

Study on Efficient Application and Mechanism of New Environmental Materials in Pollution Control

Rui He

School of Central South University, Changsha 410083, China

Abstract. We believe that with the improvement of people's awareness of environmental protection and the emergence of more new environmentally friendly materials, the problem of pollution caused by building and decoration materials can be effectively alleviated. The advancement of polymer chemistry has made it possible to synthesize nonlinear polymers with star shaped, branched, branched, and cyclic structures. The use of natural minerals for environmental pollution prevention and ecological restoration reflects the characteristics of the natural environment's self purification function. The research on environmental materials has attracted widespread attention from governments around the world, and environmental materials are an important theme in national high-tech development plans. In addition to the mechanical properties of conventional polymer materials, advanced functional polymer materials also have chemical reactivity, photosensitivity, conductivity, catalysis, biocompatibility, bioactivity, pharmacological properties, selective separation and energy conversion etc., they have become an important cornerstone of modern industry and advanced technology. Therefore, this article studies the efficient application and mechanism of new environmental materials in pollution control, and looks forward to the research prospects.

Keywords: Environmental materials, Decoration materials, Pollution, Environmental protection.

1. Introduction

The new environmental materials industry supports the development of human society and brings convenience and benefits to human beings, but at the same time it also brings heavy environmental burden in the process of material production, treatment, recycling, consumption, use, recycling and abandonment [1]. However, when people use a large number of building decoration materials for interior decoration, they often encounter problems such as unqualified and substandard building decoration materials, which not only bring economic losses to people, but also cause serious indoor environmental pollution [2]. We believe that with the improvement of people's awareness of environmental protection and the emergence of more new environmental protection materials, the pollution problem of building decoration materials can be effectively alleviated. With the development of society, conventional polymers can not meet the special needs in some fields, thus promoting the development of new polymer materials with specific functions. Advances in polymer chemistry have made it possible to synthesize nonlinear polymers with star, branched, dendritic, and cyclic structures [3]. The main pollution sources are organic pollutants and heavy metals. The treatment methods for organic pollutants include adsorption method, membrane separation method, ion exchange method, chemical treatment technology and co-precipitation method. Among them, the adsorption method has low cost, simple operation and no need to operate. Secondary pollution [4]. China has listed biotechnology in environmental pollution control as one of the main research fields in this century [5].

With the increasing global environmental pollution, protecting the ecological environment and maintaining ecological balance have gradually attracted people's attention. The use of natural minerals for environmental pollution prevention and ecological restoration reflects the characteristics of the natural environment's own purification function [6]. Research on environmental materials has attracted widespread attention from governments around the world. Environmental materials are an important theme in national high-tech development plans [7]. At the same time, people's requirements for working environment, living environment and living environment are also increasing day by day. Under such high expectations, the building decoration and decoration market is developing in full



swing [8]. Advanced functional polymer materials not only have the mechanical properties of conventional polymer materials, but also have chemical reactivity, photosensitivity, conductivity, catalysis, biocompatibility, biological activity, pharmacological properties, selective separation and energy conversion, etc. They have become an important cornerstone of modern industry and advanced technology [9]. Therefore, this paper studies the efficient application and mechanism of new environmental materials in pollution control, and looks forward to the research prospect.

2. Application of New Environmental Materials in Environmental Pollution Control

2.1 Application of Biological Surfactants for Environmental Pollution Control

Compared with general chemically synthesized surfactants, biosurfactants have good thermal stability, antibacterial properties, selectivity and specificity. It is safe and low-toxic or non-toxic, partially resistant to strong acids and alkalis, has high chemical stability, good environmental compatibility, will not cause pollution or damage to the environment, has diverse structures, simple production processes, low dosage, and is biodegradable [10]. Chemical treatment technology uses chemical reagents, etc. to react with water pollutants to generate insoluble or non-toxic substances, which are separated. There are chemical, electrochemical reduction methods and ferrite methods. Since the pH value in the reaction system will affect the activity of Fe^{2+} , the pH value will affect the Fenton reaction rate. As shown in Figures 1 and 2.

