Status of some heavy metals in some drains and canals in kalubia governorate

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The present study was carried out to investigate the status of heavy metals i.e., Pb, Ni, Mn, Fe, Zn and Cu in some canals and drains in Kalubia Governorate for range detection ofpollution in drains and canals, and coincidence with law 48,1982.A survey study to select the drains and canals were made.Six canals were selected to represent main canals and branch- canals, Ismailiya, Kashmir El-Yosra, EI-Sharkawia, El-Mersafawia, El-Basosia and El-Quronfolia canals. Nine drains represent different wastewaters (industrial, sewage, mixed and agricultural wastewater) were selected.Industrial wastewater represented by (Mostorad drain),mixed wastewater (EI-Kalubia, Shebeen El-Kanater and Belbese drain), sewage water represented by [El-Khosos, El-Gabal El-Asfar, El-Kanater El-Khairia (ATS) and El- Manzala (ATS)] and agricultural wastewater represented by [Karr Hatnza,El-Kanater El-Khairia (BTS) AND El-Manzala (BTS)]were used in this study.Sources of pollution have been detected as they discharging their wastewaters into the drains and canals, and water samples were collected before and after pollution sources along and the canals and or drains before and after treatmentstation, as well as samples from Nile water in all seasons were collected The obtained findings could be summarized in the following points:Evaluation of canals waterMonitoring status of heavy metals i.e., Pb, Ni, Mn, Fe, Zn and Cu in all seasons and physical and chemical parameters of water showed that:1.The concentration of Pb, Ni, Mn, Fe, Zn and Cu recorded that the highest values in summer while the lowest values were in winter in all seasons. The concentrations of Pb, Ni and Mn recorded the highest values were in El-Mersafawia canal and the lowest values of Pb and Mn were in Nile water. While, the lowest values of Ni occurred in Nile water and El-Basosia canal. Also, the concentrations of Fe, Zn and Cu recorded the highest values in El-Qronfolia canal and the lowest values in Nile water.2.The concentrations of Pb ranged between 0.160- 0.401 mgLi in all seasons and were higher than the maximum permissible limit of law 48, 1982 (0.05 mgL-I). The results of Pb concentration in canals during the year of this study could be arranged in the following order: summer > autumn > spring > winter3.The concentrations of Ni ranged between 0.050- 0.321 mgC, they were higher than the maximum permissible limits in law 48, 1982 in three seasons of summer, Autumn and spring while in winter season Ni concentrations were less than the limit of the same law (0.1 mgC). The results of Ni oncentration in canals could be arranged in the following order: summer > autumn > spring > winter4.The concentrations of Mn ranged between 0.086- 0.336 mg1_,-in all seasons. They were less than the maximum permissible limit in law 48, 1982 (0.5 mgC). The concentration of Mn in canals could be arranged in the following order: summer > spring > autumn > winter.5.The concentrations of Fe ranged between 0.237- 1.390 mg1.,-1 and were higher than the maximum permissible limit in law 48, 1982 (1.0 mg1_,-I), in summer season, while, in autumn, spring and winter seasons less than limits of the same law. Seasonal changes of Fe concentrations in canals could be arranged in the following order summer > autumn > spring > winter.6.The concentrations of Zn ranged between 0.026- 0.318 mg1_,-I .in all seasons and they were less than the maximum permissible limit in law 48, 1982 (1.0 mglil). Changes in Zn concentrations in canals among season could be followed this order: summer > autumn > spring > winter.7.The concentrations of Cu ranged between 0.080- 0.303 mg1_,1 .in all seasons. The concentrations were loss than the maximum permissible limit in law 48, 1982 (1.0 mgC) The results of Cu concentration in canals could be

