

Study on the combination characteristics of polyvinyl chloride (PVC), fly ash and antibacterial agent

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폴리염화비닐(PVC)수지, 플라이애쉬 및 항균제의 결합특성에 관한 연구

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Abstract

Polyvinyl chloride (PVC) is the world's third-most widely produced synthetic polymer of plastic (after polyethylene and polypropylene). About 40 million tons of PVC are produced each year. PVC is one of the thermoplastics. It has the characteristics of strength, toughness, easy color development, hardness, softness and not easy to wear. Therefore, PVC resin is often used as raw materials for artificial leather, packaging materials, pipes, electrical insulators, flooring materials and other materials. PVC resin has long been synonymous with plastic. It can prepare all kinds of hard materials, from soft things such as seats, handbags and soft dolls to hard things such as water pipes. Water pipes are divided into metal pipes and non-metal pipes. Metal pipes were often used as tap water pipes in the early stage because of their high mechanical strength and semi permanent durability. However, due to the poor corrosion resistance and heavy weight of metal pipes, it is difficult to process and transport, so PVC pipes are very popular recently. In addition, other researchers reported that 48% of water pipes were spun cast iron (and 19% ductile iron), and that these were considered the most susceptible to corrosion in 1992. The most recent statistics for Australia, suggest that there is around 260,000 km of pipelines used by water utilities, and around 80% of these are buried - of this >70% are of some form of ferrous metal, with the most critical transmission mains generally constructed of ferrous metal; i.e. around 150,000 km for a population of around 22 million. Moreover, recently, with the development of nanotechnology, the preparation of water pipes with antibacterial properties by using nano antibacterial agents has also attracted extensive attention. Over the past few years, the broad-spectrum antibacterial properties of silver have received widespread attention. The application of silver for water treatment mainly includes the following two ways: directly use silver ions (Ag⁺) as disinfectant, and load silver on the carrier as antibacterial material. Ag⁺ was suitable as secondary residual disinfectant.

In this study, in order to study the combination characteristics of PVC resin, fly ash and antibacterial agent, so as to lay a foundation for the future study of the antibacterial characteristics of the PVC composites, the PVC, fly ash and antibacterial agent were dissolved in dimethylformamide solvent according to a certain mass ratio. After 24-hour magnetic stirring, the mixed solutions were added into the mold prepared in advance for forming. The morphology and the crystal structure were investigated by scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS), X-ray diffraction patterns (XRD) and Fourier transform infrared spectroscopy (FT-IR).

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