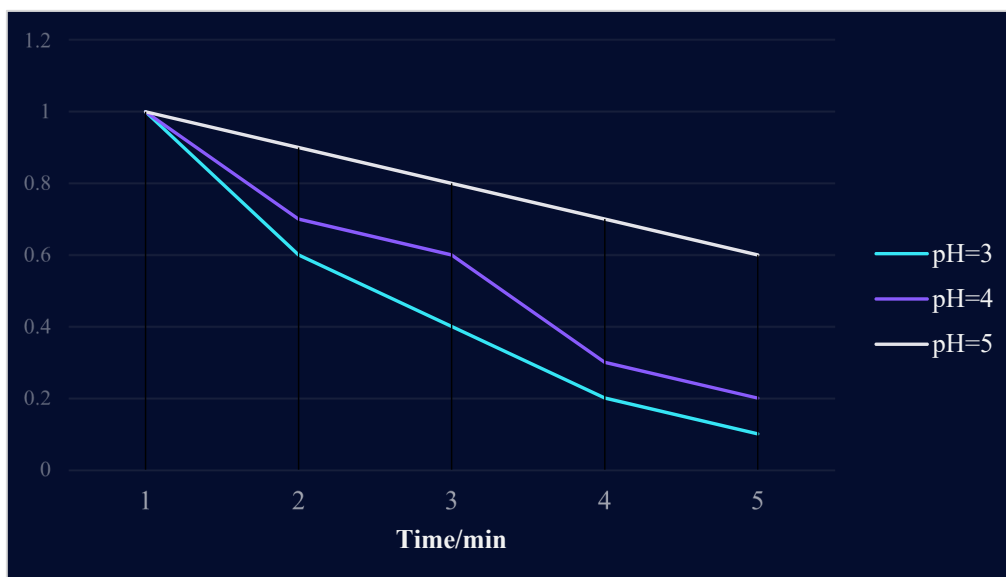


Figure 1 Degradation performance

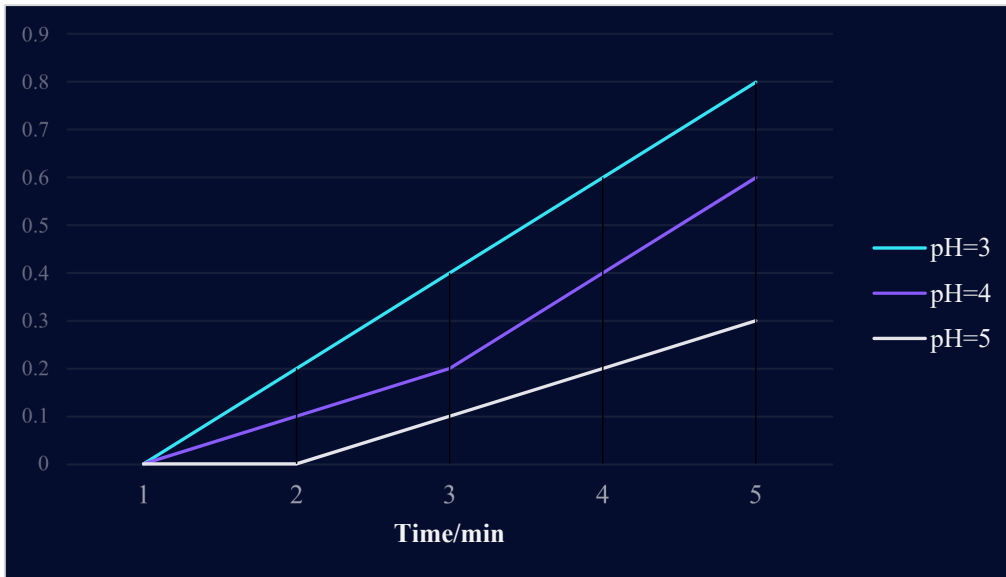


Figure 2 Reaction rate

The precipitation method is to prepare composite oxides containing two or more metal elements by adding a precipitant to a solution containing two or more cations and undergoing precipitation reaction. The preparation is convenient and fast, and the application prospects are promising. In the process of removing heavy metal ions from sodium manganese ore, it is divided into electrostatic adsorption and specific adsorption according to different adsorption methods for heavy metals. The different adsorption methods and structural coordination of heavy metal ions by sodium manganese ore will also cause changes in its fine structure. Environmental materials science integrates the mining, preparation, processing, use, and regeneration processes of materials with ecological and environmental issues, striving for mutual coordination and promotion between the two. The future eco-environmental materials are recyclable, so the effective and reasonable utilization of waste materials will also become a hot topic in the development of materials. In addition, benzene can also irritate the skin, eyes and upper respiratory tract. If it is frequently exposed to benzene series, it may cause skin dryness, allergies and other phenomena, and it may also destroy human immune function, leading to an increase in the incidence of leukemia and cardiovascular diseases.

2.2 Application of microbial fuel cell to control environmental pollution

Taking the treatment of leachate with microbial fuel cells as an example, the leachate contains high concentrations of heavy metal elements, ammonia nitrogen, and other substances, which pose serious hazards to the surrounding soil, water sources, and atmosphere. The use of microbial fuel cells for the treatment of landfill leachate not only achieves good treatment results, but also exhibits excellent resource utilization processes, making it a major research object in the current and future field of landfill leachate treatment. The recyclability and stability of photocatalytic materials determine their practical applicability. The recyclability of this composite material is shown in Figure 3.

