

Siriphorn Udkhao 2012: Preparation of ZnS-Intercalated Bentonite and Application as a Low Cost Potentiometric Sensor. Master of Science (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Associate Professor Ladda Meesuk, Ph.D. 118 pages.

Sensors based on clay-modified electrode have been studied extensively. They have been made from different intercalation compounds to determine both organic and inorganic species. Various electrochemical techniques have been applied for clay-modified electrodes. In this work, we prepared ZnS-intercalated bentonite as a sensor of a potentiometric electrode.

ZnS was formed in the interlayer spaces of bentonite by solid-solid reaction between Zn(II)-bentonite and sodium sulfide at room temperature. The intercalation compound was characterized by Atomic Absorption Spectrometry (AAS), nitrogen sorption analysis by BET method and surface morphology was studied by scanning electron microscope (SEM).

The electrode was constructed by mixing ZnS-intercalated bentonite, artificial graphite, carboxymethyl cellulose (CMC) and polytetrafluoroethylene (PTFE) in a ratio 0.2: 0.025: 0.4: 0.3 by weight. It was found that, the electrode gave best response to sulfide compared to other ions. The graph plotted between potential in mV against $\log[S^{2-}]$ gave slope closed to 29.5 following Nernst equation. The linear concentration range was around 3×10^{-1} to 3×10^{-4} M of S^{2-} . The pH study showed that, this electrode worked well in pH range 4-10. The heat treatment of the intercalated product at 150-200°C did not affect efficiency of the electrode. The electrode also gave good precision, stability and low cost. The practical analytical utility of the electrode was demonstrated by measurement of sulfide ion in water samples.

Student's signature

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