

FERROSEN REMOVAL REACTIONS

Bokiyev Mirzoxidbek Muzafarjon o'g'li

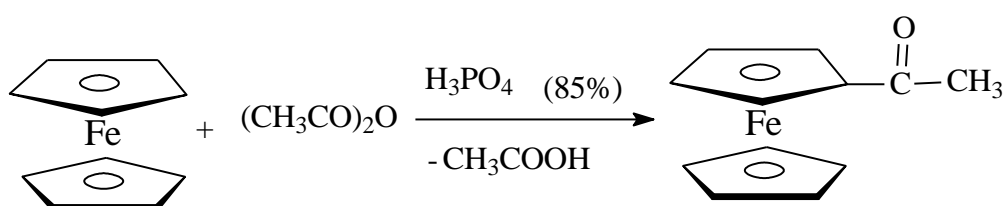
Assistant of the Department of Biological Chemistry,

Andijan State Medical Institute

Annotation: The article provides information on ferrocene arylation reactions, as well as biologically active substances containing ferrocene

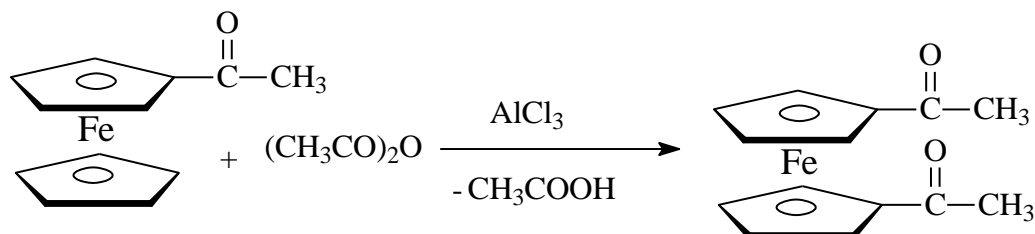
Keywords: ferrocene, getroanullary, homoanular, diacetylferrocene, ferrosenylketone, polyalkylferrocene.

Ferrosene is more susceptible to electrophilic substitution reactions than benzene. For example, the acidification reaction of ferrocene occurs in the presence of phosphoric acid under the action of acetic anhydride.

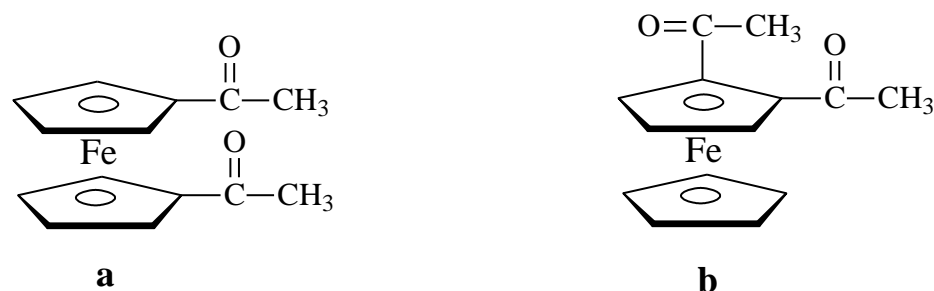


Synthesis of monoacetylferrosene

The acetyl group reduces the activity of ferrocene. The addition of a substituent to a molecule, such as an acetylation reaction, occurs under more severe conditions in the presence of Lewis acids:

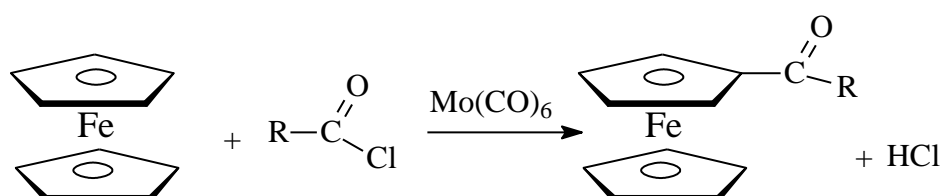


In the synthesis of diacetylferrocene mainly heteroannular diacetyl compound - 1,1'-diacetylferrocene and to a lesser extent its homoannular isomer - 1,2-diacetylferrocene are formed [1]:

