Spectroelectrochemistry

A brief overview

By

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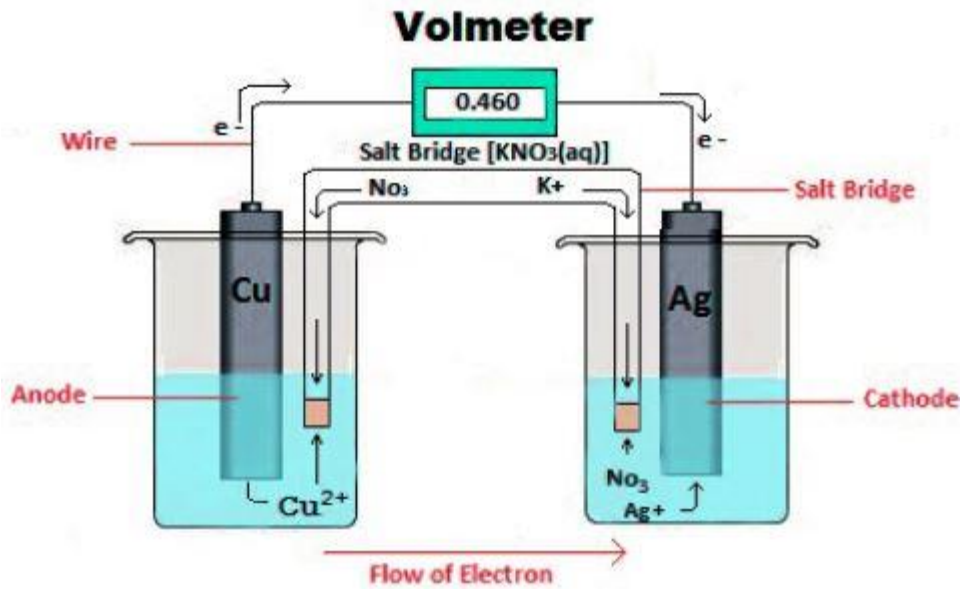
Electrochemistry

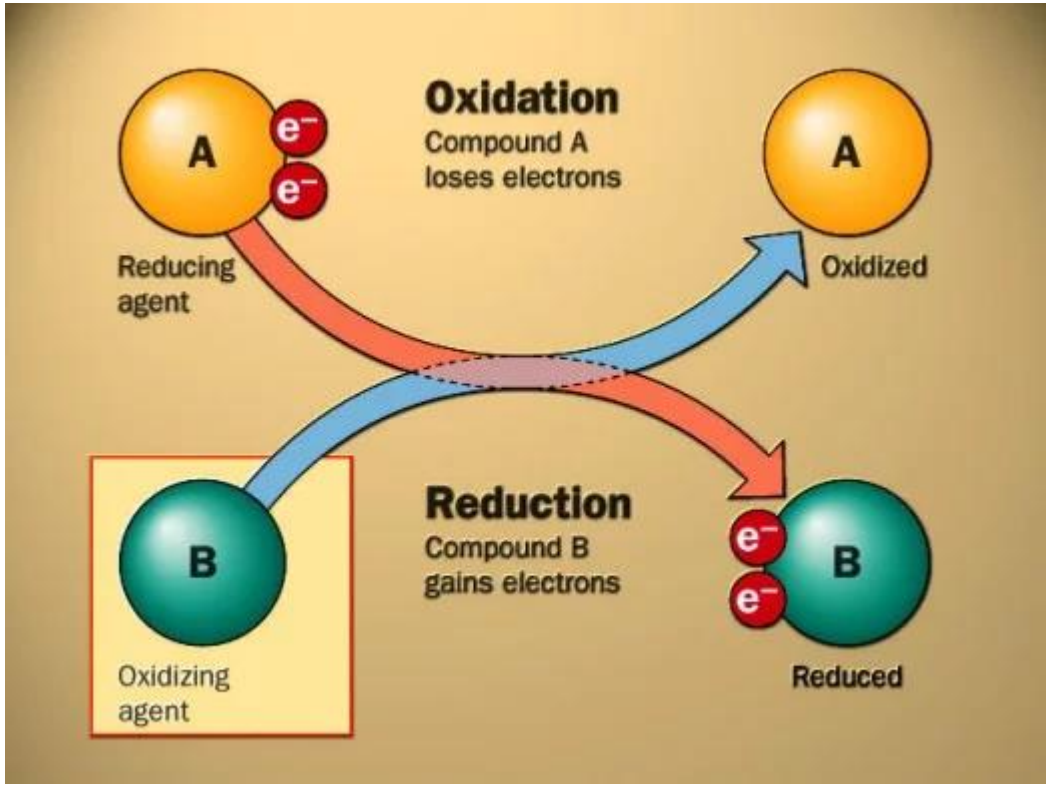
- Measure of electron movement in chemical reactions

