

## Invited Lecture

57<sup>th</sup> Annual Convention of Chemists (ACC) - Indian Chemical Society (ICS)  
Recent Trends in Chemical Sciences (RTCS 2020)

### The Halogen–Bonding Catalysis: An Efficient Tool for Functional Group Activation

G. Sekar\*

Professor

Department of Chemistry, IIT Madras, Chennai-36, India  
(gsekar@iitm.ac.in)

#### Abstract:

In the recent years, halogen bond donor organocatalysts are employed to activate the Lewis basic functional groups.<sup>1,2</sup> The halogen–bonding interaction between the Lewis bases and the halogen(I) reagents or intermediates (halonium ions) is shown enhance the reactivity and selectivity.<sup>2b</sup> Recently, we have developed new halogen bond donor catalysts for several transition metal–free organic reactions where halogen–bonded halogen(I) species act as key intermediates with unusual reactivity and selectivity (Figure 1).<sup>2</sup> For example, NBS and *in situ*–generated acetyl hypoiodite (CH<sub>3</sub>COOI) have been employed for selective oxidation of heterobenzylic C(sp<sup>3</sup>)–H bond to C(sp<sup>2</sup>)–O and C(sp<sup>3</sup>)–O bonds *via* activation of the heterocyclic ring.<sup>2b</sup> The halogen–bonded iodonium ions have been utilized as stable and key oxidants to develop a domino oxidation of benzylic secondary alcohols with high selectivity to synthesize  $\alpha$ –hydroxyketones.<sup>3</sup> Also, we have developed an iodination methodology for electron deficient aromatic ring under mild condition.<sup>3</sup>

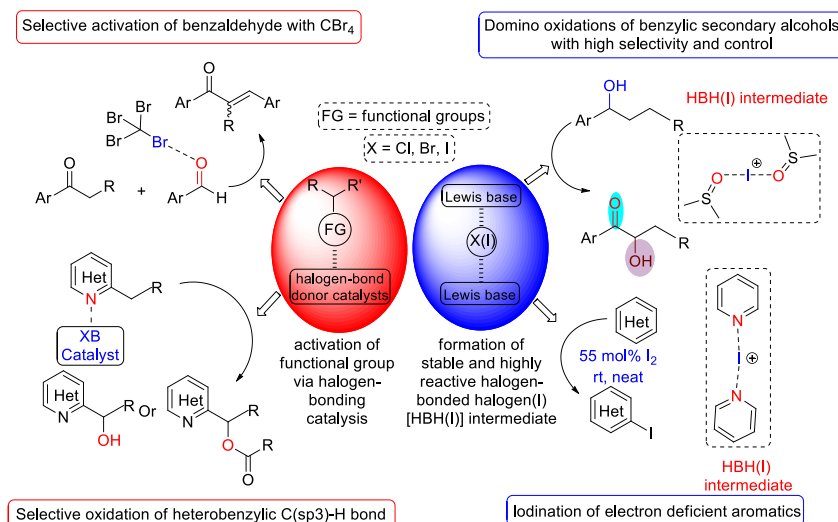


Figure 1

#### References and Notes:

1. G. Cavallo, P. Metrangolo, R. Milani, T. Pilati, A. Priimagi, G. Resnati and G. Terraneo, *Chem. Rev.* **2016**, *116*, 2478.
2. (a) D. Bulfield and S. M. Huber, *Chem. Eur. J.* **2016**, *22*, 14434. (b) S. Guha, I. Kazi, A. Nandy and G. Sekar, *Eur. J. Org. Chem.* **2017**, *23*, 5497.
3. (a) I. Kazi, S. Guha and G. Sekar, *Org. Lett.* **2017**, *19*, 1244. (b) S. Guha, I. Kazi, P. Mukherjee and G. Sekar, *Chem. Commun.*, **2017**, *53*, 10942. (c) S. Guha and G. Sekar, *Chem. Eur. J.* **2018**, *24*, 14171. (d) I. Kazi, S. Guha and G. Sekar, *J. Org. Chem.* **2019**, *84*, 6642.

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**Bio-Sketch of Speaker**

**G. Sekar**

*Professor*

Affiliation: Department of Chemistry  
IIT Madras, Chennai, India

e-Mail: [gsekar@iitm.ac.in](mailto:gsekar@iitm.ac.in)

Homepage: <http://sekargroup.com/>



Prof. G. Sekar obtained his Ph.D. from IIT Kanpur in 1999 under the guidance of Padma Shri, Prof. Vinod K. Singh. Dr. Sekar was a JSPS postdoctoral fellow (with Prof. H. Nishiyama) at Toyohashi University of Technology, Japan, and an AvH postdoctoral fellow (with Prof. L. F. Tietze) at Goettingen University, Germany. He also carried out postdoctoral research (with Prof. Brian M. Stoltz) at Caltech, USA.

Prof. Sekar's research activity on organic synthesis focuses on developing new synthetic methodologies employing environmentally benign homogeneous catalysts, metal nanocatalysts, and halogen bonding catalysis.

Prof. Sekar is the author of 125 publications, graduated 24 Ph.D. students, and presently guiding 11 Ph.D. scholars. He is the recipient of the Institute Research and Development Award (Mid-Career)-2017 and the CRSI bronze medal for the year-2015. Prof. Sekar is the Fellow National Academy of Sciences (FNASc, 2019), Fellow of Royal Society of Chemistry (FRSC), and Fellow of the Academy of Sciences, Chennai (FASCh). He is present council member of the National Organic Symposium Trust (NOST), Chemical Research Society of India (Joint Secretary, CRSI), and Academy