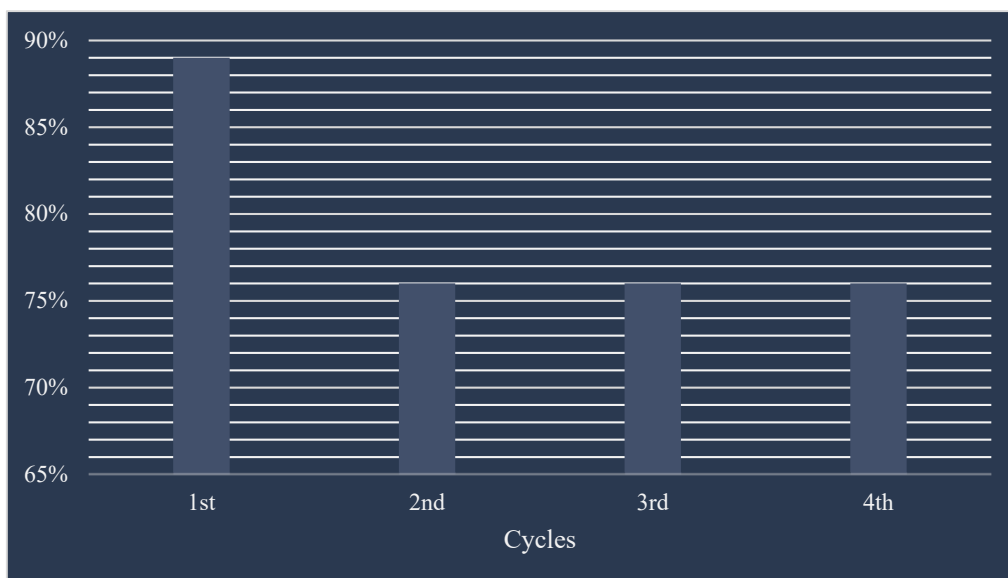


Figure 3 Cycling of Phenol Degradation

Even short-term inhalation can easily cause chest tightness and nausea. In severe cases, it may cause respiratory and circulatory system failure and death. At the same time, benzene is also widely used in building decoration materials, such as coatings, thinners, etc. Under such circumstances, it is difficult to avoid the inhalation of benzene during normal decoration, and synthetic boards have begun to be widely used in the building decoration market. These include synthetic plywood, multi-layer boards, fiberboards, etc., and urea-formaldehyde resin adhesives are mainly used to bond wood. These polymer wastes, such as plastic wastes, will produce a large number of toxic gases during incineration, and particulate matter such as smoke and dust after incineration will cause human respiratory system infection. In particular, chlorine-containing plastics can easily produce strong carcinogens or teratogens in the incineration process, which poses a great threat to the health of human beings and future generations.

3. Environmental pollution control strategy of new environmental materials

3.1 Scientifically formulate the decoration construction scheme

If there are defects in the construction plan for building decoration and renovation, it is highly likely to cause indoor environmental pollution. Therefore, it is necessary to scientifically develop a decoration and renovation construction plan. Therefore, it is necessary to instill advanced design concepts in designers, improve their professional level, and enhance the quality of engineering design. According to relevant information, although the design fee accounts for a very low proportion of the entire project cost, not exceeding 1%, its impact on the project cost is much higher than this 1%, to be precise, it can reach over 75%. Green technology innovation is an important driving force for high-quality economic development, but environmental management system reform is the key to improving environmental pollution control and green technology innovation. The pollution mainly comes from various insecticides and anti disease and antibacterial pesticides. Biological surfactants are used to treat pesticide contaminated areas. It can replace chemical insecticides by transforming and decomposing organic waste into organic compounds with certain insecticidal effects through bacterial transformation, which not only reduces pesticide pollution but also improves the utilization rate of organic compounds. The bischofite and its hybrid compound have a good removal effect on heavy metals, highly polluting printing and dyeing, phenolic wastewater and air purification in water. The development of environmental engineering materials aims at the accumulated pollution problems and develops a complete range of environmental engineering materials. It is also an important aspect of environmental materials to repair, purify or replace the environment, gradually improve the ecological environment of the earth and make it sustainable. In the concrete construction process, it

is required to strengthen the dynamic management of decoration scheme according to the actual situation, so as to avoid or reduce the indoor environmental pollution caused by improper decoration process.

