

Synthesis of Transition Metal π -arene
Compounds via Metal Vapors

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Metal vapor syntheses (MVS) have greatly expanded the number of π -arene compounds of the transition metals and allowed for a systematic study of their chemistry [1]. Fischer's traditional route to π -arenes was both laborious and restricted to a very few arenes [2]. The MVS method, by contrast, is applicable to virtually all metals, even the most refractory (e.g. W), and is suitable for a wide variety of arenes [3].

The MVS technique involves production of metal atoms, usually from either a resistance heated furnace or an electron-gun furnace, and their cocondensation with an arene at low temperature followed by warming and product extraction [1].

Recent studies of π -arene compounds prepared by the MVS method are many and varied. A series of derivatives of $[\text{Cr}(\text{PhX})(\text{PhCOOH})]\text{-}[\text{PF}_6]$ ($\text{X} = \text{H}, \text{CH}_3, \text{Cl}, \text{CF}_3$, etc.) have been prepared and transannular effects on, for instance, the pK_a of the carboxylic acid group investigated [4]. Until recently, MVS has been the only synthetic route to divalent group VIII arenes. Studies of $\text{Ni}(\eta^6\text{-toluene})\text{-}(\text{C}_6\text{F}_5)_2$ show it to contain an unusually labile π -arene [5]. The isoelectronic $\text{Fe}(\eta^6\text{-toluene})(\text{bpy})$ is, however, essentially inert to arene exchange [6]. π -arenes of Re dimers have been prepared and some show C-H activation [7].

References

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