

Study on the Environmental Materials with the Disposal Measures of the Benzene Leakage Accidents

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Abstract. In recent years, the higher frequency occurrence of benzene leakage accident brings great harm to the country and people's life and property. This paper analyses the types, hazards and accidents measures to dispose of dangerous chemical accident.

Introduction

Benzene is important petrochemical materials, which is mainly used in the industry of pesticides production, dyes and explosives manufacturing. In recent years, benzene is widely used in industrial production, as a result, in the process of production, storage, transportation and use of benzene, the benzene leakage accident happen from time to time. Benzene has flammable and toxic properties, once the container and pipeline are broken because of an explosion and fire, benzene will leak out. the leaked benzene also can burn and explode. The continuous benzene leakage accident resulting in a large number of casualties and severe economic losses to the people's life, economic construction and influence in politics. For example, on November 13, 2005, there was an benzene leakage and explosion accident in the double benzene plant of Jilin Petrochemical Company. In the process of accident, 5000 tons of water and 28 tons of foam were consumed, the leaked benzene and the fire water are discharged into the Songhua River. Consequently, it caused serious water pollution and brings about significant environmental pollution accident.

Benzene accident type

Fire accident. Benzene is a flammable and explosive substances, it immediately burn or explode after it occurs leakage if it meets the fire source.

Poisoning and pollution accident. Benzene is toxic, people breathe or skin of the body contact will appear headache, nausea, vomiting and other symptoms of poisoning, and it has the carcinogenic risk. If benzene flow into the water and permeate the soil, it will cause the serious ecological environment pollution.

Benzene leakage accident harm

In the past few years, the use of benzene increases considerably, so the frequency of leakage and explosion accident increases, which has brought human numerous casualties and huge economic losses. At the same time, the accident can cause serious environmental pollution, posing a great threat to the sustainable development of human society. The frequency of benzene leakage and explosion accident increase because of its wide variety ,its extensive range of usage and

circulation; Benzene leakage accident has the characteristics of fast spreading speed , wide impact scope, high toxicity and it is difficult to cope with and decontaminate.

The environmental materials

The elimination of harm caused by dangerous chemicals accident is an important link in disposal of chemical accidents, and decontamination is elimination of toxic hazards and pollution area. The dangerous chemicals accident can be achieved to reduce the harm according to physical decontamination method handled by activated carbon absorption .

Activated carbon is a carbon material (coal, shells, wood shavings, etc.) made of hydrophobic adsorbent, including granular activated carbon and pulverous activated carbon. It is a kind of environmental material. It can absorb: pesticides, aromatic hydrocarbon organic matter and color material ,etc. Particle size of granular activated carbon is 1.5~ 3mm,which is used to advanced treatment after conventional treatment in water works and pollution accident disposal (granular activated carbon filter dam, etc.).Pulverous activated carbon of 200 mesh or 325 mesh (coal char)and 100 mesh (wood charcoal) is used for water intensive preprocessing (before coagulation dosing) and short-term water quality deterioration in water works.

In the urban water supply emergency treatment of the Songhua River water pollution accident, multiple security barriers of the emergency response process are formed by the pulverous activated carbon and granular activated carbon, namely pulverous activated carbon is thrown in the intake. Activated carbon for the dangerous chemicals accident is able to regenerate. Activated carbon regeneration is to use physical or chemical method without destroying its original structure to get rid of the adsorbate in activated carbon microvoid and restore its adsorption performance. Regenerative activated carbon can be reused.

The characteristics of benzene leakage accident

Benzene is vulnerable to occur fire and explosion accident. Benzene immediately burn or explode after it occurs leakage if it meets the fire source.

Benzene has the danger of poisoning. Benzene is toxic, if people breathe or the skin of the body contact ,people will appear headache, nausea, vomiting and other symptoms of poisoning, and it has the carcinogenic risk. Health hazards of different concentrations of benzene vapor on the body.(See table 1).

Table 1 The hazards of benzene vapor on the body

Health hazards of different concentrations of benzene vapor /ppm	/(mg/m ³)	The contact time	The reaction
19000~20000	61000~64000	5~10	Death
75000	24000	30	Life risk
1500	4800	60	Severe symptoms of poisoning
500	1600	60	General poisoning symptom
50~150	160~480	300	Headache and fatigue

Benzene is easy to cause environmental secondary disasters. When benzene occurs leakage or explosion, the leaked benzene or the mixed material or after the explosion can pollute the atmosphere, water and soil. If benzene flow into the water and permeate the soil, it will the cause serious ecological environment pollution.

The disposal measures of benzene leakage accident

Because benzene is flammable and toxic, the accident central area should forbid fire and cut off power supply. The firemen should use special protective clothing and isolated air mask. They should train strictly to properly use and adapt, and the firemen should be covered with the water gun and water cannon.

Table 2 Personal protection grade

Level	Form	Chemical protective clothing	Protectiveclothing	Protective mask
One level	Whole body	The built-in heavy anti chemical clothes	Cotton anti-static inner, coat , gloves, socks	Positive pressure air breathing apparatus
Two level	Whole body	Closed chemical protective clothing	Cotton anti-static inner, coat , gloves, socks	Positive pressure air breathing apparatus
Three level	Breathing	Simple chemical protective clothing	Battle suit	Simple canister and mask

The control measures of benzene leakage. The firemen should close the valve and stop the operation process to reduce load operation. When the benzene leakage occur in the tank area, The firemen should close the valve to prevent the material outflow along the ditch. The spray water flow to the poisonous and harmful gases leakage can accelerate the air diffusion. The environmental materials can be falled into the pits to absorb benzene. The operation can change benzene to low toxic or non-toxic substances.

The explosion disposal measures after benzene occurs leakage. When benzene occur leak , benzene can occur explode. The firemen should actively take the command to quickly cut off the leakage. At the same time, the firemen should take self-protection measures. They should wear protective masks and special protective and so on. The commander should control fire range when the fire breaks out. The fire force should use the cooling and dilution protection measures to prevent the benzene spread after the fire and the explosion. To prevent fire, endangering the adjacent facilities, The fire force shall take measures to cool the surrounding facilities and set water curtain or steam to reduce the concentration of benzene.

Conclusion

With the social and economic progress, the environmental materials based on the benzene leakage accident disposal will be more and more advanced. When the environmental materials are more advanced, they will play more and more important role. The country should actively promote the relevant knowledge of benzene safety and environmental protection in the whole society to enhance the understanding of the public on the benzene hazards and safety protection measures.

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