

# The Periodical

## Making molecular sandwiches



The discovery of ferrocene revolutionized the field of organometallic chemistry. Here we look at the molecule's origins, the other sandwich compounds that followed, and their applications.

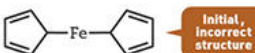
### The history of ferrocene

#### 1940s First known synthesis

Researchers at a US chemical company pass cyclopentadiene vapor through an iron pipe, making yellow sludge. Analysis years later shows that the sludge is ferrocene.

#### 1951 Discovery

Two groups of scientists independently discover ferrocene by accident while trying to synthesize other compounds. One group suggests a linear structure.



#### 1952 Determination of structure

Several scientists propose a new structure for ferrocene in which the iron ion is sandwiched between two cyclopentadienyl anions. X-ray crystallography data confirm this structure.

#### 1973 Nobel Prize in Chemistry

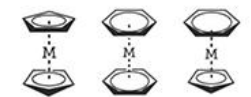
The 1973 Nobel Prize in Chemistry is awarded to Geoffrey Wilkinson and Ernst Otto Fischer for their determination of ferrocene's structure and subsequent research on sandwich compounds.

### Other sandwich compounds

#### Metalloenes and arene sandwiches

Ferrocene is a metallocene: a metal ion sandwiched between two cyclopentadienyl anions. Researchers have synthesized metallocenes with different metals. They have also made sandwich compounds with different arenes.

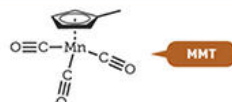
First-row transition metals for which metallocenes are known



#### Sandwich compounds (M = metal)

#### Other sandwich compounds

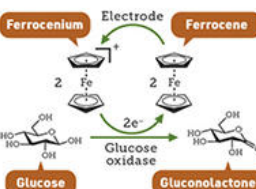
Other types of sandwich compounds include half-sandwich compounds, such as methylcyclopentadienyl manganese tricarbonyl (MMT), and multidecker sandwich compounds.



### Sandwich compound uses

#### Glucose sensors

Electronic devices that measure blood sugar levels use glucose oxidase to oxidize glucose molecules. Electrons from glucose oxidase then reduce ferrocenium cations to ferrocene. Electrodes regenerate the ferrocenium cations, and the device measures the current to determine a blood glucose reading.



#### Antiknock agents in gasoline

Canada and Australia use MMT as an antiknock agent in gasoline. Antiknock agents prevent uneven combustion by raising the temperature at which fuel ignites.

#### Other uses

Some ferrocene derivatives catalyze hydrogenation reactions. In medicine, the ferrocene derivative ferroquine underwent trials as an antimalarial drug.

## Novel of the Week



"Why did Gandhi hate iodine (I, 53)? How did radium (Ra, 88) nearly ruin Marie Curie's reputation? And why is gallium (Ga, 31) the go-to element for laboratory pranksters? These fascinating tales follow every element on the table as they play out their parts in human history, finance, mythology, conflict, the arts, medicine, and in the lives of the (frequently) mad scientists who discovered them."

## Reminders

### Interested in Joining Chemistry Club?

Apply by scanning the QR code below and filling out the form.



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SIGN UP TO PARTICIPATE IN STEM DAY!



### FOR VILLA BELLA

CSUP WILL BE HOSTING A STEM DAY FOR VILLA BELLA EXPEDITIONARY SCHOOL FOR GRADES 5 AND YOUNGER.

ACTIVITIES WILL TAKE PLACE ON WEDNESDAY, MAY 17TH FROM 9-2 PM WITH 50 STUDENTS PER HOUR SESSION.



USE THE QR CODE TO SIGN UP FOR A TRIP TO THE MOLLIE KATHLEEN GOLD MINE!



SCAN ME

## Chemistry Club Officer Elections for Fall 2023



The meeting to elect new officers for the Fall semester of 2023 will take place in the Science Learning Center (SLC) on **April 25, 2023 @3:30pm.**

### INTERESTED IN BECOMING AN OFFICER?

PLEASE USE THE QR CODE, AND LET US KNOW WHICH POSITION YOU WOULD LIKE TO RUN FOR!



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# The Periodical



FOR THE  
ANSWER  
KEY/HINTS



ACIDIC  
BASIC  
CARBON DIOXIDE  
CHEMISTRY  
COMPOUND  
DISTILLATION  
ELEMENTS  
EMULSION  
FILTERING

FLUIDS  
GAS  
HETEROGENEOUS  
HOMOGENEOUS  
HYDROGEN  
LIQUID  
MATTER  
MIXTURE  
OXYGEN

SEPARATING  
SIEVE  
SOLID  
SOLUABLE  
SOLUTION  
SOLVENT  
SORTING