Yan baizhong and Yu Furong, 2017. Study of fate and transport of chromium in unsaturated zone- saturated zone. *Acta Geologica Sinica* (English Edition), 91(supp. 1): 168-169.

Study of fate and transport of chromium in unsaturated zone-saturated zone

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Effluent irrigation can ease the water shortage area agricultural water shortage，and waste-water recycling，as well as bring a series of scientific and socio-economic issues，such as environmental issues，food safety，sustainable development and so on，which has attracted the attention of people. So，paper to Kaifeng city several important dirt irrigation district for research object，system analysis long-term dirt irrigation conditions soil heavy metal of content and the rich set status，and used within Mei Luo index method on the district soil heavy metal pollution status for evaluation，and research has Cr(VI) in different soil in the of adsorption characteristics，established adsorption dynamics model，and using non-are quality sand box simulation research that when the level changes，Cr(VI) in unsaturated zone-saturated zone interface of points different migration law.

（1）Through the evaluation of water quality revealed in the long-term under sewage irrigation，heavy metals after entering the zone of aeration，and particles of organic matter in surface soil will be adsorption，and reacts with minerals in the soil after the formation of insoluble salts，accumulates in the soil for a long time. Soil pollution index gradually reduced as the depth increases. Index of soil heavy metal pollution in sewage irrigation region in Kaifeng from strong to weak largely followed by Cd>Pb >Cr，Cd and Pb pollution is particularly serious，wastewater irrigation in plough layer soil pollution is most serious，as the depth increases，pollution along with ease. Clear irrigation district of farmland soil in security of grade，soil compared clean，yet was heavy metal pollution；fertilizer River near farmland soil by pollution status serious，and away from river more near pollution index more high，Before 150m are reached has heavy degrees pollution of degree；in away from fertilizer River about 150m of soil profile known，in 0-20cm depth of soil has reached in the degrees pollution，20-30m depth as light pollution，starting from the 50cm depth of soil in a clean state.

（2）Static experiment determination of vibration time，concentration，pH value of soil conditions change state of Cr(VI) the adsorption and absorption rate. Surface soil because by pollution serious，so adsorption effect not is good，oscillation just began stage Cr(VI) from soil in the solutions sucking out，led to solution in the Cr(VI) moments increases，with time over，soil solution in the constantly occurred with adsorption role reconciliation sucking role，adsorption rate gradually formed balance；in research pollutants concentration on soil adsorption effect，soil initial conditions Cr(VI) from soil in the solutions sucking out，appeared "anti-spit" phenomenon，And the absorption rate of the same initial concentration decreases as the depth decreases，along with the original Cr(VI) in solution concentration

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increases，increasing adsorption，desorption is inhibited when the initial solution of Cr(VI) in 80mg·L-1，started to keep forward volatility equilibrium adsorption States；when we studied the effect of pH value on adsorption in soil can be seen，soil adsorption of Cr(VI) in different changes of acid or alkaline solution under different soil Cr(VI) mainly in the HCrO4-adsorbed form，while CrO42- for migration patterns. Dang solution pH value is less than at 4 o'clock，Cr(VI) main to HCrO4-exists solution in the, soil on Cr(VI) adsorption rate and adsorption volume are sharply rose，dang solution pH value in 4-10，adsorption rate is upper and lower floating，but basic balance in a stable of State，dang solution pH value is greater than 10，with pH of increases，solution in the CrO42- constantly increased，is due to soil solution in the negative number of increased，led to soil adsorption volume sharply declined.

（3）Through the soil to the Cr(VI) batch adsorption experiments，Langmuir adsorption isotherm of different soil model，Freundlich model of isothermal adsorption models and Temkin adsorption isotherm，achieved a certain effect，correlation coefficient reaches a certain level. Soil on Cr(VI) of adsorption is physical adsorption and chemical adsorption mutual role of results，different soil on chrome of adsorption can with Freundlich isothermal equation and Temkin isothermal equation is good of description，if to maximum adsorption volume for factors to select words，is consider Langmuir isothermal equation；through established adsorption Dynamics equation，can learned that，with Elovich formula，and parabola diffusion formula，and double constants rate on soil adsorption Dynamics curve for intends collection，Fit are better，reach significant levels. Judging from the fitting，which of the three equations，Elovich formula > parabolic diffusion equation > using dual-constant rate.

（4）By sand box experiment simulation of Cr(VI) in the unsaturated zone-interface migration in water saturated zone in the horizontal direction，Center direction around the same point in time by pollutants Cr(VI) concentrations in turn backward，over time，Cr(VI)-concentrations curves gradually forward from pollution nearer the Centre，Cr(VI) first appeared. Farther from Central pollution，Cr(VI) longer migration time. Vertically，from top to bottom，the Cr(VI) sample holes concentration over time，curves gradually forward and expanding the scope of pollution. Aeration zone in soil Cr(VI) concentration is high，there is a certain closure，Cr(VI) enters the aquifer concentrations are relatively low，from sources farther away，Cr(VI) spread more slowly. Water levels rise，the original becoming saturated in the aeration zone，soil Cr(VI) concentrations，the aeration zone in soil residues of Cr(VI) and spread in the aquifer，causing secondary pollution of the aquifer，in the lower soil layer Cr(VI) concentrations rose slowly. When the water level dropped，Cr(VI) in the presence of gravity as the water level decreases，and when it reaches the aquifer interface starting enrichment. But enough water remains in the soil above a certain concentration of Cr(VI)，pose a threat to groundwater.