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Discussion Based on the Promotion Effect of Green Chemical Engineering and its Process on Energy Conservation and Emission Reduction in Chemical Industry

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Abstract: This article introduces the connotation of green chemical engineering, and summarizes the development and application of green chemical engineering and technology. This article also summarizes the promoting effect of green chemical engineering and technology on energy saving and emission reduction of chemical industry in the end.

Keywords: Chemical Industry; Green Chemical Engineering and Technology; Energy Saving and Emission Reduction

Introduction

The chemical industry is an important pillar of the industrial system of human society and an important "booster" of material civilization. It plays an important role in enriching the material wealth and spiritual wealth of human society. However, while the chemical industry is advancing the progress of human society, the pollution problems that it brings have also brought a variety of problems to the natural environment. Therefore, in the process of human society development, the "two-sidedness problem" brought about by the development of the chemical industry cannot be ignored, and it also brings challenges to human society[1]. Research on green chemical engineering and technology in the context of "green production" and "energy saving and emission reduction" has a positive effect on promoting the green development of China's chemical industry and reducing the impact of the chemical industry on human society and the environment.

1. The connotation of green chemical engineering

The green chemical engineering refers to the process of chemical production using green environmental protection technology and other green production processes in the R & D and production of chemical industrial products. In academia, green chemical engineering is called "environment-friendly chemistry", "green chemistry" and "clean chemistry". Different from traditional chemical engineering, green chemical engineering attaches great importance to fine-grained control of pollutant emissions at various stages of chemical production, and effectively prevents the various processes of chemical raw material collection, processing, configuration and application. Zero emissions of pollutants. Green chemical engineering lies in fully digging out the maximum efficiency of raw materials and energy, releasing the potential of raw materials and energy to the greatest extent, and seeking the best reaction path. Green and clean production processes are used in all aspects of production to avoid all-round pollution emissions[2]. Green chemical engineering is to introduce "ecological thoughts", "green production concepts", and "environment-friendly concepts" into traditional chemical industry production. Green production technologies and clean energy are used as far as possible to avoid pollutant emissions and reduce or eliminate chemical pollution problem. It can be said that the ultimate purpose of green chemical engineering is to build a green chemical industry system that has no pollution to the natural environment, human society, and the ecological environment and does not cause negative effects[3].

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2. Application and development of green chemical engineering and technology

With the continuous increase of human society's material needs, the pollution problems caused by chemical engineering have affected the normal life of human beings. Although the discharge of pollutants has been effectively controlled, the "micro-pollution" problems brought about during the development of the chemical industry still affect with the normal development of human society, and the pollution rate of chemical engineering is much faster than the speed of pollution control, it is inevitable that the cost of pollution control will rise rapidly, and the pollution control will become more and more difficult. However, the green chemical industry and processes have changed the traditional chemical industrial product production model, using non-toxic and harmless production raw materials to carry out production under non-polluting reaction conditions, minimizing pollutant emissions during the chemical reaction process and having high options. To minimize waste generation and its impact on the natural environment[3]. In order to achieve zero emissions throughout the production process of the chemical industry, to achieve green production, to eliminate pollution problems in the use and development of chemical raw materials. The specific implementation methods of green chemical engineering and technology in the production process of the chemical industry are divided into the following.

2.1 Guarantee the use of green production raw materials

In the development of the chemical industry, the choice of chemical raw materials determines the quality of chemical products and the safety and environmental protection of chemical production. Green chemical engineering and technology need to choose non-toxic and harmless raw materials for production, and non-polluting chemical raw materials are also the key content of the development of green chemical industry. In the current development of the chemical industry, people use a large number of non-toxic and harmless chemical raw materials with environmental protection characteristics as the research direction of key industries, and a large number of renewable biomass resources are used as raw materials for chemical production[4]. For example, using biomass resources and crop resources as raw materials for chemical industry production, or using some natural degradable products to extract chemical industry raw materials through biological reactions, and relying on biochemical technology to extract the chemical raw materials that people need in the biological reaction process To ensure that the chemical production process is clean and free of pollution.

2.2 Greening as the use of chemical catalysts

With the rapid progress of chemical industry technology in recent years, ensuring the rationality, safety and greenness of chemical reactions has become an important factor to promote the development of the chemical industry. The development of the chemical industry is inseparable from the support of catalysts. The rational use of catalysts can not only accelerate the chemical reaction rate, but also promote the more applicable chemical reactions, improve the production efficiency of chemical products, and reduce production costs. Therefore, the use of green catalysts in the development of green chemical engineering and process applications can fundamentally remove pollutants and minimize the impact of chemical production on the environment[5]. At present, chemical catalysts with green environmental protection characteristics have been widely used in chemical production processes. For example, in the refined production process, safe solid catalyst molecular sieves and heteropoly acids have been widely used instead of traditional highly corrosive catalysts, which not only makes production. The process is simpler and more efficient, and it can produce high-quality chemicals.

