

An Assessment of Trace Heavy Metal Contamination of Some Edible Oils Regularly Marketed in Benue and Taraba States of Nigeria

Authors : Raphael Odoh, Obida J. Oko, Mary S. Dauda

Abstract : The determination of Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn contents in edible oils (palm oil, ground-nut oil and soybean oil) bought from various markets of Benue and Taraba state were carried out with flame atomic absorption spectrophotometric technique. The method 3031 developed acid digestion of oils for metal analysis by atomic absorption or ICP spectrometry was used in the preparation of the edible oil samples for the determination of total metal content in this study. The overall results ($\mu\text{g/g}$) in palm oil sample ranged from 0.028-0.076, 0.035-0.092, 1.011-1.955, 2.101-4.892, 0.666-0.922, 0.054-0.095, 0.031-0.068 and 1.987-2.971 for Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn respectively, while in ground-nut oil the overall results ranged from 0.011-0.042, 0.011-0.052, 0.133-0.788, 1.789-2.511, 0.078-0.765, 0.045-0.092, 0.011-0.028 and 1.098-1.997 for Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn respectively. Of the heavy metals considered Cd and Ni showed the highest contamination in the soybean oil sample. The overall results in soybean oil samples ranged from 0.011-0.015, 0.017-0.032, 0.453-0.987, 1.789-2.511, 0.089-0.321, 0.011-0.016, 0.012-0.065 and 1.011-1.997 for Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn respectively. The concentration of Pb was the highest. The degree of contamination by each metal was estimated by the transfer factor. The transfer factors obtained for Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn in edible oils (palm oil, ground-nut oil and soybean oil) were 10.800, 16.500, 16.000, 18.813, 15.115, 14.230, 23.000 and 9.418 for Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn in palm oil, and 7.000, 12.500, 8.880, 11.333, 7.708, 10.833, 15.00 and 6.608 for Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn in ground-nut oil while for soybean oil the transfer factors were 13.000, 11.000, 7.642, 11.578, 4.486, 13.00, 12.333 and 4.412 for Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn respectively. The inter-element correlation was found among metals in edible oil samples using Pearson's correlation coefficient. There were positive and negative correlations among the metals determined. All Metals determined showed degree of contamination but concentrations lower than the USP specification.

Keywords : Benue State, contamination, edible oils, heavy metals, markets, Taraba State

Conference Title : ICEPRM 2014 : International Conference on Environmental Pollution, Restoration and Management

Conference Location : Barcelona, Spain

Conference Dates : August 18-19, 2014