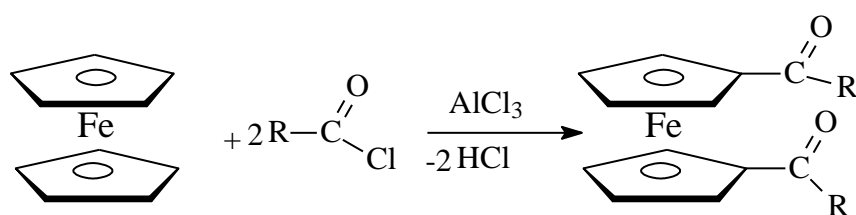


a-1,1'-diacetylferrocene; b-1,2-diacetylferrocene

It has been shown that ferrocene can be acylated with acyl chlorides in the presence of hexacarbonyl molybdenum:



Acetylferrocenes are used to obtain other derivatives of ferrocene. It has been shown that diacylferrocenes are formed when ferrocene is acylated with halogen anhydrides or anhydrides in the presence of large amounts of aluminum chloride. The reaction produces mainly heteroannular diacetylferrocenes and very few homoannular diacetylferrocenes.



Heteroannular diacetylferrocene synthesis

The two cyclopentadienyl rings in Ferrocene can be linked by an acylation reaction [2].

The reaction produces a specific bridging compound of ferrocene.

The formation of mono- and polyalkylferrocenes as a result of alkylation of ferrocene by Friedel-Crafts has been reported in the literature [3]. Under such

conditions, the yield of the alkylation reaction is of more medicinal value. This is because oxidation, isomerization reactions, and partial decomposition of the Ferrosen nucleus occur during the process.

The unusual chemical structure of the ferrocene nucleus and the possibility that such compounds can be used in a variety of fields, including the production of biologically active compounds, determine the relevance of the study of ferrocene derivatives over the last decade. Ferrosenyl (alkyl) derivatives have been found to have high anti-tumor activity and low toxicity [4].

The arylation reactions of ferrocene are also relatively well studied, and the methods of synthesis of arylferrocene are as follows [5]:

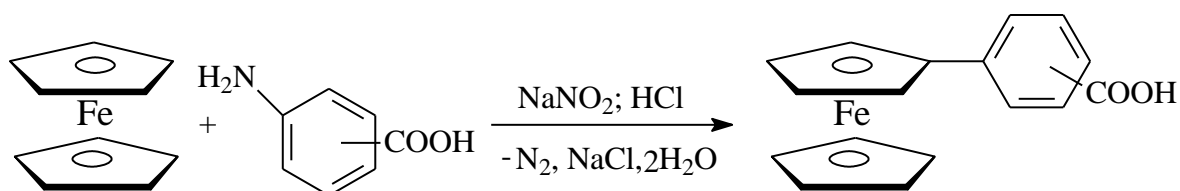
1. Radical arylation reactions;
2. Ferrosenyl halides are converted to arylboric acids or $\text{Fc} - \text{EX}_n$ ($\text{E} = \text{B}, \text{Zn}, \text{Hg}$ and b., $\text{X} = \text{Cl}, \text{Br}, \text{I}$.) cross-coupling reactions of compounds of the type with aryl halides;
3. Reaction of alkali metals with arylcyclopentadienides with salts and complexes of Fe (II) or Fe (III).

Ferrocene derivatives with aromatic compounds are obtained mainly by diazotization.

It is known that the diazotizing reaction was discovered by P. Gris in 1858 and is widely used in organic synthesis. Based on this reaction, the production of paints on an industrial scale was launched. The diazotization reaction is also widely used to obtain various compounds of aromatic amines, ie to introduce an aromatic compound residue into a molecule of organic matter [6].

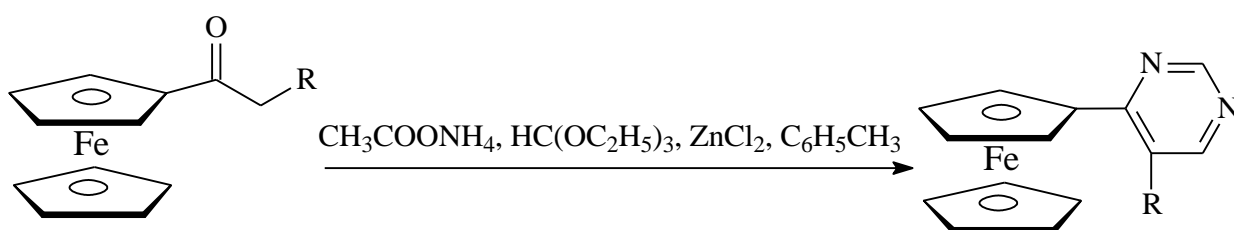
Ferrocene aryl compounds are relatively well studied. Arylation reactions are mainly carried out with arendiazonic salts. Depending on the reaction conditions, mainly mono- and partially bis-heteroannular diarylferrocenes were formed [1].

