



**DEVELOPMENT OF AN OPTO-CHEMICAL SENSOR  
FOR THE DETECTION OF METAL IONS  
IN AQUEOUS SOLUTION**

**A PROJECT REPORT PRESENTED BY**

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## DEVELOPMENT OF AN OPTO-CHEMICAL SENSOR FOR THE DETECTION OF METAL IONS IN AQUEOUS SOLUTION

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The construction of an opto-chemical sensor based on fibre optics for the detection of the  $\text{Cu}^{2+}$  ion in aqueous solution is described where, amino derivative of 8-hydroxy quinoline immobilized on silica gel serves as complexing agent. Convenient detection of  $\text{Cu}^{2+}$  ion can be achieved at concentration from 40 ppm to 1000 ppm range. Here, amino derivative of 8-hydroxy quinoline was synthesized from 8-hydroxy quinoline.

As a strategy to chemically modify 8-hydroxy quinoline such that it could be chemically attached to an appropriately transparent substrate while keeping reagent's chelating ability intact, an attempt was made to introduce to an amino group to the system by nitration followed by the  $\text{Sn}/\text{HCl}$  reduction.

The potential of the amino derivatives of 8-hydroxy quinoline sensor material was then investigated by immobilized chromatographic grade silica gel.

The immobilization of the sensor on chromatographic silica was achieved through chemical means. Here silica gel was first reacted with thionyl chloride to convert the surface  $-\text{OH}$  group into  $-\text{Cl}$  to obtain surface modified silica. Then this was treated with amino derivative of 8-hydroxy quinoline reagent in dry ether.

The material, which produced visible color changes with ppm range aqueous solutions of  $\text{Cu}^{2+}$  ion, was used in the construction of the opto-chemical probe. This probe could be used to record the reflectance spectrum of the copper-amino derivative of 8-hydroxy quinoline.

A fibre-optic based portable low cost visible reflectance spectrophotometer was used to record the spectra.