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Analysis of Pollution Control on the Construction of Garden Green Space in Petrochemical Enterprises

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According to the production characteristics of petrochemical enterprises, this paper puts forward the control ability and the reduction ability of the environmental pollution of the plant area. It is the important goal of the construction of the garden green space for the petrochemical enterprise. It is also the key content of the research on the construction plan of the petrochemical enterprise garden green space. The latest plant ecological restoration theory and related technology are the direction for the aspects of pollution control, water pollution control, soil pollution control and air pollution and noise pollution control. The use of plants combined with the engineering design examples.

1. Introduction

The petrochemical production is the industrial production of petroleum raw materials. The production process produces a variety of pollutants (Qian et al., 2010; Liu et al., 2010). The main air pollutants are sulfur oxides, nitrogen oxides, hydrocarbons, CO and odor substances, followed by dust, ammonia and organic acids, etc. In this process it also produces waste water, alkali, waste acid, waste water in the main pollutants from the residue products. And it also produces organic matter, oil, suspended solids, acidity, suspended solids. Waste residue mainly from the cold water tower and water treatment sludge and dehydrated waste residue. These pollution sources have a wide distribution and complex emissions. The impact of all-round, comprehensive and dual on the ecological environment cannot be ignored. Figure 1 shows the production of petrochemical enterprises in the process of a series of problem, which seriously restricts the construction of petrochemical enterprises and sustainable development (Zhou, 2012; Cong et al., 2012).

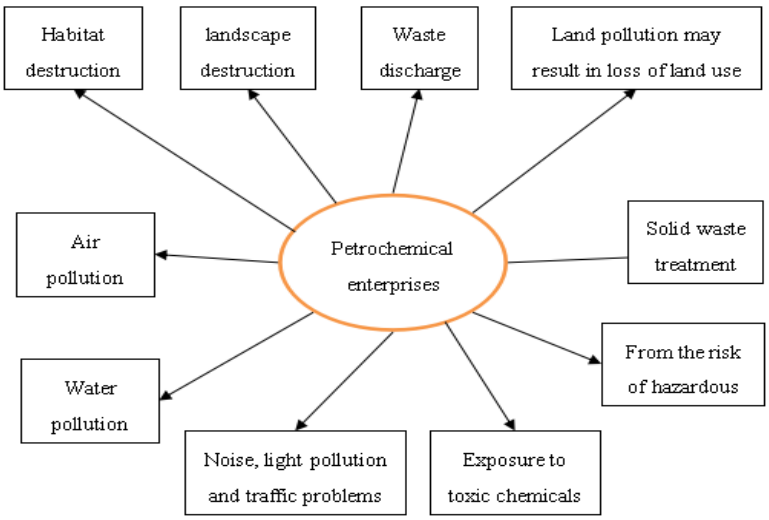

Figure 1: The influence of environmental protection on the production process of petrochemical enterprises

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In order to eliminate and reduce environmental pollution, people generally take three measures (Yamamoto et al., 2013;): (1) Improve the production process, installation of purification, filtration, recycling equipment to protect the environment; (2) In the industrial enterprise planning and layout, according to the local wind direction, terrain, water flow we need to deal with industrial production land and other land location relationship; (3) According to the production characteristics of industrial enterprises, we choose anti-pollution tree green plant to build health protection forest.

2. Theoretical basis of ecological green space system construction in petrochemical city

The theoretical basis of ecological green space system construction in petrochemical city is ecology. Ecology also includes the following:

(1) Ecosystem theory (Müller, 2012)

According to Ehaekcel's definition, ecology is a science that studies the interrelationships between the creatures and the environment. And the ecosystem (Ecosysetm) is the habitat of all living creatures (ie, biological communities) and their environment. The unity of material circulation and energy flow is considered to be the most important concept in ecology.

(2) The principle of ecological balance

Ecological balance means that the energy flow and the material circulation in the ecosystem are always carried out smoothly under normal circumstances (without severe interference from external forces). While the structure of the ecosystem remains relatively stable (Klijn and Haes, 1994; Bergkamp, 1995). It is a kind of dynamic equilibrium. In the ecological construction of green space, the leading role of ecological balance principle should be emphasized. It pay attention to the relationship between urban functional zoning and it focuses on the ecology of the whole city environment and rational layout. As a result, the urban green space is not only around the city, but also the introduction of natural into the city maintain the ecological balance of the city. In recent years, many cities in China, such as Beijing, Tianjin, Hefei, Nanjing, Shenzhen and other cities have begun to combine the combination of forest gardens, urban green area. It expands the three-dimensional ecological construction approach.

