ANASAZI **EXPERIMENT SERIES**

OXIDATION AND REDUCTION

OXIDATION OF 9-FLUORENOL

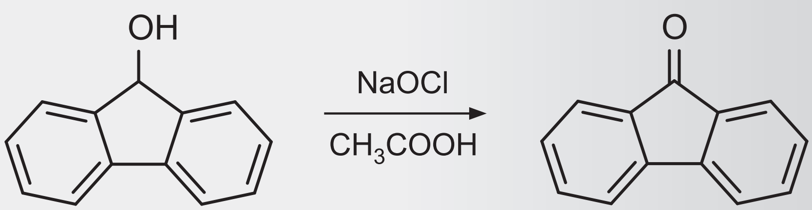
Anasazi Instruments

DID YOU KNOW?

Reduction-oxidation reactions, or redox reactions, have enormous importance in biological systems. For example, your cells oxidize glucose to CO_2 providing much of the energy you use!

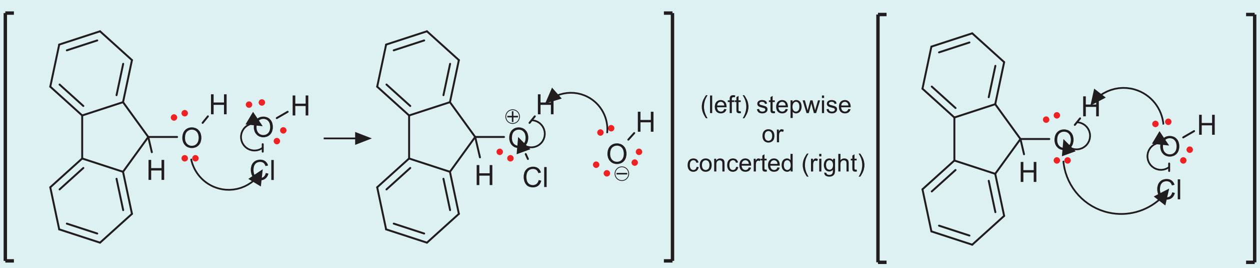
Oxidation reactions are particularly useful tools for synthetic chemists. They functionalize otherwise unreactive positions on molecules adding new chemical possibilities to explore!

THE REACTION



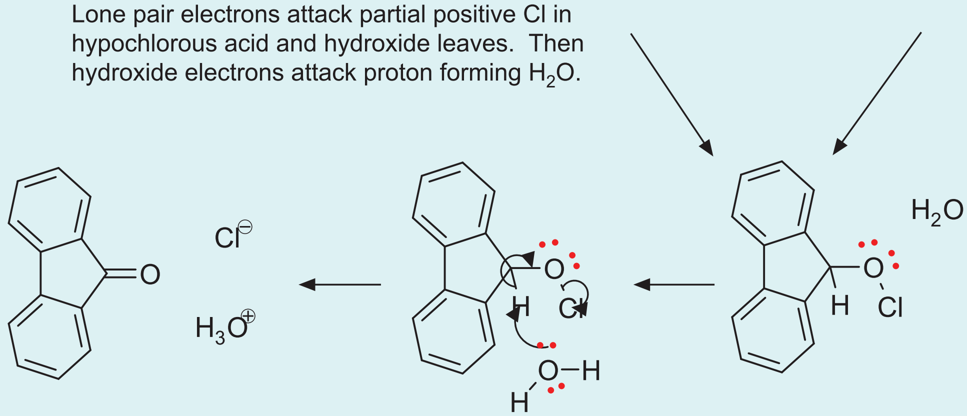
Note: sodium hypochlorite and acetic acid form hypochlorous acid - the key oxidant in this rxn.

THE MECHANISM



Lone pair electrons attack partial positive Cl in hypochlorous acid and hydroxide leaves. Then hydroxide electrons attack proton forming H_2O.

Lone pair electrons attack Cl. Hydroxide leaves while simultaneously abstracting proton to form H_2O.



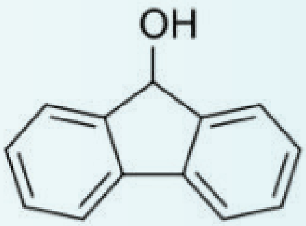
Carbon oxygen double bond forms; chloride ion leaves.

Water acts as a base attacking acidic proton.