Among the arylferrosens, ferrosenylbenzoic acid is also important. The interaction of diazonium salts and ferrocene made from aminobenzoic acids results in the formation of ferrosenylbenzoic acid:

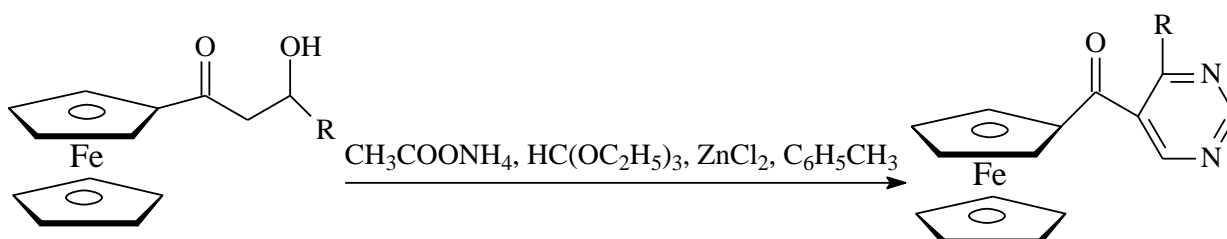


Ferrosenylphenols were also synthesized by this method. Some derivatives of ferrosenylbenzoic acids and ferrosenylphenols are biologically active compounds. For example, the sodium salt of p-ferrocenyl-phenol has been shown to be used in the treatment of anemia, while the sodium salt of o-carboxybenzoilferrosene has been introduced into the treatment of anemia under the name Ferrocerone [6,7].

Derivatives of ferrocene with some heterocyclic compounds have also been reported in the literature. For example, ferrosenyl-pyrimidines are derived from ferrosenyl ketones by annealing (a type of cyclization reaction in which an additional cycle is attached to an existing cyclic compound) and intramolecular cyclization reactions [8]. The electrochemical properties of the newly obtained compounds were studied.



Ferrosenylpyrimidines have been shown to react with ferrocenylbutandione-1,3.



The structure of the obtained compounds was confirmed by PMR and ¹³C spectroscopy methods. These compounds have been described as potentially biologically active substances.

Under the guidance of Professor IR Askarov, the synthesis of a number of aromatic compounds of ferrocene and its derivatives was carried out with high efficiency [9,10].

References:

1. Перевалова Э.Г, Решетова М.Д, Грандберг К.И. Методы элементоорганической химии. Железоорганические соединения. Ферроцен. – М.: Наука, 1983. – 544 с .
2. Хьюи Дж. Неорганическая химия. Строение вещества и реакционная способность. –М.: Химия. 1987. – 696 с.
3. Snegur L.V. et al. // J. Org. Chem. – 2004. – Vol. 689. – P. 2473-2479.
4. Simenel A.A. et al. // J. Org. Chem. – 2003. – Vol. 688. – P. 138-143.
5. Окулов В.Н. Синтез ферроценсодержащих лигандов со стержнеобразной структурой и получение цитотоксичных комплексов рутения на их основе. Канд. дисс. Хим. Наук. – Москва. 2015. – 7-27 с.
6. Кривенько А.П, Поплевина Н.В Ароматические диазо– и азосоединения. Издательство Саратовского университета. Саратов.: 2012. – 12 – 14 с.
7. Аскаров И.Р., Абдуллаев Ш.Х., Абдуллаев О.Ш. Кимё. –Т.: Илм – зиё –заковат, 2017. – 896 б
8. Мамарахмонов М.Х, Аскаров И.Р. п-Ферроценилфенолнинг пара-аминофенол билан борадиган ариллаш реакциясини квант-кимёвий ўрганиш// Илмий хабарнома. Андижон. - 2017.-№3. -Б. 24-26.