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Emission control of pollutants in waste incineration power generation process

Sifang Kong^{1,2}, Jianlin Sun^{1*}, Xueqin Cheng³

¹School of Traffic & Environment, Shenzhen Institute of Information Technology, Shenzhen 518172, China.

²Shenzhen Key Laboratory of Circular Economy, Shenzhen Graduate School, Peking University, Shenzhen 518055, China.

³Shenzhen Shanshuile Environmental Technology Co., Ltd.

ABSTRACT

The waste incineration power generation is not only an effective measure to deal with the urban domestic garbage, but also can realize the supplement of the urban electric energy resources. Because of the complexity and diversification of the municipal solid waste in our country, there are different and complex chemical reactions in the waste incineration process. The reaction itself has a direct hazard to the human body and the environment, especially the highly toxic dioxins, which is a key factor to hinder the development of the waste incineration power generation technology. In order to better improve the comprehensive benefit of the waste incineration power generation, this paper briefly analyzes the emission control of the pollutants in the waste incineration power generation process, and hopes to provide theoretical help to the relevant workers.

keywords: Waste Incineration; Power Stations; Pollutants; Emission Control

*Correspondence to Author:

Jianlin Sun

School of Traffic & Environment,
Shenzhen Institute of Information
Technology, Shenzhen 518172,
China.

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1. Introduction

With the continuous development of the national economy and the continuous improvement of the quality of life of urban and rural residents, the annual production of domestic waste in our country is in a fast-growing state. There is a need for a large amount of land resources in the way of life, landfill and composting, but the limited resources are clearly unable to meet the growing volume of waste. Therefore, it is very important to strengthen the power generation technology of the waste incineration, and it is the key to solve the increasing of the living garbage. The waste incineration data is a process of high-temperature decomposition and deep oxidation, the treatment amount is relatively large, the reduction capacity is good, no direct harm is realized, and the released heat energy can also be recycled. However, secondary pollutants will be present in the waste incineration process, which can lead to the deterioration of the environment. In this paper, the paper discusses the practical value of pollutant emission control in the waste incineration power generation process.

1. Main pollutants of waste incineration power generation

Waste incineration power generation, though it is an effective method of reduction treatment, can reach a certain degree of resource utilization and innocent treatment, but because the type of domestic garbage in our country is much more, The formation of a number of chemical reactions during the incineration of the waste will cause serious damage to the human body and the environment. According to the special properties of the pollutant, it can be divided into heavy metal, particulate matter, acid gas and organic pollutant^[1]. the prevention and treatment of secondary pollutants caused by the burning

of the waste during the power generation of the waste incineration are also very important, and if the secondary pollution is not effectively treated in time, the secondary pollution can be caused, and the harm of the pollutant to the human body is higher, in particular under the influence of the haze pressure, It is very important to strictly control the emission of waste incineration power. At present, the pollutants from the waste incineration power generation mainly include sulfur dioxide, hydrogen chloride, nitrogen oxides, heavy metals and dioxins.

2. Waste incineration power generation process pollutant emission control measures

2.1 emission control methods

first of all, it is necessary to do a good job of source control. In the process of waste incineration and power generation, the formation of dioxin has a great influence. In the process of primary waste classification and processing, the content of heavy metals and chlorine can be reduced, and the brightness of dioxin can be reduced to the greatest extent. A combustion test was carried out on the composition of simulated waste. It was proved that the chloride in flue gas belongs to the main chlorine source of dioxin, and there are a lot of chloride in the waste. The more common chloride involves polyvinyl chloride, polystyrene and KIC ^[2]. In this regard, it is very important for garbage classification and collection, which can better ensure the new effect of resource recovery. By using the way of waste incineration pretreatment, the substances with high chlorine content and metal catalyst can be used to reduce the formation of subsequent pollutants. Secondly, do a good job of combustion furnace control. In the aspect of furnace structure, the incinerator used in China mainly involves circulating fluidized bed, mechanical furnace exhaust furnace, rotary kiln,