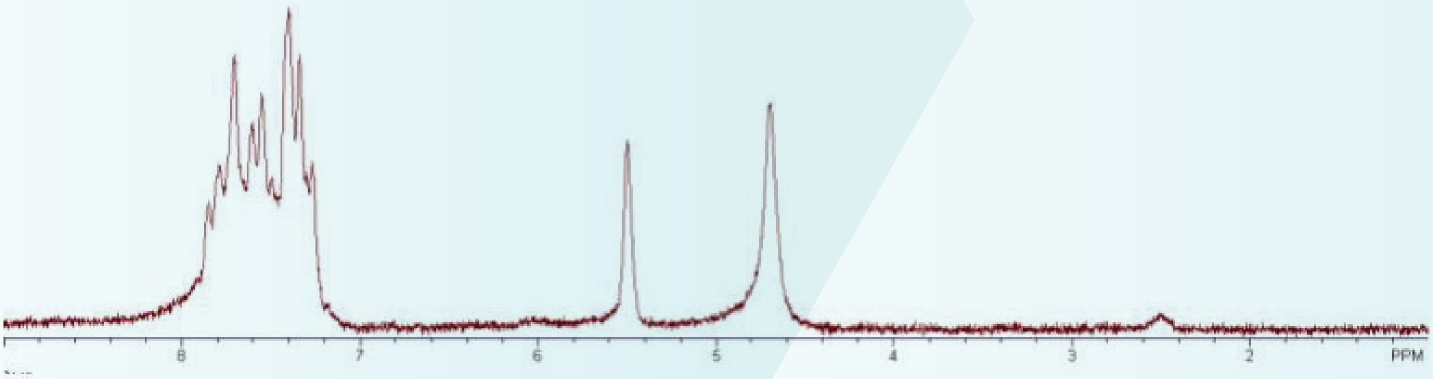
SPECTRA & INTERPRETATION

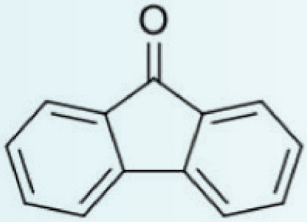
9-Fluorenol ^{1}H NMR

(60 MHz, 2 scan, 22 seconds)



^{1}H NMR spectrum of 9-fluorenol in DMSO shows a group of signals at 7.2 - 8.0 ppm that arises from the aromatic protons. The -CH proton resonantes at 5.5 ppm and the -OH proton resonantes at 4.7 ppm.

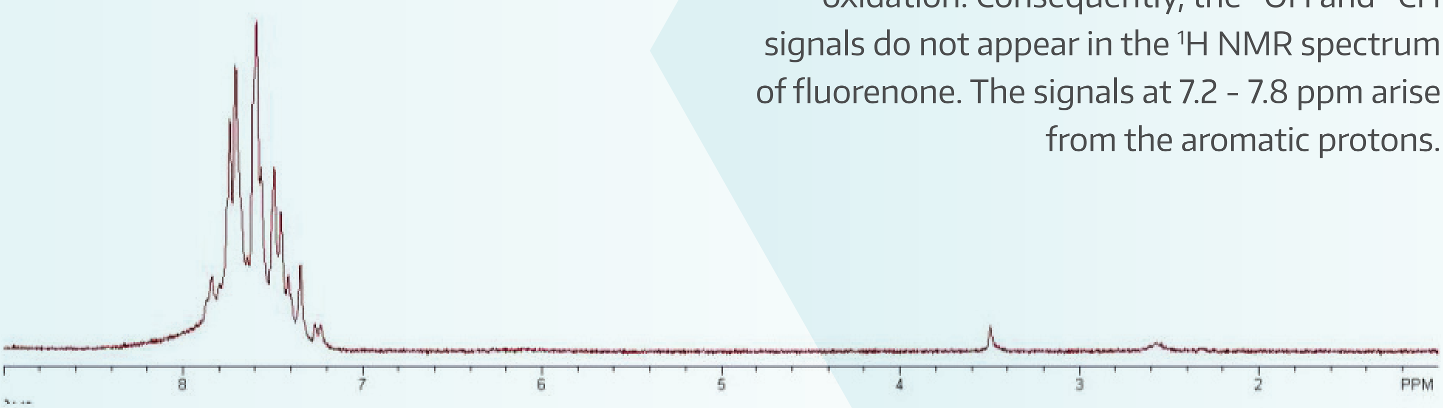




Fluorenone ^{1}H NMR

(60 MHz, 2 scan, 22 seconds)

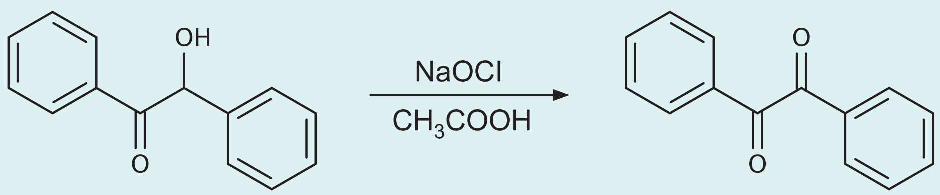
Comparing fluorenone with 9-fluorenol, we see two fewer protons as a result of oxidation. Consequently, the -OH and -CH signals do not appear in the ^{1}H NMR spectrum of fluorenone. The signals at 7.2 - 7.8 ppm arise from the aromatic protons.



REINFORCE KEY CONCEPTS

- electronegativity
- oxidation state
- oxidizing agent

PRACTICE THE MECHANISM



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