

Natural Product-inspired Green Chemistry Approach for the Synthesis of Polyphenolic Compounds of Biological and Industrial Relevance

Arun K. Sinha*

Medicinal and Process Chemistry Division, C.S.I.R- Central Drug Research Institute

Sector 10, Janakipuram Extension, Sitapur Road , Lucknow 226021, UP.

E-mail: aksinha08@rediffmail.com; Tel No.: +91-522-2771940/42/60; Fax +91-522-2771941

Polyphenols are naturally occurring compounds found largely in the fruits, vegetables, cereals and beverages. Fruits like grapes, apple, pear, cherries and berries contains up to 200–300 mg polyphenols per 100 grams fresh weight. Typically a glass of red wine or a cup of tea or coffee contains about 100 mg polyphenols. Cereals, dry legumes and chocolate also contribute to the polyphenolic intake. Polyphenols are secondary metabolites of plants and are generally involved in defense against ultraviolet radiation or aggression by pathogens. Thus, the discovery of biologically active polyphenolic natural products including hydroxylated stilbenes, chalcones and styrenes has proven to be a subject of considerable importance in chemistry and medicine. Interest in accessing these polyphenolics have gained pace because of plethora of biological activities such as anticancer, antibacterial, antifungal, anti-inflammatory and antimalarial etc. However, exploration of these phenolics is severely hindered by their insufficient percentage in their natural resources, difficult isolation procedure, limiting trials for wider applications besides their tedious synthesis involving protection-deprotection strategy. A protection/deprotection event introduces at least two steps into a sequence, incurring costs from additional reagents and waste disposal besides leading to a reduced overall yield. In this context, the concept of Green Chemistry has provided a fresh stimulus to develop a strategy with minimum number of steps, atom economy and waste minimization besides being devoid of protection-deprotection steps. For this various tools and strategies of green chemistry such as microwave-assisted reactions, ionic liquid, tandem reactions, cooperative catalysts, biocatalyst, water-assisted reaction etc are being explored for the synthesis of various bioactive small molecules including phenolic and thiophenolic compounds. Our group from noticeable time working on such green methodologies for synthesis of various phenolic based bioactive molecules like FEMA-GRAS approved 4-vinylphenols, stilbenoids (symmetrical/unsymmetrical, distyrylbenzene and octupolar stilbenes) and stilbene-chalcones/stilbene-cinnamate hybrids and their biological evaluation. The details will be discussed during presentation.

References:

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