STABILITY OF ORGANOZINC COMPOUNDS OVER TIME

Ivanytsya M. O.[1,2,3], Nechaev M. A.[2,4], Filippov M. M.[2,3], Velbovets A. R.[2,3], Kolotilov S. V.[1,2], Ryabukhin S. V.[2,3], Volochnyuk D. M.[2,3,4]
[1]L. V. Pisarzhevskii Institute of Physical Chemistry of the National Academy of Sciences of Ukraine, Kyiv, Ukraine
[2]Enamine Ltd, Kyiv, Ukraine
[3]National Taras Shevchenko University of Kyiv, Kyiv, Ukraine
[4]Institute of Organic Chemistry, National Academy of Sciences of Ukraine, Kyiv, Ukraine
ivanytsya.mykyta@gmail.com

Organozinc reagents are highly reactive yet functional group-tolerant carbon nucleophiles rendering them valuable in Reformatsky reactions, Negishi cross-couplings, Michael additions, and related transformations. However, at present the organozinc reagents are usually generated immediately before use (or even *in situ*), due to limited data on their stability. Such a situation is a serious obstacle for broader application of such compounds and their transfer into the category of commercially available reagents.

Our objective was to elucidate the factors impacting the stability of organozinc species. To accomplish this, we prepared 20 samples of organozinc compounds and monitored their concentration decay over 6 months using iodine titration. These samples varied in the structure of organic moiety, concentration, solvent (tetrahydrofuran or N,N-dimethylformamide), and the presence of inorganic salts as stabilizing additives.

It was observed that the rate of decomposition did not depend on the reagent concentration, allowing us to categorize the species into three distinct groups based on their decomposition rates, quantified in MPM (mol/L per month) (Fig. 1). Surprisingly, the solvent employed exhibited negligible impact on the decomposition rates of the investigated samples. These findings offer valuable insights for the expanded application of organozinc reagents in various synthetic methodologies.

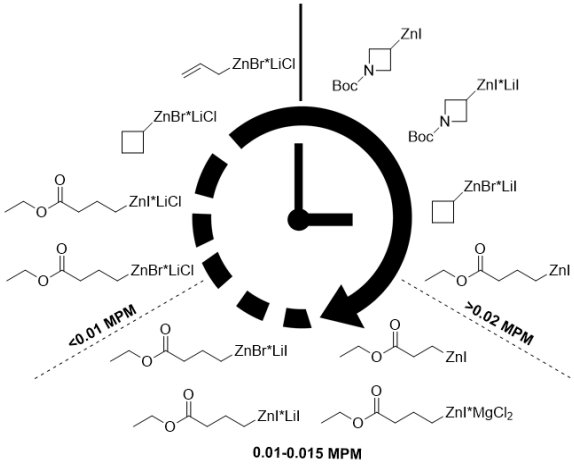

Fig. 1. Categorization of organozinc reagents by their stability measured in MPM (mol/L per month)