arranged in the following order. summer > spring > autumn > winter.8.Physical and chemical parameters of the collected water samples in canal, showed that for both DO, pH, EC, cations (Ca, Mg, Na, K and NH4) and anions (HCO3, CO3, NO3, SO4 and PO4), were within limits of law 48, 1982. The highest values were recorded in summer and the lowest values recorded in winter for EC, cations and anions. While DO and pH recorded the highest values in winter and the lowest values in summer. The values of BOD, were within limits of law 48, 1982 in all seasons. Also, the values of COD in winter season were lower than the level of law 48, 1982, while, in three seasons of summer , autumn and spring they were higher than that of the same law.Evaluation of drains waterMonitoring status of heavy metals i.e., Pb, Ni, Mn, Fe, Zn and Cu as well as physical and chemical parameters of water in all seasons, revealed that, the highest values were in summer season and the lowest values were in winter.1- LeadThe concentration of Pb , in all seasons , recorded high values comparing with that of the maximum permissible limit in law 48 , 1982 . The concentration of Pb between ranged 0.377- 1.158 mg1: . It s recorded that the highest concentration in summer of Mostorad drain (industrial wastewater) and the lowest concentration in winter of El-Kanater El-Khairia (BTS) (agricultural wastewater) .The concentration of pb in drains could be arranged in drainage species in the following order : industrial wastewater (Mostorad drain) >mixed wastewater (El-Kalubia , Shebeen El-Kanater and Belbese drains) > sewage water [El-Khosos , El-Gabal El-Asfar , El-Kanater El-Khairia (ATS) and El-Manzal ATS) > agricultural wastewater [Kafr Hamza , El-Kanater El-Khairia (BTS) and El-Manzal (BTS) > Nile water (control) . Also, The results of pb concentration in canals could be arranged in the following order: summer > autumn > spring > winter.The concentrations of lead in different seasons ranged between 0.697- 1.158, 0.653- 0.919, 0.687- 0.810, 0.614- 0.676, 0.644-0.742, 0.638- 0.751, 0.521- 0.616, 0.540-0.619, 0.411-0.545 ,0.403- 0.450, 0.377- 0.475 and 0.140- 0.230 mgL-I for Mostorod, Shebeen El-Kanater, Belbese, El-Kalubia, El- Khosos, El- Gabal El- Asfar, El- Manzala (ATS), El-Kanater El- Khairia (ATS), Kafr Hamza, El- Manzala (BTS)and El-Kanater El-Khairia (BTS) drains. These results in these drains, the concentration of lead reach to 4.90, 3.90, 3.84, 3.25, 3.55, 3.55, 2.92, 2.97, 2.54, 2.19, and 2.18 fold that of Nile water, respectively. The results show that the concentration of lead, in all drains in all seasons, were highest than the maximum recommended limits of Egyptian standards in law number 48/1982 (0.05 mgL-I). Generally, the contents of lead in the drains higher than the canal, in all seasons.2- NickelThe concentration of Ni , in all seasons , recorded that were highest than the maximum permissible limits in law 48 , 1982 . The concentration of pb between ranged 0.290-0.848 mgli . It s recorded that the highest concentration is in summer of El-Gabal El-Asfar drain (sewage water) and the lowest concentration is in winter of El-Kanater El-Khairia (BTS) (agricultural wastewater). The concentration of Nile water between ranged 0.050-0.205 mglal in all seasons The concentration of nickel took in different drains water sources recorded that the highest values in summer and the lowest values in winter as they arranged in the following order: summer >autumn > spring >winter.These results proved that, the contents of nickel in sewage water (El- Khosos and El-Gabal El-Asfar drain) > industrial wastewater (Mostorad drain) >sewage water (ATS) (El-Kanater El- Khairia and El- Manzala drain) >mixed wastewater (El- Kalubia, Shebeen El-Kanater and Belbese