

# Daily Report: Reaction of Soluble Fe(III) with Catechol (CA) at pH=3

Experiment Date: 11 June, 2019

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## Goal:

- Reproduce the data from Slikboer et al. (2015) with the new chemicals we just purchased
- Serves as a control experiment for follow up work

Molar ratios: 

Fe: CA	[2 : 1]
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## Chemicals:

- KCl Sigma-Aldrich; ACS reagent 99.0-100.5% (74.55 g/mol)
- FeCl<sub>3</sub>·6H<sub>2</sub>O Sigma-Aldrich Iron(III)hexahydrate; ACS reagent 97% (270.30 g/mol)
- C<sub>6</sub>H<sub>6</sub>O<sub>2</sub> Catechol Sigma-Aldrich (110.1 g/mol)
- KOH: BDH 97%; ACS reagent
- HCl: 6.0 N, EMD
- Nanopure water.

## Procedure:

### 1- Solutions preparation:

Solutions of Fe and CA were prepared in 0.01M KCl solution to give the following concentrations after mixing (total volume of reaction mixture=19.5ml): Fe: 2 mM, CA: 1 mM.

#### *-Concentrations before mixing:*

- 0.01M KCl [v=250 ml, Mwt: 74.55g/mol, mass: 0.1870g]. pH adjusted to **3.01** using HCl.
  - $0.1870/74.55/0.25 = \mathbf{0.01\ M}$
- 1.06mM CA [v=100 ml, Mwt: 110.10/mol, mass: 0.0118g]. (using KCl solution)
  - $0.0118/110.10/0.10 = \mathbf{1.07\ mM}$
- 80 mM FeCl<sub>3</sub> [v=10 ml, Mwt: 270.03g/mol, mass: 0.2174g]. (using KCl solution)
  - $0.2174/270.03/0.01 = \mathbf{80.5\ mM}$

#### *-Concentrations after mixing:*

- $(1.06\ \text{mM CA} \times 19\text{ml}) \div 19.5\text{ml} = 1\ \text{mM}$
- $(80\ \text{mM Fe} \times 0.5\text{ml}) \div 19.5\text{ml} = 2\ \text{mM}$

Rxns

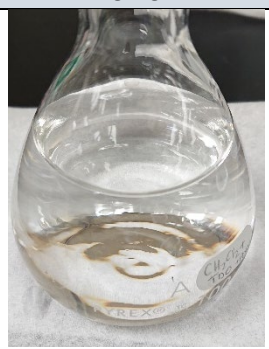

Initial [Fe] = 80 Mm Initial $V_{(Fe)}$ = 0.5 ml After mixing, [Fe] = 2 mM
Initial [CA] = 1.06 Mm Initial $V_{(CA)}$ = 19.0 ml After mixing, [CA] = 1 mM
Molar ratio Fe: CA <b>2 : 1</b>

## 2- Reaction solution:

- A) In to 20 mL vial a 19 mL of 1.06 mM catechol was added. The pH was adjusted to 3.03 by HCl solution. Then the vial was wrapped by Al-foil and a magnetic stir bar was added. The reaction started by adding 0.5 mL of 80 mM  $FeCl_3$  to the above CA solutions. Photos were taken after 5 min, 1 hour and 2 hours. UV-Vis spectra were taken after 5 min, 1 hour, and 2 hours. The solution was then syringe-filtered and let dry over night.

## Data & Results:

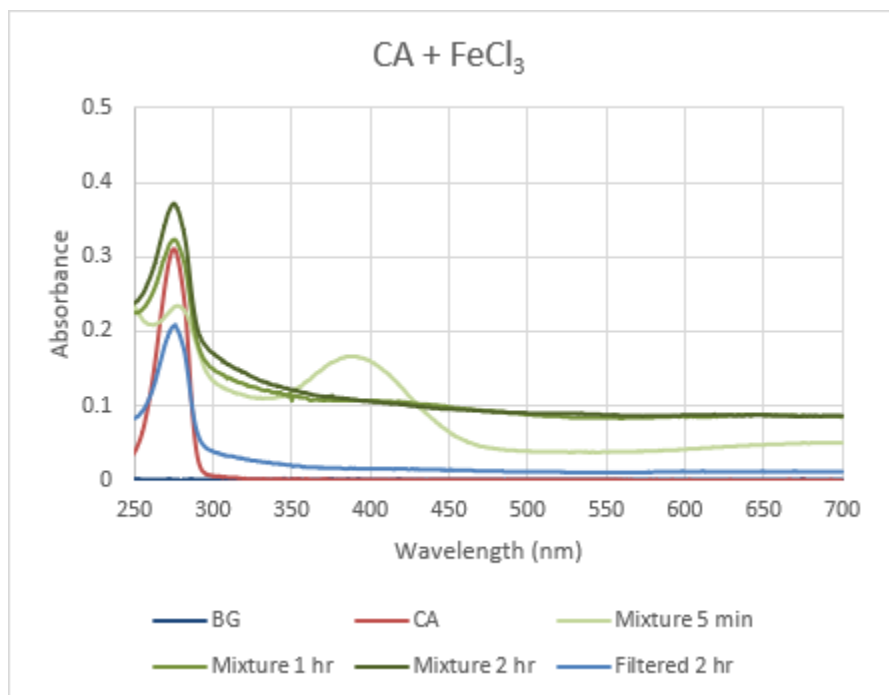
**Table (1):** pH values for prepared solutions **before** starting the reaction (mixing) and their photos:

Solution	KCl	KCl+CA	KCl+ $FeCl_3$
Photo	N/A		
pH	3.03	3.11 -> 3.02	1.86

**Table (2):** pH values and photos for reaction mixtures. Fe: CA [2:1]

Time	1 min	1 hr	2 hr
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**(zoom-in)**

### Conclusions and next steps:

- Experiments successfully reproduced the previously published data
- Next: repeat the same experiment but in the presence of irradiation