promoted by US or the combined use of US and MW irradiations [9, 10] (i.e. Suzuki-Miyaura [11] and Heck reactions [12]). We recently described a sonochemical approach to the copper-catalyzed azide-alkyne cycloaddition (CuAAC) [13], the reaction recognized as the most striking example of click chemistry. The most common catalyst system employs a Cu(II) salt in the presence of a reducing agent (often sodium ascorbate) to generate the required Cu(I) catalyst *in situ*. We replaced it with copper turnings and US irradiation smoothly activated the redox between the Cu metal and the Cu₂O on the metal surface generating Cu(I) species [14]. State-of-the-art techniques and perspectives of this branch of applied sonochemistry will be widely discussed.

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