(3) Principles of biodiversity

Biodiversity refers to the combination of various organisms. And their ecological complexes with the environment and their various ecological processes are the basis of the survival and sustainable development of human society. Due to unreasonable development and utilization, especially the ecological damage and pollution of habitats, biodiversity has continued to decline. Urban landscapes are one of the last bastions of native plants and native biodiversity conservation. Biodiversity is the basis for improving the greenland ecosystem function and greenland ecosystem health.

(4) Niche theory (Kylafis et al., 2011; Kylafis and Loreau, 2011)

The concept of niche is the function of a species in the ecosystem and its position in time and space. It reflects the relationship between species and species, species and the environment. In the construction of urban green space system, the selection and arrangement of green plants is very important, which is directly related to the ecological function of green space system and the value of landscape aesthetics. In the construction of urban green space system, we should fully consider the niche characteristics of the species. And we choose the type of plants rationally. It avoids the direct competition between species, which is the form a reasonable structure and functional and stable community structure. In order to complement each other, both the full use of environmental resources. However, the formation of beautiful landscape is also used.

3. Results and discussion

3.1 Water pollution control actuator selection

In the serious pollution natural waters refinery establishes artificial wetlands. The artificial wetlands designs a regulating pool and five units in series. The design area is 500 square meters and the artificial wetland bed design depth is 1 meter. The substrate design depth is 50 cm. The substrate is the fine sand. Wetland plants is the main body. Artificial wetland sewage treatment process is shown in Figure 2.

The results are shown in Table 1. The results showed that the wetland plants could remove the pollutants in the sewage through absorption, adsorption and enrichment. The nitrogen in the wastewater is in the form of organic nitrogen and inorganic nitrogen, in which inorganic nitrogen is used as a nutrient for plant growth. And it is absorbed by plants in the form of ions. Some organic nitrogen is decomposed by microorganisms. It is absorbed by plants. As a result, synthetic plant organisms are removed in the form of harvest. Inorganic phosphorus in wastewater is also absorbed by plants. Plants can directly absorb water-soluble heavy metals through the roots.

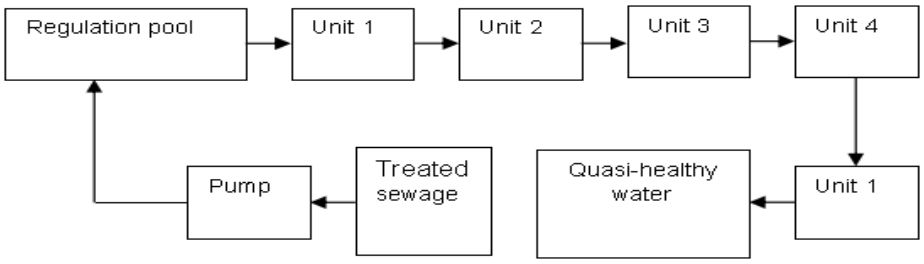

Figure 2: Technological process chart of artificial wetland

Table 1: the change of water quality at a capacity

Index	Water in	Water out	Removal rate
NO3-	1.536±0.341	0.605±0.043	60.57
NH4+	0.026±0.005	0.013±0.001	51.26
TN	2.412±0.866	0.889±0.133	63.12
TP	0.067±0.003	0.040±0.014	40.74
SS	27.000±4.240	not detected	100
KMnO4	4.369±1.126	1.282±0.055	70.67
BOD5	2.810±0.795	0.746±0.029	73.45
COD	29.572±3.217	5.005±1.930	83.07

3.2 Soil pollution control

Planting soils are resistant to petroleum substances on contaminated soils. They combine with fertilizers and they can significantly accelerate the degradation of petroleum substances in the soil. Plant bioremediation is the most economical. Plant-microbial co-repair is achieved by synergistic action of plants with specific mycorrhizal fungi or rhizosphere bacteria. Which increases the absorption and degradation of contaminants and it is shown in Figure 3.

