

How catchy is the Cu/Zn/Ag/Mo-based impregnated activated carbon towards toxic industrial gases?

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Impregnated activated carbons (IACs) prepared from aqueous copper, zinc, silver and molybdenum-containing solution for the removal of toxic gases from air was studied. Several samples were synthesized, firstly by impregnating single metal on activated carbon and then in combination of two, three and four metals by using imbibing limit method. Breakthrough time testing was employed for the determination of gas filtration capacity of the impregnated activated carbon against challenge gas concentrations of SO₂ and NO₂. Gas concentration was measured by FTIR based gas analyzer. X-ray diffraction (XRD) was used to determine the form and distribution of impregnants on activated carbon surface. Distribution of impregnants on the internal surface of activated carbon was studied by transmission electron microscopy (TEM). Surface morphology of IAC was demonstrated by scanning electron microscopy (SEM). Energy dispersive X-ray analysis (EDX) and atomic absorption spectrometer (AAS) were used to determine the impregnant loading. Surface area analysis of all IAC samples was determined by Brunauer-Emmett-Teller surface area analyzer (BET). Comparison of IAC was made with un-impregnated activated carbon. It was found that activated carbon impregnated with 3M Cu(NO₃)₂·3H₂O, 2.4M Zn(NO₃)₂·6H₂O, 1M AgNO₃ and 1.5M (NH₄)₂Mo₂O₇·4H₂O has overall best performance in gas filtration for the samples studied in this work.

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