Temporal and spatial of heavy metals concentrations (Zn, Cu, Ni, Pb, Cd and Hg) in Iranian coastal waters of the Southern Caspian Sea

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Abstract

This study was conducted to determine six heavy metals (Zn, Cu, Ni, Pb, Cd and Hg) concentrations in water (during four seasons) at eight transects (Astara, Anzali, Sefidroud, Tonekabon, Nowshahr, Babolsar, Amirabad and Turkman) in the southern coasts of the Caspian Sea in 2010-2011. 93 samples of water were collected at 10, 50 and 100 meters depths. All samples were prepared by extracting processes and then determined using Atomic Absorption Spectroscopy (AAS) instrument. Results of current study showed that maximum values of Zn, Ni, Pb and Hg were observed in spring and for Cd was in winter. Also, at the west and center regions were more contaminated than the east part. Annual mean contents and standard error (±SE) of water were registered 2.10 ±0.59, 1.64 ±0.18, 0.68 ±0.10, 0.11 ±0.01 mg/l and 3.30 ±0.40 µg/l for Ni, Pb, Cd, Zn and Hg, respectively. The mean values of the examined heavy metals with percentage (in parenthesis) in water samples during four seasons were obtained in this order Ni (46.3%)>Pb (39.1%)>Cu (15.0%)>Zn (2.5%)>Hg (1.0%). In conclusion, the results revealed that in the most transects the heavy metal concentrations of water were above the threshold levels associated with the toxicological effects and the regulatory limits (ANZECC, MPL and UKMPA) which represented polluted condition in this area. In addition, correlation between environmental parameters and heavy metals showed that the addition of different resources of metals, different behavior of bio-geochemical behavior was influenced on their concentrations.

Keywords: Heavy metals pollutions, Water, Caspian Sea, Iran.