

DEVELOPMENT OF HOLLOW FIBER FLOW FIELD-FLOW FRACTIONATION COUPLED WITH THERMOSPRAY FLAME FURNACE ATOMIC ABSORPTION SPECTROMETRY FOR NANOPARTICLE CHARACTERIZATION

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ABSTRACT

Hollow fiber flow field-flow fractionation (Hf-FIFFF) coupled with thermospray flame furnace atomic absorption spectrometry (TS-FF-AAS) was proposed for metal based particle size characterization which Hf-FIFFF acts as the separation part and TS-FF-AAS functions as the detection part. In this work, each part was individually studied about characteristics and used for practical applications.

For Hf-FIFFF technique, the parameters affecting the separation capability were investigated such as types of hollow fiber membrane and two forces affecting the separation; radial flow rate and axial flow rate. Polypropylene hollow fiber membrane is suitable for uncharged polystyrene latex standard particles used for studying the system while polysulfone hollow fiber membrane was used for protein and silver nanoparticle (AgNPs) separations. Moreover, the approach about pretreatment of polysulfone hollow fiber membrane with bovine serum albumin (BSA) was proposed in order to provide better AgNPs separation.

TS-FF-AAS was used for detecting silver signal in different forms; i.e., silver ions and AgNPs, with its' capability in sensitivity improvement. It could improve sensitivity of silver ions detection for three times and silver nanoparticles for two times when comparing with those analyzed by flame atomic absorption spectrometry

For Hf-FIFFF coupled with TS-FF-AAS, the studies of two silver forms; i.e., silver ions and AgNPs, and BSA binding were carried out in order to demonstrate the developed system.

KEY WORDS: HOLLOW FIBER FLOW FIELD-FLOW FRACTIONATION / THERMOSPRAY FLAME FURNACE ATOMIC ABSORPTION SPECTROMETRY / FRACTIONATION

111 pages