- Involves migration of charged particles across an interface

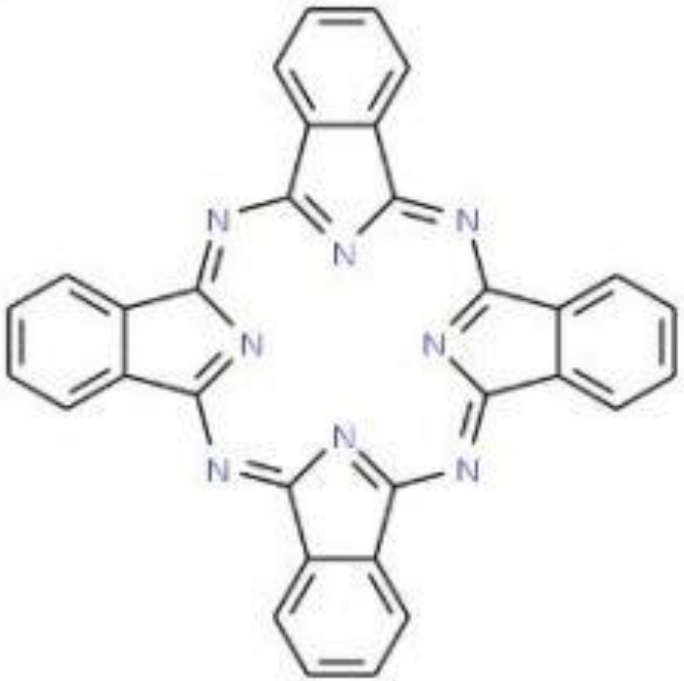


Redox reactions

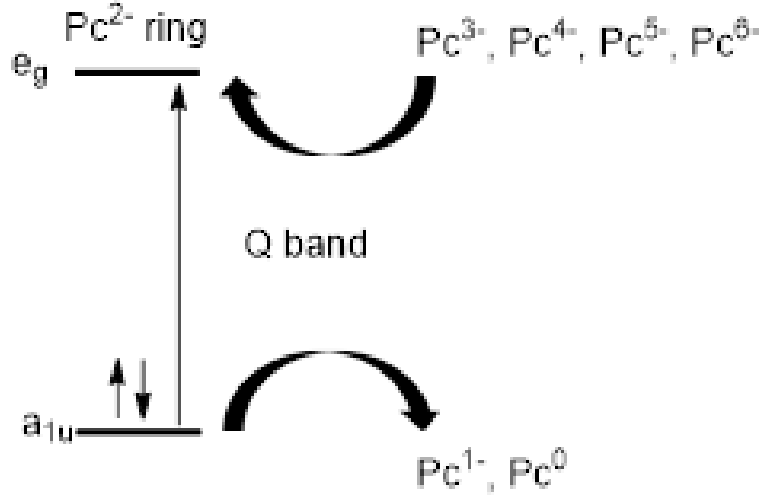
- **REDOX = Reduction + Oxidation**



Electrochemistry of Phthalocyanine



- Oxidation/reduction of Pc
- Can Occur in Pc Ring or Central metal
- Ring reductions $Pc^{2-} \rightarrow Pc^{3-}, Pc^{4-}$
- Ring Oxidations $Pc^{2-} \rightarrow Pc^{-}, Pc^{0}$



Trends observed in redox reactions

- **Position of substituents – affects electron density in frontier molecular orbitals**
- **Electron withdrawing in comparison to electron donating groups – can possibly shift redox potentials**

