MICROGRAVITY SCIENCES AND PROCESSES (A2)
Science Results from Ground Based Research (4)

Author: Dr. Bernadette Isikwue
University, Nigeria

PRELIMINARY STUDY ON THE ESTIMATION OF HORIZONTAL DILUTION POTENTIAL OF AIR POLLUTANTS OVER SOME CITIES IN NIGERIA USING WIND DATA

Abstract

Preliminary studies of the estimates of the horizontal dilution potential of air pollutants over some cities in Nigeria have been carried out using wind impact area diagrams, obtained by using standard deviation to calculate angles of spread of the pollutants, whose concentrations were thus determined downwind. The results showed that Port Harcourt and Minna have varying wind persistence (P ¡ 1.0) for all the months, thereby causing varying wind directions. This indicates unsteady pattern of winds observed in these areas. For Port Harcourt, lowest and highest values of dilution potentials, M (11.14m2 and 41.21m2) were observed in April and May respectively. For Minna, lowest and highest values of M (2.10m2 and 65.88m2) were also observed in April and May respectively. On the other hand, Makurdi had P equal to 1 through the months, showing that Makurdi had more steady winds compared to the other two stations and the predominant wind direction during the period of Oct. 2008 – Feb. 2009 was south – East oriented. Lowest and largest values of M, (1.48m2 and 11.37m2) were obtained for February and December respectively. Low values of M indicates lower dilution potential which means high concentration of inert pollutants and larger values of M indicate high nature of wind speed in with a larger area of coverage. This study shows how horizontal dilution potential can be used for comparison of wind data in time and space. It also portrays that wind impact area diagram gives a better representation of winds along with zone of high pollutant concentration as compared to wind rose. The information obtained from this study suggests period of air quality monitoring in these areas. Key words: ground level concentration, Horizontal Pollution Potential, Impact area, standard deviation, wind speed and direction