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LETTER TO THE EDITOR

Simulation Analysis of Toxic Chemical Material Deposition Process Based on Building Protection

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In order to promote the application of green building materials and prevent the damage to the environment and human body caused by toxic chemical materials in buildings, the simulation analysis method of toxic chemical materials deposition process based on building protection was proposed on the premise of full consideration of building protection. By analyzing the three main toxic components of building toxic chemical materials, formaldehyde, asbestos and stupid, the paper summarizes the influence of the use and waste stages of building chemical materials on the ecological environment. According to the influence status, the deposition process of three main toxic substances in building toxic chemical materials was simulated by using physical meteorological deposition technology and flow tank method. According to the simulation results of the deposition process, a set of reasonable and effective measures to prevent the toxic pollution of construction chemical materials are developed, which can meet the requirement of minimizing the impact on the ecological environment under the condition of building protection.

Building protection; Toxic chemical materials; Sedimentary process; Simulation

1 Introduction

Toxic chemicals in its production, use and accident handling and rescue process, through the building materials can contact the skin, causing poisoning, must take necessary protective measures. The basic principle of the deposition process of different chemical substances in building materials is a kind of mass transfer behavior, but it may show very different process characteristics due to the different system composed of building materials and deposition materials. When evaluating the influence of building materials on the deposition process of toxic substances, 2-chloro-diethyl sulfide, chloroethylphenyl sulfide and diethyl sulfate are the thousand mile simulants that can be selected or used. Many scholars have analyzed the toxic chemical material deposition technology and obtained certain research results.

Ruiping Wu published an article entitled “chemical precipitation for removal of heavy metal ions from industrial wastewater” in the journal of Ekoloji(issue 107,2019).This paper proposes a method to remove heavy metal ions from industrial wastewater based on chemical precipitation method. By using instruments and reagents, through the preparation of heavy metal ion solution, industrial wastewater and adsorbent, the metal ion solution and industrial wastewater are fused. Calcium hydroxide is placed in industrial wastewater solution and reacts directly with its heavy metal ions. Through a series of processes such as decomposition reaction, precipitation and detection of heavy metal ion concentration, the water-insoluble precipitates are finally formed and absorbed by

biofilm adsorbent. The results show that pH value, reaction time, adsorbent dosage and initial metal ion concentration have great influence on the method. The removal capacity of heavy metal ions can be improved by adjusting the influencing factors, which provides a theoretical basis for the practical application of heavy metal industrial wastewater.

Calcium phosphate coating was prepared on the substrate surface of AZ31 magnesium alloy by chemical deposition. (Wu 2015) The phase composition and morphology of the coating were analyzed by XRD and sem. The chemical deposition process of coating and its corrosion behavior in saline were studied by electrochemical noise technique. The results showed that the dense DCPD crystal coating could be formed on AZ31 matrix after 3h chemical deposition. The corrosion rate of coating sample was obviously lower than that of AZ31 substrate. In normal saline, AZ31 matrix will have obvious local corrosion in a short period of time, and the corrosion form is in the form of dispersed multiple corrosion points. (Yang et al., 2017)The coating samples soaked in normal saline for a long time will lead to local corrosion, which will develop along the direction of grinding marks, while the previous local corrosion area will stop to develop.

The computational fluid dynamics method was used to select 5 building models with staggered ratios of 0.0, 0.2, 0.4, 0.6 and 0.8, respectively, to discuss the deposition process of heavy density pollution source (mercury) between buildings with different staggered ratios under horizontal natural wind conditions, as well as the relationship between the mercury concentration of pedestrian layer in the block and the staggered ratio of buildings. (Zhao et al. 2016) The simulation results show that the scattered distribution of buildings in the city block will promote the concentration of mercury pollution sources in the pedestrian layer, and the concentration of mercury in the pedestrian layer will increase obviously. (Herrerafranco et al., 2018)In addition, with the increase of the block building ratio, the street where the maximum mercury concentration value is located is orderly close to the upstream of the incoming flow, while the mercury mass flow of pedestrian layer in the street with higher buildings on the leeward side is obviously higher than that of the pedestrian layer on the leeward side of the street with lower buildings.

In view of the above problems, this paper proposes a method to simulate and analyze the deposition process of toxic chemical materials based on building protection.

2 Idea Description

With the rapid development of national economy and the improvement of living standard and quality of life, people's desire and expectation for improving working, living and living environment are increasingly strong. Accordingly in recent years the standard that the building decorates, class to rise ceaselessly, show ascendant trend. As a result, building materials have been produced, processed and used on a large scale. Among them, there are as many as 1000 kinds of toxic substances, including formaldehyde, benzene, ammonia, total volatile organic compounds and radon, which do great harm to human health and the ecological environment (Zhu et al. 2017). Therefore, from the perspective of building protection, the deposition process of toxic chemical materials is studied and analyzed.

2.1 Analysis of toxic components in building chemical materials

Today, we know that the main toxic ingredients in building chemicals are: formaldehyde, benzene, asbestos and so on.

Formaldehyde is a colorless, soluble and irritating poisonous gas, which is breathed into the body. Modern scientific research shows that long-term exposure to low dose of formaldehyde can cause chronic respiratory

diseases, female menstrual disorders, pregnancy syndrome, resulting in reduced newborn constitution, chromosomal abnormalities. In addition, formaldehyde still has carcinogenic action, according to epidemiologist investigation, the person that contacts formaldehyde for a long time, can cause the cancer of nasal cavity, oral cavity, guttural, skin and alimentary canal.