Spectroelectrochemistry instrument

❖**Discovery dates back to 1964**

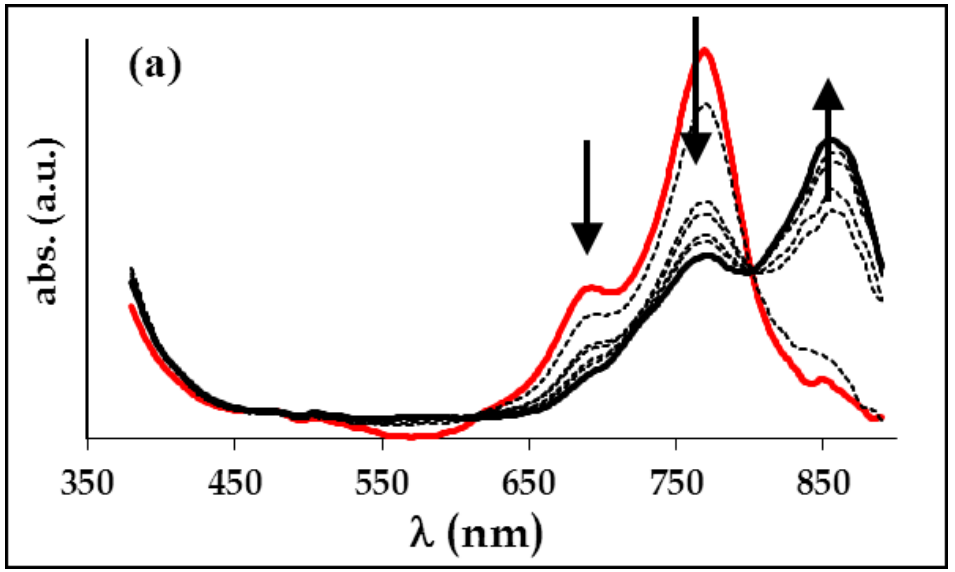
Electrochemistry **UV-Vis absorption**

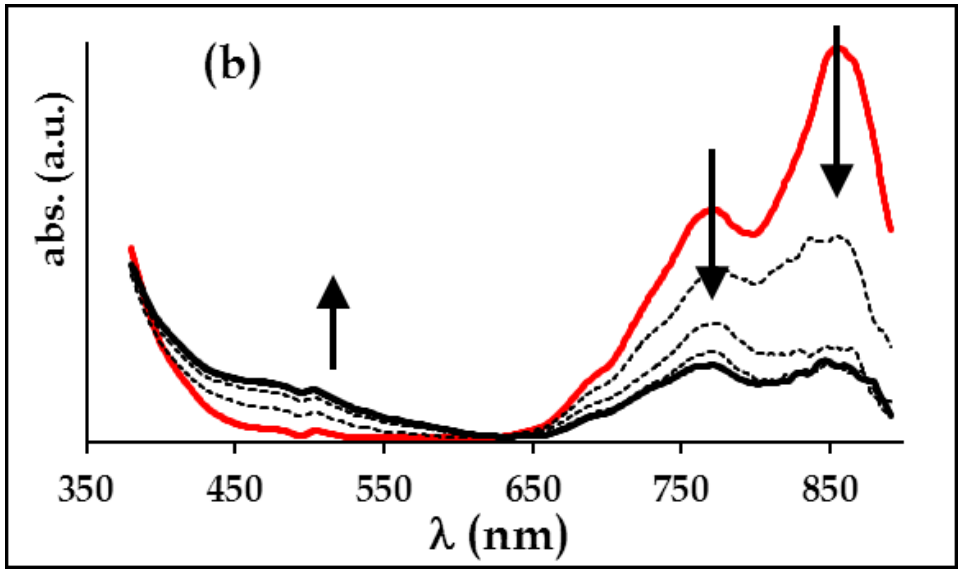
UV-Vis SEC

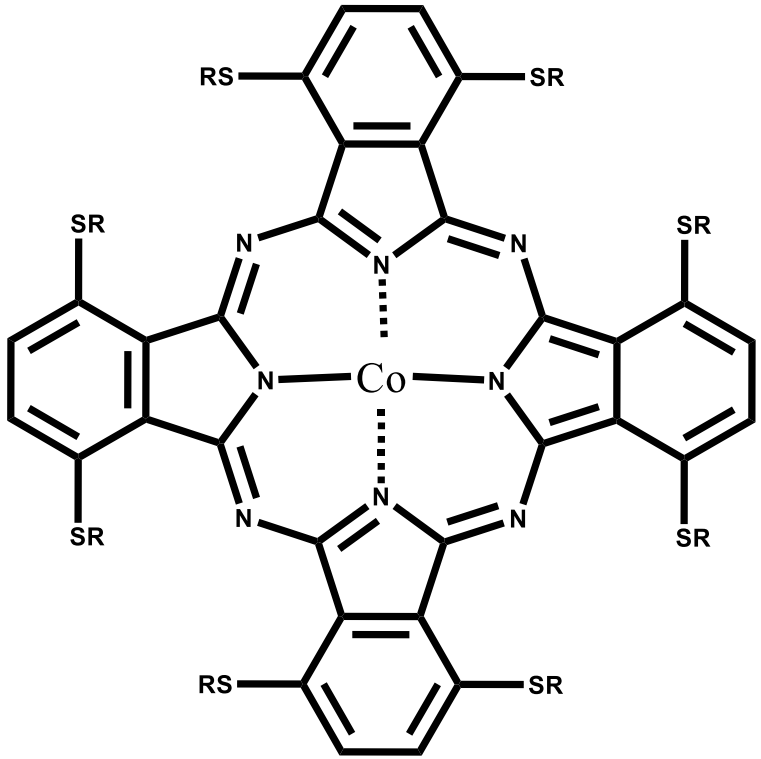
- ❖ **Optically transparent electrodes(OTE) are needed**
- ❖ **Good transparency and conductivity**

