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| Chemicalexperiments |
| Testing for Esters – The ferric hydroxamate test |

# A test tube with a red liquid  AI-generated content may be incorrect. Introduction

Image from chem.libretext.org

If you have a carbonyl compound which is not an aldehyde or ketone or carboxylic acid, it could be an ester.

The most common test for an ester is simply a boiling point or melting point test but there is a relatively simple generic test: the ferric hydroxamate test.

In this test, the ester is converted to a hydroxamic acid (HOHN-C=O) which will give a colour change with Iron III (ferric) chloride.

## You will need

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| Test tube and rack | balance |
| 95% Ethanol/IDA\* | Iron III chloride solution (5%) |
| Hydroxylamine hydrochloride solution (0.5 mol l-1) | Hydrochloric acid (1 mol l-1)  |
| Sodium hydroxide (6 mol l-1) | Pasteur pipette(s) |

\* Despite there being not much apparent difference, it is important not to use ‘neat’ IDA – the test won’t work.

Make up the solution by adding 5 cm3 distilled water to 95 cm3 ethanol/IDA.

Since enols can give a positive ferric chloride test, first test your compound with ferric chloride solution as follows:

1. Dissolve 10 mg of solid (or 1 drop of liquid) unknown in 1 cm3 of 95% ethanol/IDA.
2. Add 1 cm3 of 1 mol l-1 HCl.
3. Then add a 1-2 drops of 5% iron III chloride solution.
4. If you obtain a colour other than yellow, the test cannot be used.

Otherwise, continue with the test as follows:

**Method**

1. dissolve 50 mg of solid or 2 drops of liquid unknown in 1 cm3 of 0.5 mol l-1 hydroxylamine hydrochloride in ethanol (IDA) and 0.2 cm3 6 mol l-1 NaOH.
2. Heat to boiling in a hot water bath for 2-3 minutes, then cool and add 2 cm3 1 mol l-1 HCl.
3. If the solution becomes cloudy, add 1-2 cm3 of 95% Ethanol/IDA to clarify.
4. Add 1 drop of 5% Iron III chloride solution.
5. If a red colour forms and then fades, add additional drops of 5% iron III chloride until the colour persists.

A deep burgundy colour is positive - due to a complex between the hydroxamic acid and the iron III ion.