Benzene is a toxic gas released from paint thinner. If a large amount of benzene vapor is inhaled in a high concentration, it will cause acute poisoning, which is mainly manifested as anesthesia. Severe drug addicts may experience coma, convulsions, pulmonary edema, and cardiac arrest. (Guner et al., 2016)Long-term inhalation of low concentration of benzene, can lead to chronic poisoning, neurasthenia, damage to hematopoietic function, and even cause blood cancer. In order to prevent benzene poisoning, in the process of painting, should pay attention to open doors and Windows, do well ventilated. The new standard stipulates that indoor benzene limits should be less than or equal to 0.09mg/m3(Qin et al. 2015).

Asbestos fibers are dispersed into the air and, if inhaled into the lungs, can cause serious diseases, such as scarring of the lungs, asbestosis and melanoma. When asbestos and its products are damaged due to wear, tear, water erosion or the demolition and alteration of houses, asbestos fibers will be dispersed into the air. When repairing or removing a building, appropriate protective measures should be taken and the asbestos removed should be buried in a licensed place.

2.2 The influence of the use and waste stages of building chemical materials on the ecological environment

Building material USES a phase to basically cause indoor pollution, can make indoor crowd appears “undesirable building syndrome” wait for a disease. In addition, toxic substances released into the environment during the use stage will affect other organisms (animals, plants, microorganisms), making them abnormal, unable to live normally, or even die.

Construction dust, noise, environmental health and other pollution caused by construction are temporary hazards, and most of the construction waste is simply treated as urban garbage. Those toxic substances continue to pollute soil and water, thus causing long-term pollution of soil and groundwater. Because of the different resistance, the organisms have different performance to it, those who do not have bad performance will eventually show the symptoms of victimization due to biological enrichment.

2.3 Simulation of the deposition process of toxic chemical materials under building protection

Physical vapor deposition (PVD) belongs to dry deposition technology (Hua et al. 2017). It is in the vacuum environment, through a variety of evaporation, sputtering, ion plating and other methods, so that the film material in the workpiece surface deposition and get the required film. Compared with chemical vapor deposition (CVD) and solution deposition technology, the main advantages are that the deposition process is easy to operate, the composition of the film layer is easy to control, and there is no pollution of waste water, gas and slag. At present, this technique has been widely used in the preparation of electrical and optical thin films. In recent years, with the rapid development of decoration industry, this technology has been applied in the field of building chemical materials.

The deposition process of three main toxic substances in building toxic chemical materials was simulated by physical meteorology deposition technique and flow pool method. The experimental device is mainly composed of closed sample tank, continuous micro-air flow control system and concentration analysis and detection system. The chemical reagent and material composition system to be tested were placed in the closed sample tank, and methane chloride was used as the absorbent to absorb the substance to be tested in the air stream. The deposition and mass transfer process was carried out in a constant temperature chamber. The air flow control system

provides continuous air flow through the sample tank, and the deposited toxic chemicals to be tested are sent out by the air flow to the analysis and detection system. According to the types of toxic chemicals and the concentration of air flow, the corresponding analytical methods and instruments were selected for detection and analysis. Based on the above analysis and simulation methods, the toxic chemical material deposition process simulation based on building protection was completed.

3 Results

According to the simulation analysis results of the deposition process of toxic building chemical materials, some effective measures for preventing and controlling toxic building chemical material pollution are put forward.

(1) Accelerate the formulation and revision of environmental protection standards for building materials and develop and produce green building materials.

At present, our country building and the environmental protection standard that decorates material originally already cannot adapt building materials market development and the demand of people. To this end, we must speed up the formulation and revision of its relevant environmental protection standards, as soon as possible to draw up to international high standards. We must increase investment, on the one hand, the introduction of foreign new pollution-free production technology of environmental protection building materials, or cooperation with foreign enterprises to develop and produce pollution-free environmental protection building materials; On the other hand, absorbing the most advanced foreign technology, organizing research and development of domestic new pollution-free construction and decoration materials.

(2) Measures should be taken to minimize indoor pollution caused by toxic substances

In order to effectively reduce the damage of indoor pollution caused by building and decorative materials to human body and improve people's health level, we must accelerate the pace of research and work out a set of systematic evaluation standards and methods of indoor pollution caused by building and decorative materials in the shortest possible time.

(3) Strengthen construction control measures. One is to control the entrance of decoration materials inspection, inspection qualified rear can be used; Second is to control the construction process of harmful substances, such as a ban on indoor use organic solvent cleaning construction equipment, banning the use of benzene, toluene, xylene and gasoline oil removal and clean up the old coating operations, coating, adhesive, water treatment agent, diluent and solvent should be closed in time to deposit after use, waste should be cleared in time and indoor construction and so on; Third, the materials used in the construction process should be controlled. In addition to the main materials used in the design, many auxiliary materials should be controlled. For example, benzene, industrial benzene, petroleum benzene and mixed benzene should be strictly prohibited as diluents and solvents.

4 Conclusion

From the point of view of protecting building, protecting ecological environment and promoting sustainable development, this paper puts forward a method of simulating and analyzing the deposition process of toxic chemical materials based on building protection. This paper introduces the composition of toxic substances in building chemical materials and their effects on residents' health and urban ecological environment, simulates the deposition process of toxic substances in building chemical materials, and explores the prevention measures of toxic substances in building chemical materials, in order to provide theoretical basis for building a green and beautiful ecological environment.

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