SEC in the INI

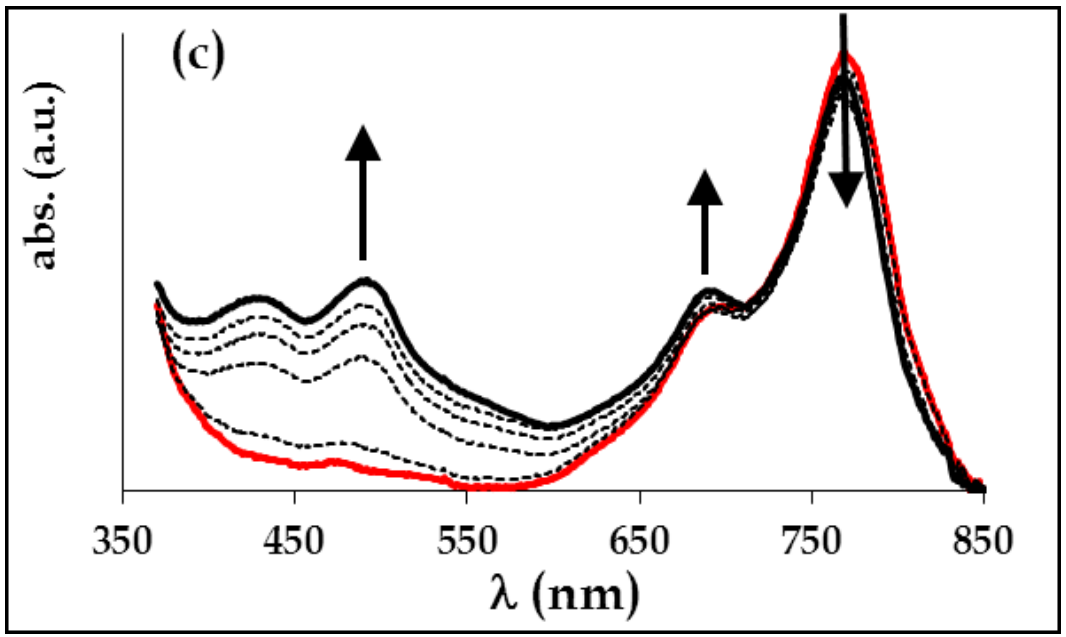
Typical Spectra of UV-Vis SEC

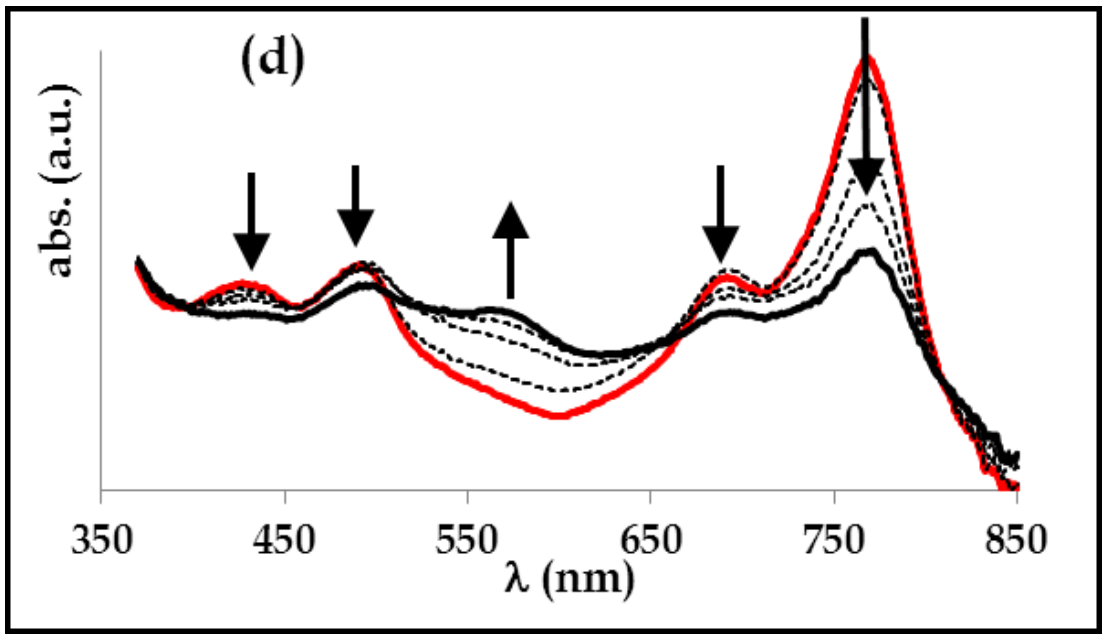






R= $(CH_2)_5CH_3$


(c)
abs. (a.u.)
350
450
550
650
750
850
λ (nm)


(d)
abs. (a.u.)
350
450
550
650
750
850
λ (nm)

Appreciation

- **Dist.Prof Nyokong**
- **Prof Sam Khene and Dr Mashazi**
- **Mr Daniel Mwanza**