Foreword

The study of kinetics and reaction mechanisms of organometallic compounds has long been touted as a means of modeling heterogeneously catalyzed reactions. This approach has witnessed moderate success in the development of higher activity, more selective catalysts such as improved polymerization catalysts. However, it has been less successful in other important areas of catalysis such as Fischer–Tropsch where there is still some debate as to the exact heterogeneous catalysis mechanisms despite twenty years of research on homogeneous models.

Fischer–Tropsch may be considered to be one part of a broader field called fuel processing catalysis which includes steam cracking reactions, reforming reactions, hydrotreating reactions, etc. Surprisingly, much less effort has been made to develop homogeneous models of these extremely important industrial reactions despite the fact that improvements in rates, selectivities, and catalyst longevities for these reactions could lead to savings of millions of dollars annually. The purpose of this issue is to highlight recent work on hydrotreating reactions to provide the reader with a glimpse of where successes in modeling various steps in hydrodesulfurization and hydrodenitrogenation may lead to significant improvements in heterogeneous hydrotreating catalysts. The intent is to emphasize the importance and potential of homogeneous catalysis modeling in the field of fuel processing catalysis.

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