

**Name of Scholar** : Ms. Sonika  
**Name of Supervisor** : Dr. Saiqa Ikram  
**Department** : Chemistry  
**Title of thesis** : “Development of Calixarene-based molecules  
in ion selective electrodes”

### **ABSTRACT**

This presented thesis deals with the use of ion-selective electrode (ISE) membranes to study selective binding, known also as *molecular recognition*. On the one hand, molecular recognition of charged species by lipophilic neutral or charged ligands, incorporated into ISE membranes, is the basic principle of ISEs design, on the other hand, molecular recognition of electroinactive species affecting the response of ISEs can be used for broadening their application.

Potentiometric polymeric membrane electrodes based on electrically neutral ionophores are a useful analytical tool for the detection of heavy metal ions from environmental and industrial waste water. PVC based membrane containing p-tert-butylcalix[4]arenethioether derivative as active material along with sodiumtetraphenylborate (NaTPB) as solvent mediator and dibutylphthalate as a plasticizer. Excellent selectivity for  $\text{Hg}^{2+}$  ions is indicated by match potential method and fixed interference method with the containing p-tert-butylcalix[4]arenethioether.

**Name of Scholar** : Ms. Sonika  
**Name of Supervisor** : Dr. Saiqa Ikram  
**Department** : Chemistry  
**Title of thesis** : “Development of Calixarene-based molecules  
in ion selective electrodes”

We discussed a highly electroactive material  $\text{Mo}_2[(\text{OAc})_2(\text{H}_2\text{-calix}[4]\text{arene})]$  used as a neutral carrier for  $\text{Cd}^{2+}$  ions in this thesis. We introduced a new calixarene molecule *p-tert-butyl-thiacalix[4]arene* derivative as ionophore for thorium(IV) selective polymeric membrane electrode. The resulting data clarified that the electrode shows a Nernstian slope of  $14.9 \pm 0.6$  mV per decade for Th(IV) ions over a broad working concentration range of  $8.0 \times 10^{-8}$  to  $1.0 \times 10^{-1}$  mol/L. This experimental study revealed that an electroactive material *p-tert-butyl-biscalix[4]arene* can be used as an ionophore in the preparation of PVC based ion selective electrode and we found that it shows ionophoric binding property for uranyl cation. This electrode shows excellent selectivity for  $\text{UO}_2^{2+}$ -cations with respect to most of the common cations including inner transition and heavy metal ions. In the proposed work, we used *p-tert-butylcalix[4]arene* derivative (L) as a suitable lipophilic neutral ionophore for the construction of PVC based membrane electrode for selective determination of europium ion.