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Preliminary communication

STEREOSELECTIVE ELABORATION OF THE ACYL LIGAND IN $(\eta^5\text{-}C_5H_5)Fe(CO)(PPh_3)(COCH_2R)$ VIA THE ALKYLATION OF THE ANIONS $[(\eta^5\text{-}C_5H_5)Fe(CO)(PPh_3)(COCHR)]Li$ (R = Me, Et)

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Summary

The stereoselective elaboration of the acyl ligand in the complexes $(\eta^5\text{-}C_5H_5)$-$Fe(CO)(PPh_3)(COCH_2R)$ by addition of electrophiles to the anions $[(\eta^5\text{-}C_5H_5)Fe$-$(CO)(PPh_3)(COCHR)]Li$ is described (R = Me, Et).

We have previously reported that the acetyl ligand of complex 1 can be elaborated via alkylation of the anion 2 with a variety of electrophiles [1]. Recently some of these results have received independent confirmation [2] and a similar reactivity has been reported for cobaltacyclopentanones [3]. We describe here that the acyl complexes 3 and 4 may be further elaborated by successive treatment with base and another electrophile, the new chiral centre being formed stereoselectively.

Acyl complexes 3 and 4 are readily prepared either from anion 2 or from $[(\eta^5\text{-}C_5H_5)Fe(CO)_2]_2$ via treatment of the corresponding alkyl complexes $(\eta^5\text{-}C_5H_5)Fe(CO)_2(CH_2R)$ with triphenylphosphine. Similarly treatment of the racemic 2-butyliron complex 5* with triphenylphosphine generates the acyl complex 6 [4]. No stereoselectivity is observed in this reaction; the two diastereoisomers 6a and 6b* being formed in equal proportions. The diastereoisomers 6a and 6b are readily distinguishable by ^1H and ^{13}C NMR spectroscopy.

Treatment of the acyl complex 3 with n-butyllithium in tetrahydrofuran at −78°C generates anion 7. Anion 7 reacts with methyl iodide to produce 8 which is readily identifiable by the two doublets in the ^1H NMR spectrum corresponding to the diastereotopic methyl groups [5]. Alkylation of anion 7 at −78°C with ethyl iodide generates the acyl complex 6. Good stereoselectivity is observed with the diastereoisomers of 6 being produced in the ratio 98/2. Acyl complex 6 may

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*Compounds 5, 6a and 6b are racemic but only one enantiomer is shown for clarity.

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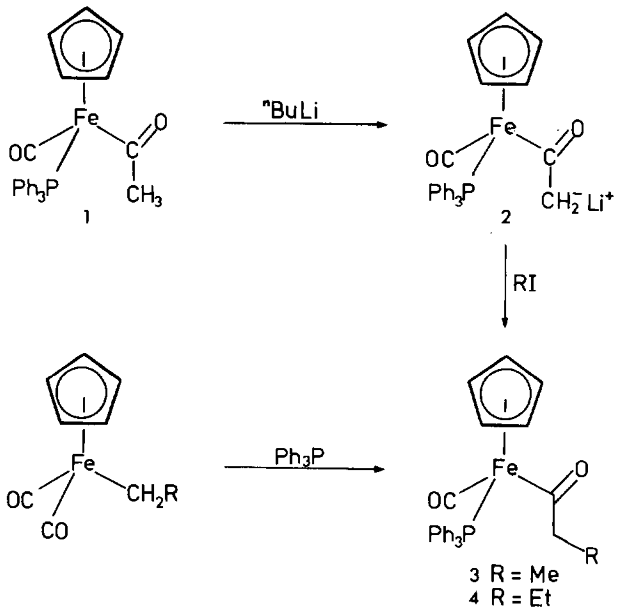
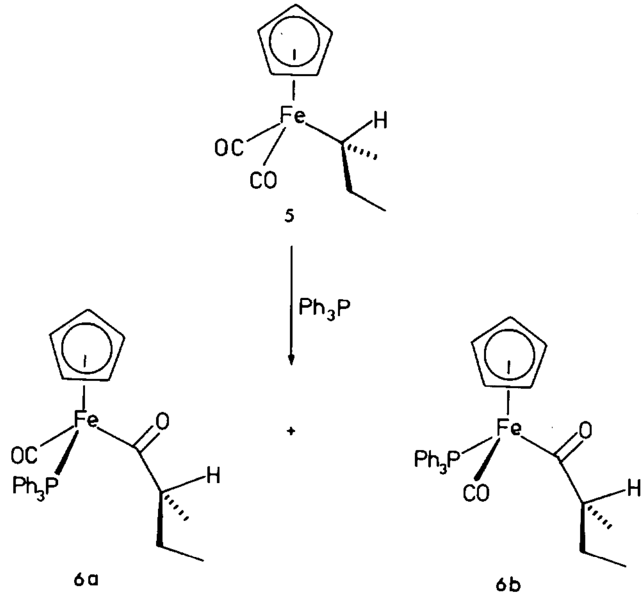
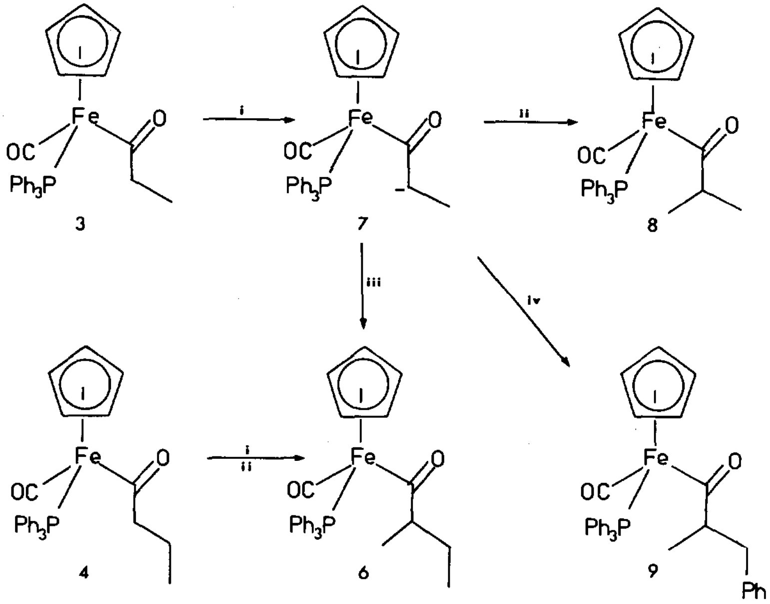




also be prepared by alkylation with methyl iodide at −78°C of the anion generated from **4**. In this reaction slightly lower diastereoselectivity 4/96 was observed with the smaller electrophile. In this latter case, however, it is the other diastereoisomer to that formed from anion **7** which is produced. At higher reaction temperatures stereoselectivity diminishes. Similar diastereoselectivity is observed in the reaction of anion **7** with benzyl bromide to generate **9**.



(i) n-BuLi, THF, −78°C; (ii) MeI, −78°C; (iii) EtI, −78°C; (iv) $PhCH_2Br$, −78°C.

This stereoselective elaboration of acyl ligands combined with known procedures for the resolution of 1 [6] and the decomplexation of acyl ligands without racemisation [4] will allow the development of efficient asymmetric syntheses.

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