

## **Reduction of isolation period of coal humic acids**

### **Abstract**

Problem statement: The isolation of Humic Acids (HA) from coal is laborious, costly and time consuming. The extraction and fractionation periods of HA vary from 4 h to 7 days. Fractionation period ranges from 12-24 h. However, most studies use 24 h as extraction period and also 24 h as fractionation period. This study was conducted to investigate whether the isolation period for HA of coals could be reduced. Approach: Different extraction periods using 0.1 M NaOH (4, 8, 12, 16, 20 and 24 h) were tested. Samples were centrifuged (16,211 G for 15 min) at the end of each extraction period. The dark-colored supernatant liquor containing HA was decanted and the pH of solution was adjusted to 1.0 using 6 M HCl. After acidification, the fractionation periods evaluated were 4, 8, 12, 16, 20 and 24 h. The samples were transferred to a polyethylene bottle and centrifuged (16, 211 G for 10 min) after each fractionation period. The HA purification was done by suspending them in 50 mL distilled water and centrifuged (16,211 G for 10 min). HA samples were dried in an oven at 40°C to a constant weight. Standard procedures were used to characterized the HA (total carbon, E4/E6, phenolic OH, carboxylic COOH and total acidity). Results: There was significant effect of both extraction and fractionation periods on the isolation of HA from coal. The optimum period for Na ions to saturate the exchange complex of HA during the extraction process was 8 h while the optimum period for the exchanges sites of the HA to be saturated with H ions during the fractionation process was 20 h. The distilled water used in this study was able to purify HA within 1 h because it served as Bronsted-Lowry acid. Additionally, carbon, E4/E6, phenolic OH, carboxylic COOH and total acidity of the HA were typical of those reported in the literature, suggesting that that the isolation process of the HA was successful. Conclusion: The isolation period of HA from coal can be reduced to 29 h (8 h extraction, 20 h fractionation period and 1 h purification period) instead of the existing range of 2-7 days. © 2009 Science Publications.