3.2 Properly purchase decoration and construction material

Decoration construction materials are the basic guarantee of decoration engineering construction, but due to their own interests and other factors, many builders choose inferior materials when purchasing decoration construction materials, and the lack of supervision mechanism intensifies environmental pollution. This requires the construction unit to establish a sound construction management mechanism and strictly control the quality of the project. At the same time, a series of measures are taken to reduce the project cost and achieve the highest economic benefit with the lowest possible project cost. Therefore, from the perspective of sustainability, it is necessary to develop biodegradable functional polymer materials such as wood, and biodegradable polymers are a fairly universal substitute for traditional polymers. Among them, biotechnology has gradually taken a dominant position in the field of environmental pollution control due to its many advantages. Biomaterials such as biological surfactants and microbial fuel cells have significant advantages in environmental pollution control. The oxidation of phenol by sodium manganese ore has two mechanisms, one relying on its own oxidation as an oxidant. Another type is the oxidation effect caused by the generation of free radicals on the surface of sodium silicate manganese ore under light conditions, with the latter being more effective. The recycling and utilization of waste plastics has always seriously polluted the environment, and the problem of white garbage has been a persistent environmental issue in cities. Therefore, plastic recycling is of great significance for environmental protection. Relevant departments must establish unified technical standards and regulations for decoration and renovation materials, strictly adhere to the principle of high quality and good price, and price based on quality, in order to effectively control indoor environmental pollution in terms of decoration and renovation materials.

4. Conclusions

In a word, with the improvement of people's economic living standards, the requirements for architectural decoration are also improved, so as to have a higher quality of life. On the other hand, it laid a foundation for the development of enterprises and obtained higher economic benefits. As a new environmental treatment technology, biotechnology and biomaterials have a very broad application prospect and development prospect in the field of environmental pollution control. According to different environmental pollutants and production processes, the technological process combining with practice is developed to provide necessary technological parameters for the industrial application of biscite. Environmental load is regarded as a new index to evaluate materials, which is used to guide the development of green materials and products with environmental awareness. Integrate knowledge of resource efficiency, ecological balance, environmental protection and sustainable development into materials science to protect nature and benefit mankind. In the future use of building decoration materials, we should strengthen the use of green, healthy, and environmentally friendly decoration materials, continuously develop new energy, new technologies, and new products, establish new building decoration concepts, truly create a comfortable environment that is green, healthy, and environmentally friendly, and improve people's quality of life. Controlling the source of some difficult to degrade polymer materials, reducing the use of disposable polymer materials, recycling and reusing waste materials, and creating a harmonious green environment require the joint efforts of people all over the world, which is also the common aspiration of all mankind.

References

- [1] Fan Yujie. (2023). Application practice of new building materials in urban ecological environment construction. *Chinese Construction Metal Structure*, 22(8), 71-73.

- [2] Wu Jianbao, Cao Bo, Huang Xiaoling. (2023). Environmental pollution and prevention of polymer materials. *Contemporary Chemical Engineering Research*, (12), 60-62.
- [3] Xiao Lu, Rong Qun, Bai Xi, et al. (2023). Research progress on ibuprofen adsorption materials for environmental pollutants. *Daily Chemical Industry (Chinese and English)*, 53(12), 1437-1442.
- [4] Li Haoxin, Tai Guoyu, Liu Qi, Wu Guangyu, Cai Zhangzhen, Han Jiangang, and Zhu Yongli. (2022). Research progress of biomass adsorption materials in environmental pollution control. *Chemical Reaction Engineering and Technology*, 38(5), 473-480.
- [5] Ma Bing, Shao Shiwei, Sun Yaping, et al. (2022). Effects of different passivation materials and their combinations on the remediation effect of Cd and Pb contaminated soil and the growth of corn. *Environmental Chemistry*, 41(12), 10 .
- [6] Wang Liuwei, Wang Huixia, Zhao Jinling, et al. (2023). Screening of matrix materials for stabilization of heavy metal complex contaminated soil. *Journal of Environmental Science*, 43(2), 309-316.
- [7] Sheng Aimin, Li Zhong. (2022). Application of gold nanocomposites in catalyzing environmental pollutants. *Shandong Chemical Industry*, 51(14), 3.
- [8] Liang Chao, Mo Qiang, Yang Tianyu, et al. (2023). Research progress of nanoscale zero-valent iron and its modified materials in the remediation of soil organic pollution. *Environmental Pollution and Prevention*, 45(5), 708-715.
- [9] Wu Qiuchan, Wu Jizi, Zhao Keli, et al. (2024). Remediation of cadmium and arsenic composite contaminated farmland soil using biochar and iron-calcium materials. *Environmental Science*, (001), 045.
- [10] Yang Jingmin, Liang Xinran, Jiang Na, et al. (2022). Passivation remediation of cadmium and arsenic composite contaminated soil by combined/modified materials. *Journal of Agricultural Environmental Sciences*, (002), 041.