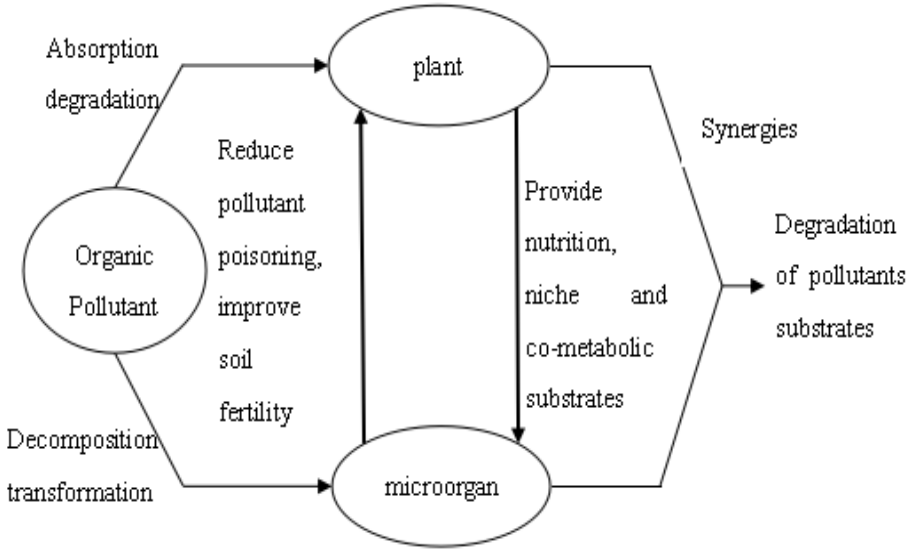

Figure 3: Sketch chart of microbial-phytoremediation system

It has been found that more than 400 species of As, Cd, Co, Cu, Mn, Ni, Pb, Se, Zn and other elements are more than 400 species (Table 2). Super-rich plants are characterized by over-absorption of heavy metals. And they can be transported to the plant part of the ground. It mainly considers two factors, one is the plant part of the enrichment of heavy metals and the other is the plant part of the heavy metal content. They should be higher than the roots. Because of the concentration of various heavy metals in the soil and the background value in soil and plant, there are different enrichment limits for enrichment of different heavy metals.

It is an easy and cost-effective method to strengthen phytoremediation through cultivation measures. This method is indeed an easy and cost-effective method. The following measures are shown in Figure 4.

Table 2: Species concentration of hyperaccumulators

Heavy metals	Plant species	Content(mg/kg)
Cd	Solanum nigtrum L.	114
Cd	Thlaspi caerulescens	3000
Pb	Thlaspi rotundifolium Subsp.	820
Co	Haumaniastrum robertii	10200
Cu	Haumaniastrum robertii	2070
Au	Brassica juncea	10
Mn	Macadamia neurophylla	55000
Mn	Phytolacca acinosa Roxb.	19300
Se	Astragalus racemosus	14900
Zn	Cardaminossis balleri	13600
Zn	Sedum alferdii Hance.	4515
U	Atriplex confertifolia	100
Ni	Alyssum bertolonii	13400
Ni	Psychotria doarrei	47500
T1	Iberis intermedia	3070
AS	Pteris vittata L.	7500