vaporization pyrolysis furnace and so on, which is mainly used in circulating fluidized bed and grate furnace. The fluidized bed boiler has relatively good adaptability to garbage, the effect of heat and mass transfer is relatively good, the particle disturbance in the furnace is relatively violent, the waste with low calorific value and high moisture can also be effectively burned, and the pollutants in flue gas can be reduced to the greatest extent. In most waste incineration power plants, fluidized bed boilers are the main ones, but the fluidized bed needs to strictly control the quality and size of waste particles in the furnace, the waste must be pretreated, and auxiliary fuel is generally needed, which will also lead to the increase of the overall operating cost [3]. Grate furnace is a relatively mature way of technology, which has a high combustion rate and can be effectively used in incineration of waste with relatively high calorific value and large waste incinerator. However, this type of furnace with relatively high pre-furnace investment, combustion conditions are difficult to effectively control, can not ensure the complete decomposition of dioxins, so this type of furnace must be equipped with flue gas purification equipment. According to the theory of combustion control, the waste can be transformed into combustible gas under certain conditions, and the combustible gas can be fully burned in high temperature environment. With the help of waste heat boiler, the heat can be recovered and reused, so the pollutants in this kind of furnace are relatively small [4]. In addition, inhibitors can be added to the combustion furnace. In the process of waste incineration power generation, the formation of dioxin can be effectively inhibited by the addition of inhibitors. There are three main additives, the first is to reduce the formation of Cl₂, promote heavy metal catalyst

poisoning sulfides. When sulfur is contained in coal, it can promote the formation of less dioxin in the combustion process of coal. The second kind is nitride which is derived from SNCR denitrification reaction. Nitrogen can control NO_x and HCl, reduce the chlorine source involved in the reaction, and thus control the formation of dioxin. The third is alkaline compounds, which can effectively reduce the emission of acidic gases and inhibit the formation and emission of dioxins in the brain. Alkaline adsorbents can effectively neutralize acid gases in flue gas, so that gases react accordingly, thus reducing dioxin emissions.

2.2 Pollutant control method

during waste incineration and power generation, not only dioxin will be formed, but also heavy metals, particles and acid gases will be formed. The treatment of particles and heavy metals is relatively simple, and the treatment of heavy metals and the control of material content can be realized at the source. In the aspect of waste incineration, bag precipitators are required to be equipped in the smoke stomach gas purification device. This kind of dust collector can sun out fine particles within 1mm. The treatment temperature of bag dust collector is relatively low, and the heavy metals in tail gas can be removed by filter cloth after reaching saturation. If activated carbon is injected into bag dust collector, heavy metals in tail gas can be further removed, and acid gases such as SO₂, HCl in tail gas can be removed by dry method, semi-dry method and wet method. In the dry process, the dry cleaning method mainly uses compressed air to spray the alkaline solid powder into the flue and its reactor. The alkaline powder can be in contact with the acid gas driven by the air flow. At this time, the acid gas can be removed after neutralizing with the acid gas. Dry technology

will not involve sewage discharge, but the removal efficiency can reach 70%, but it still does not meet the environmental management standards. The semi-dry washing method is mainly to mix CAO into powder CO (OH) 2 and a small amount of water, and spray cooked lime pulp into the tower to promote the effective contact and neutralization between lime slurry and flue gas. The contact area of washing gas and liquid in semi-dry process is relatively large, which can effectively neutralize acid gas. Because the moisture in lime mud can evaporate effectively in the tower, no waste water will be formed. The dosage of semi-dry technical drugs is relatively small, and the removal efficiency can reach 90% or higher, which is one of the important ways to remove acid from flue gas. The rule of wet gas washing is the building packing absorption tower, in which the flue gas can be convective with the alkaline solution, and the contact and reaction can be formed to realize the absorption and neutralization of acid gas in the tail gas. The wet gas washing method can achieve ideal deacidizing effect, but the removal rates of SO₂ and HCl are different, about 90% and 98%, respectively. However, a large number of polluted water is discharged, which may lead to secondary pollution, and the investment and operation costs are also high. In the application of specific technology, the most suitable scheme should be selected according to the actual situation to improve the comprehensive benefit of pollutant control.

3. Summary

as the progress of urban construction is increasing, the importance of waste incineration power generation is increasing. In this paper, the emission control measures such as the dioxin, the acid gas and the particulate matter in the waste incineration power generation process are

briefly analyzed. In the future, it is necessary to carry out the targeted control according to the main pollutants in the waste incineration power generation process, for example, the source control, the intracranial control and the external control measures should be made for the dioxin, and the formation and the discharge amount of the pollutants can be reduced as much as possible. And the comprehensive benefit of the waste incineration power generation is improved, and the development of the urban construction is continuously promoted.

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