

[ENV09]

Fabrication of a novel salicylic acid optical fibre sensor and optimisation using artificial neural network

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Optical fibre salicylic acid (SA) sensor is fabricated based on immobilisation of ferric(III) nitrate on Dowex-50x8. SA forms a stable purple complex with immobilised Fe^{3+} at pH 2.1. The reflectance spectra of the sensor were measured by using an optical fibre spectrophotometer. The results showed this SA sensor has a maximum reflectance at 786 nm. The useful dynamic response is range from 2.0×10^{-2} g/L to 5.0×10^{-1} g/L. The complex is stable for more than 24 hours. A good reproducibility (0.9%) of measurement was obtained with this probe. The application of an artificial neural network (ANN) in optimising the response of an optical fibre salicylic acid (SA) sensor is presented in this paper. A back-propagation (BP) artificial neural network (ANN) was used to analyse the response of the sensor developed. The results showed that ANN technique was very effective and useful in broadening the limited dynamic response range of the SA sensor (0.02 – 0.50 g/L) to an extensive calibration response (0.02 – 2.00 g/L). It was found that a network with 15 hidden neurons was highly accurate in predicting the response of the optical fibre SA sensor. This network scores a summation of squared error (SSE) skill and low average predicted error of 0.014 g/L and 0.032 g/L respectively.