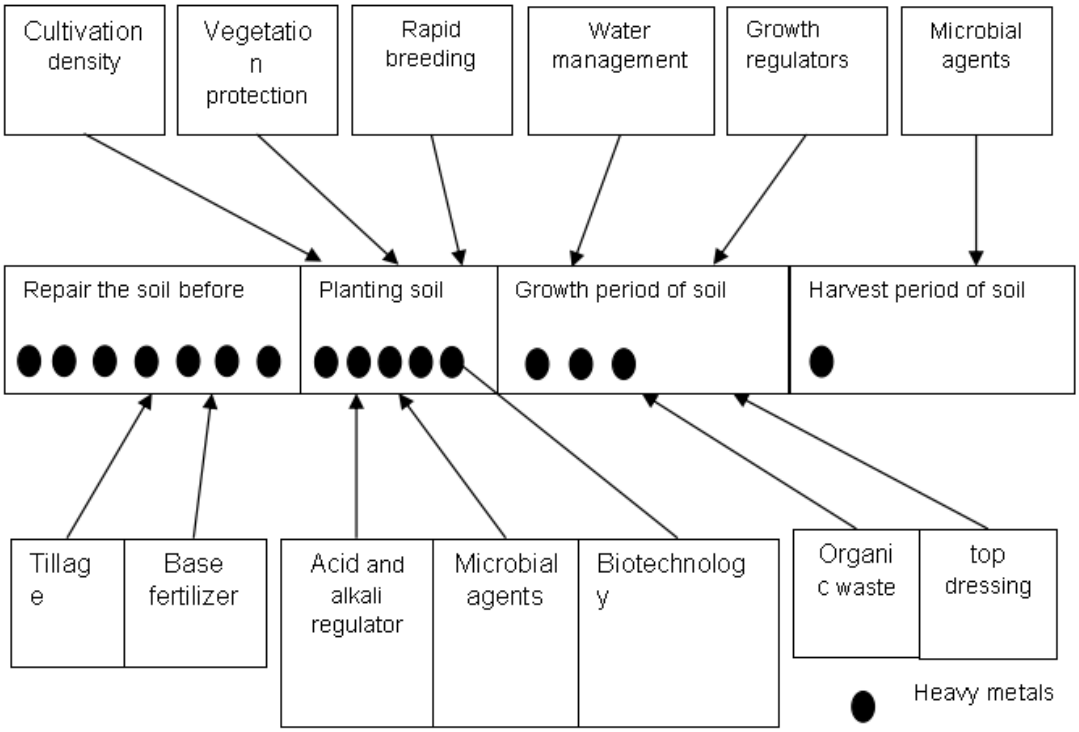

Figure 4: Application of enhancing technology for phytoremediation

3.3 Air pollution control

Phytoremediation is the science and technology that utilizes the interaction between plants and their symbiotic microorganisms. Plant remediation includes direct repairs and indirect repairs. Direct repair refers to the absorption and assimilation of air pollutants. Indirect repair refers to the removal of dry. The removal process includes plant absorption, degradation, transformation and assimilation. The ability of common plants to absorb fluorine and chloride ions is shown in Table 3 and Table 4.

Table 3: The comparision of fluorine absorpive capacity of different plant's leaves (g/kg)

Plant leave	Fluorine absorpive capacity	Plant leave	Fluorine absorpive capacity
Grape plants	0.636	Side cypress	0.253
peach	0.580	Pine	0.190
Apple tree	0.108	peanut	0.736
Poplar	0.792	Cynodon	0.056
Populus×canadensi	1.700	locust	1.150
Ash tree	1.258		

Table 4: The comparision of chloride absorpive capacity of different plant's leaves (g/kg)

Plant leave	chloride absorpive capacity	Plant leave	chloride absorpive capacity
Hibiscus	27.7	Oleander	7.7
Buxus boxwood	24.8	Coral tree	6.9
Cockscomb	16.5	Peach	6.3
Canna	12.4	Palm	3.6
Weeping willow	11.9	Bauhinia	3.6
Privet	10.7	Heather	2.8
Dragon claws	8.2	Camellia	1.6
Euonymus japonicus	8.0	Green onion	1.8

3.4 Noise pollution control

The weakening effect of the same community on the noise in different growth stages is different. The weakening effect of the plant community on the noise is excellent. Therefore, when the green plant configuration is carried out, it should be used to reduce the noise pollution. Common plant noise reduction effect can be seen in Table 5.

Tabel 5: Afforest effect that forest belt either hedge abate the buzz

Forest type	Sound source to forest belt distance (m)	Forest width (m)	Noise through the attenuation of the forest (dB)	The amount of attenuation of the corresponding space (dB)	The net loss of the forest (dB)
Blackberry pure forest	8	34	16	11	5
Cedar, cypress forest belt	6	18	16	6	10
Trees, Pittite Green Fence	11	4	8.5	2.5	6

4. Conclusion

Through the study of the construction of garden green space, it is found that the plant and plant combination methods are different in the aspects of water pollution control, soil pollution control and air pollution and noise pollution control. For water pollution, the main way is to build artificial wetlands. For soil pollution, it is mainly with the cultivation of plants. For air pollution and noise pollution control, the main way is to use evergreen tree species and deciduous tree species. And under the forest configuration of a variety levels and ground cover plants, it increases the thickness of the forest.

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