2.3 Guarantee the use of green solvents

During the development of the chemical industry, the use of a large number of solvents and various obstacles in the production of chemical products are needed in the production of chemical products. However, some solvents and boosters are highly polluting and often bring environmental problems. Greater pollution. Therefore, the development of environmentally friendly solvents and additives is of great significance to promote chemical production. Scientific green solvents and auxiliaries can not only improve the chemical reaction efficiency, but also lower energy consumption, better reaction effect, more effectively promote the decomposition of chemicals, and more effectively protect the

environment[6]. For example, solvents or reagents with green environmental protection characteristics have been developed as typical ionic liquids. Applying them to chemical reaction processes can create a new reaction environment for the production of chemical products and ensure the separation of useful chemicals and byproducts .

2.4 Ensuring the use of green energy

The process of chemical reactions is also a process of energy transfer. Chemical reactions require not only specific raw materials, but also effective energy. However, in the production process of chemical products, if the chemical reaction is an endothermic process, it is necessary to add heat to each step of the chemical reaction to accelerate the efficiency of the chemical reaction. If the chemical reaction is an exothermic process, it is necessary to protect the heat in advance to ensure heat can be quickly released[6]. Similarly, in the process of chemical separation and purification, operations such as rectification, extraction, recrystallization, and ultrafiltration are required. These operations will consume a large amount of energy, either endothermic or exothermic. Therefore, the use of clean and pollution-free energy for chemical and chemical production has become an important goal for the development of green chemical engineering and processes. At present, the cleaner energy sources used in the production process of the chemical industry are electric energy, light energy, ultrasound and microwave. For example, in the process of electrocatalytic reaction, using vitamin B12 as a catalyst can ensure that no toxic and harmful substances are generated in the chemical reaction process, and energy can be saved.

3. Green chemical engineering and technology promote the energy saving and emission reduction of the chemical industry

With the rapid development of China's chemical industry in recent years, green chemical engineering and processes are mainly used in clean production technology, biotechnology production and green chemical product production.

3.1 Application of cleaner production technology

Clean production technology is mainly used in the development of the chemical industry in the production of clean chemicals and the use of clean energy. In the construction process of green chemical industry, green chemistry mainly pursues clean production. In the production process of chemical industrial products, try to use non-toxic raw materials, use green production technology without waste, and apply high-efficiency chemical production equipment to change the conventional chemical production methods to avoid pollutant emissions. For example, the production process of high-temperature, high-pressure, flammable and explosive chemical products is changed to a simple and easy-to-control chemical production method to avoid the impact of dangerous factors on chemical production[6]. The current cases of widely used cleaner production technology in the production process of the chemical industry: the use of cleaner production technology for phosphate fertilizer production, improvement of the chemical production process of ammonium phosphate, and the realization of green production of ammonium phosphate, etc. It can minimize the discharge of pollutants and harmful substances in the production process of the chemical industry, and also effectively realize the greening of chemical production and effectively protect the ecological environment.

3.2 Biotechnology production

In the development of the chemical industry, green chemical process technology is often used in conjunction with biotechnology. Biorefinery technology is used to convert renewable energy into chemical raw materials, and then produce chemicals that meet the needs of the chemical industry. Chemical raw materials obtained using biotechnology have more advantages in material properties and catalyst reactions than traditional raw materials produced in the chemical industry, and are environmentally friendly and low in energy consumption[7]. Biotechnology makes chemical production more efficient and opens a new path for the development of bioenergy and chemical industries. For example, using rapeseed, soybean, sugarcane, corn as raw materials, combined with biotechnology, and using gene combination methods, it can produce important chemicals such as propylene glycol under aerobic conditions.

3.3 Production of green chemical products

In the development of the chemical industry, the use of green chemical industries and processes can produce chemical industry products that meet the development of a green and harmonious society. These green chemical

industrial products have extremely wide applications in social life. Such as the use of environmentally friendly refrigerants instead of traditional Freon, will not cause pollution to the atmosphere, and will not have side effects on the ecological environment[8]. In 2007, the World Environmental Protection Agency has approved the use of new fumigant vapor pesticides instead of traditional chemical pesticides, which not only have more insecticidal effects but also do not cause atmospheric pollution[9].

4. Conclusion

In the current development process of green chemical engineering, green is environmentally friendly for chemical production and the raw materials are used from the source of chemical product for production, and clean production technology is also used to produce green control in the production process of chemical industrial products, which can reduce the generation of by-products and reduce pollutants. Emissions, and effectively protect the ecological environment[10]. Therefore, advancing the development of green chemical engineering and process technology can promote the development of modern chemical engineering. While protecting the natural ecological environment, which also promotes the sustainable development of human science.

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