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Environmental impact of heavy metals on the soils and plants around a coke-making factory of Jiyuan city, China

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The combustion of coal usually leads to many different kinds of pollution around coke-making factories. Among these pollutions, the heavy metal contamination in the soil and plants is one of the major concerns by people living around. Heavy metals are highly attracted to the biological tissue, and can stay in bodies of organisms for long period of time, causing a lot of hazardous diseases to human beings, animal and plants. In the developing regions of China, developing of industries has been based on the sacrifices of environments and human health. In order to evaluate the danger of heavy metal contamination from a coke factory to citizens of close inhabitants, a survey on soil and plants was conducted in the region around a coke-making factory in Jiyuan city, which is a major electricity supplying city for the Henan Province in China. In this study, 8 surface soil samples and 11 plant samples were collected from 8 different places around the coke-making factory in Jiyuan city. The collected samples are then treated in the laboratory, and 8 types of heavy metals, which include arsenic, cadmium, chromium, cobalt, copper, lead, nickel and zinc, are analyzed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES). The concentration data of heavy metals that collected from the analysis are then used to evaluate their toxicity towards living organisms and ecology by applying several biological effect standards, such as effect-range low (ERL), effect-range median (ERM) and several maximum allowances standards of heavy metal concentrations in soils and plants that established by different countries. Moreover, the relationship between the distance from the factory and the concentration of heavy metals in soils and plants are also evaluated in order to find out the contamination ranges of those heavy metals from the source. The result shows that the concentration of these 8 types of heavy metals in the site exceeds the ERL, with lead being the heavy metals that exceeds the biological effect standards the most. This study suggests some remediate measures that must be made in order to decrease the emission of these elements to meet the national standards. The local government is now realized the problems and begins to limit the emissions and offers medical treatments to kids detected with high blood lead.