drain) > agricultural wastewater (El-Kanater El-Khairia (BTS), El-Mania (BTS), and Kafr Hamza drain in all seasons. The results of Ni concentration in canals could be arranged in the following order: summer > autumn > spring > winterThe content of nickel in different seasons ranged between 0.480- 0.694, 0.392- 0.521, 0.430- 0.550, 0.440- 0.574, 0.484-0.835, 0.489-0848,0.451-0.587, 0.447- 0.594, 0.290- 0.444, 0.294- 0.439, 0.321- 0.480 and 0.050- 0.205 mg1j1 for Mostorad , El-Kaludia, Shebeen El-Kanater, Belbese, El-Khosos ,El- Gabal El-Asfar, El-Kanater El- Khairia (ATS), El-Manzala (ATS) El-Kanater El-Khairia (BTS) , El-Manzal (BTS), Kafr Hamza and Nile water. These results in the same drains, the concentration of nickel reach to 5.13, 4.00, 4.26, 4.42, 5.96, 6.01, 4.60, 4.62, 3.16 3.18, 3.50 fold that Nile water respectively .The contents of nickel in the drains higher than the canals in the all seasons, while, the contents of Nile water less than drains and canals in all seasons. ManganeseThe results showed that the concentration of manganese in all seasons were below the permissible limit given by law 48, 1982 except sewage water of El-Kosos and El-Kanater El-Khairia (ATS) in spring and all sewage water drains in summer rEl-Khosos, EI-Gabal El-Asfar, El-Kanater EI-Khairia (ATS) andEl-Manzala (ATS)] in addition to Shebeen

El-Kanater (mixed wastewater drainage only).The concentration of manganese took in different drains water sources recorded that the highest values in summer and thelowest values in winter, as they arranged in the following order: summer > spring > autumn > winter.This results observed that the contents of manganese in sewage water > mixed wastewater > industrial wastewater > agricultural wastewater > Nile water (control) in all seasons.Manganese values of different seasons ranged between 0.120- 0.361, 0.265- 0.459, 0.244- 0.512, 0.232- 0.385, 0.280-0.862, 0.283- 0.557, 0.403- 0.543, 0.283- 0.767, 0.116- 0.293, 0.103- 0.267, 0.093- 0.346 and 0.086- 0.288 mgL' for Mostorad, El-Kalubia, Shebeen El-Kanater, Belbese, El-Khosos, EI-Gabal El-Asfar, El-Kanater El-Khairia (ATS), El-Manzala (ATS), El-Kanater El-Khairia (BTS), El- Manzala (BTS), Kafr Hamza and Nile water (control).4-IronIron concentration in drains, values of iron were higher than the maximum permissible limit of Egyptian standards in law 48, 1982 (1.0 ingL,1) for industrial wastewater in all seasons e in sewage water the increase of iron values at summer and autumn occurred. However, in spring the high Fe concentration were found in the following drains: El-Kanater El-Khairia (ATS) and E1-Manzala (ATS). In winter the high level of Fe was in El-Kanater El-Khairia (ATS) drain. Regarding the mixed wastewater, iron concentration was high in summer and autumn. But.in spring Fe exceeded the permissible level in Shebeen El-Kanater and Belbese drains.In agricultural wastewater in summer particularly in El-Kanater El-Khairia (BTS) and Kafr Hamza drains. On the other hand, Fe levels in drains during in all seasons were below than the maximum recommended by law 48, 1982 (1.0 mgL-I).Iron values of different water sources could be arranged in the following order: industrial wastewater (mostorad drain) > sewage water (ATS) (El-Kanater El-Khairia and El-Manzala drain) > mixed wastewater (Belbese, Shebeen El-Kanater and El-Kalubia drain) > sewage water (El-Khosos and El-Gabal El-Asfar drain) > agricultural wastewater (Kafr Hamza, El-Manzala (BTS) and El-Kanater El-Khairia (BTS).The concentrations of iron in different seasons ranged between 1.503- 5.445, 0.687- 1.326, 0.847- 1.550, 0.867- 2.006,0.595-1.250,.606-1.296, 1.206- 3.775, 0.980- 2.131, 0.486-1.021,0.480-0.956,0.515- 1.191 and 0.237- 1.076 mgill forMostorad, El-Kalubia, Shebeen El-Kanater, Belbese, El-Khosos, El-Gabal El-Asfar, El-Kanater El-Khairia (ATS), El-Manzala (ATS), El-Kanater El-Kairia (BTS),E1-Manzala (BTS), Kafr Hamza drain and Nile water respectively. This results in these ains, the concentratios of iron reach to 5.6, 1.9, 2.3, 2.5, 1.6, 1.6, 4.2, 2.8, 1.4, 1.3 and 1.4 fold that of Nile water, respectively.5-ZincThe results show that the concentrations of zinc were lowest than the maximum permissible limits of Egyptian standards in law 48,1982 (1.0 mgL-I), except Mostorad drains in summer only reached 1.203Zinc values of different water sources could be arranged in all seasons in the following order: summer > spring > autumn > winter.The contents of zinc took different tends in studied water sources in all seasons as well as NW, recorded that the highest values in summer and the lowest values in winter. Zn values of different water sources could be arranged in the following order: industrial wastewater (mostorad drain) > sewage water (EI-Kanater El-Kairia (ATS), El-Manzala (ATS), El-Khosos and EI-Gabal El-Asfar drain) > mixed wastewater (Belbese, Shebeen El-Kanater and El-Kalubia drain) > agricultural wastewater [Kafr Hamza, El-Manzala (BTS) and El-Kanater El-Khairia (BTS)].The concentrations of zinc in different seasons ranged between 0.160- 1.203, 0.157- 0.247, 0.154- 0.268, 0.140- 0.247,0.130-0.215,0.110-0.244, 0.136- 0.236, 0.130- 0.238, 0.069-0.212,0.090-0.215,0.099- 0.217 and 0.020- 0.178 mgli forMostorad, El-Kalubia, Shebeen El-Kanater, Belbese, El-Khosos, El-Gabal El-Asfar, El-Kanater El-Khairia (ATS), El-Manzala (ATS), El-Kanater El-Kairia (BTS),El-Manzala (BTS), Kafr Hamza drain and Nile water, respectively.6-CopperThe results show that the concentration of copper in all drains were below the permissible limit given by law 48; 1982. (1.0mgLi)The Concentration of copper took in different drains water sources recorded that the highest values in summer and the lowest values in winter as they arranged in the following order: summer > spring >autumn >winter.These results proved that, the contents of copper in industrial wastewater (Mostorad drain) > agricultural wastewater (EI-Kanater El-Khairia (BTS), El-Manzala (BTS), and Kafr Hamza drain >mixed wastewater (El-Kalubia, Shebeen El-Kanater and Belbese drain) > sewage water (El- Khosos, El-Gabal El-Asfar, El-Kanater El- Khairia (ATS) and El- Manzala (ATS) drains) > Nile water (control) in all seasons.The content of copper in different seasons ranged between 0.253- 0.555, 0.165- 0.355, 0.180- 0.343, 0.174- 0.340, 0.120-0.274, 0.116-0.276,0.173- 0.283, 0.166- 0.290, 0.183- 0.459, 0.200- 0.446,

0.193- 0.396 and 0.080- 0.231 mgli for Mostorad , El-Kaludia, Shebeen El-Kanater, Belbese, El-Khosos ,E1- Gabal El-Asfar, El-Kanater El- Khairia (ATS), EI-Manzala (ATS) El-Kanater El-Khairia (BTS) , El-Manzal (BTS), Kafr Hamza and Nile water. 7- Physical and chemical parameterPhysical and chemical parameter of the collected water sampling in drains showed that , the pH values were within permissible limits level in law 48 , 1982. Also , DO values were loss than of recommended limits level in law 48, 1982 (5 mg1,-1) in all drains except El-Kanater El-Khairia (BTS) and El-Manzal (BTS). While, EC was within permissible limits level in law 48, 1982 . (1.5 dsm-I) in all drains except Mostorad drain, was highest than permissible limit level in the same law .The concentrations of Ca , Mg , K , Na , SO4 and NO3 in addition to , PO4 of industrial and agricultural wastewater only recorded that they were the lowest permissible limits level in law 48, 1982. While, PO4 of sewage and mixed wastewater recorded that they were the highest permissible limits level in law 48, 1982, the values of HCO3 recorded that they were the highest permissible limits level in industrial, sewage and mixed wastewater. COD, BOD and NH4 values recorded that they were the highest permissible limits level in the same law