大气中石棉粉尘计数浓度测定法探讨*

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四川省石棉矿系我国三个特大型矿之一，拥有丰富的纵纤维矿床。正确测定石棉粉尘浓度，能评定劳动卫生条件的优劣，并为制定防尘措施，减轻粉尘的危害提供科学依据。本文以四川省石棉矿为例，提出采用纤维计数法测定石棉粉尘浓度，以供讨论。

1 大气 TSP 监测

1.1 采样布点

按功能分区和全年主导风向布点原则，布设测点 6 个，各采样点功能见表 1。

表 1 各采样点功能

点 号	地 名	功 能
1	大漩	清洁对照点
2	二选厂	厂区监控点
3	二中	生活区监控点
4	一选厂	厂区监测点
5	县招待所	下风向监控点
6	南水公司	扇形监控点

1.2 监测结果

结果见表 2。

表 2 大气 TSP 现状监测结果(日均值: mg/Nm^3)

点号	采样日期 1993-08/日					5 d 均值	评价标准	超标次数	占比例 /%
	21	22	23	24	25				
1	0.015	0.094	0.089	0.035	0.038	0.054		0	0
2	0.439	0.416	0.358	0.277	0.340	0.366		4	80
3	0.022	0.133	0.219	0.095	0.118	0.117	0.30	0	0
4	2.448	1.948	3.292	1.959	2.481	2.426		5	100
5	0.630	0.944	1.107	1.042	0.473	0.839		5	100
6	0.367	0.374	0.353	0.214	0.139	0.289		3	60

2 石棉纤维测定

(1) 布点及时间　同大气 TSP 监测。

(2) 浓度表示方法　用纤维计数法表示大气中石棉粉尘的浓度，即：根/ml。

(3) 测定方法　采用滤膜/相衬显微镜法。使用直径 37 mmPC 滤膜，其有效采尘直径为 33 mm。用新鲜配制的邻苯二甲酸二甲脂(AR)与草酸二乙酯(AR)等容积混合液(苯-草透明液)透明滤膜制片。于德国 OPTON 相衬显微镜 40×15x 相衬观察，用改进 Beckett 型目镜测微网计测石棉纤维。

(4) 计数规则　不同纤维尺寸的石棉对健康的影响各异。1986 年国际劳工组织会议提出危害健康的尺寸范围：长>5 μm，宽<1.5 μm，长：宽>3：1。

参照我国制订的"车间空气中石棉纤维(计数法)卫生标准"，本次规定的计数规则：计数长度>5 μm，宽度<3 μm，长：宽>3：1 的石棉纤维，即：能被吸入并沉着在肺泡内而引起对人体危害的石棉纤维，呼吸性石棉纤维。 每份采样滤膜制片 1—2 张，每片计数 100

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China. Zhang Zhongxiang(Beijing Municipal Research Academy of Environmental protection, Beijing 100037): *Chin. J. Environ. Sci.*, **17** (4), 1996, pp. 75—79

In this paper, the current discharge and pollution of industrial wastewater of China were described. The goals, tasks and the strategy, countermeasures for industrial wastewater control from the end of this century to 2020, were put forward, and the preliminary cost-benifit analysis was conducted. This paper stressed the following main points: for controlling the discharge and pollution loads of industrial wastewater, the developing model, from positive increasing rate to zero increasing rate, and finally to negative increasing rate, must be adhered to; the whole production process control with using cleaner production and technologies, and strengthening centralizing wastewater treatment schemes must be implemented. As the results of implementation of above-maintained strategy and countermeasures, the COD load of industrial wastewater will decrease more than 54.6%, and the ratio of costs and benifits will reach to 1∶2.58.

Key words: strategy, countermeasures, cost-benifit analysis.

The Status and Trend of Vehicle Pollution in China. He Kebin et al. (Dept. of Environ. Eng., Tsinghua University, Beijing 100084): *Chin. J. Environ. Sci.*, **17**(4), 1996, pp. 80—83

This paper presents the status of vehicle pollution in China and its evolution by the year 2000 and 2010 through the consideration of vehicle population, oil consumption, pollutant emissions, and air quality in major cities. Meanwhile, the integral strategy for vehicle emission reduction is primarily analyzed from the viewpoint of energy conservation, purification and management.

Key words: vehicle population, vehicle pollution, pollution contributions from vehicles.

Application of Biosurfactants in Environmental Biotechnology. Chen Jian et al. (Dept. of Biotechnology, Wuxi University of Light Industry, Wuxi 214036): *Chin. J. Environ. Sci.*, **17** (4), 1996, pp. 84—87

Biosurfactants are natural products derived from bacteria, yeast, or fungi. Due to their chemical structures and physical properities equal to, or exceeding, synthetic surfactants, and their low toxicity profile to freshwater, marine, and terrestrial ecosystems, biosurfactants are potential candidates for a variety of environmental application, particularly for bioremediation of polluted materials, such as oil and organic solvent. The solubilization and emulsification of toxic pesticides by biosurfactants aid in degradation of such hazardous materials from contaminated site. The future success of biosurfactant technology in bioremediation will require the precise targeting of the biosurfactant system to the physical conditions and chemical nature of the pollution-affected site.

Key words: biosurfactant, bioremediation, application.

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个及其以上视野中纤维根数。

(5) 计算公式

$$c = A \cdot N/(a \cdot n \cdot r \cdot t \cdot 1000)$$

式中，c 为石棉粉尘浓度(根/ml)；A 为滤膜有效采尘面积(mm^2)；N 为计测的总纤维数(根)；a 为目镜测微计计数视野面积(mm^2)；n 为计测的总视野数；r 为采样流量(L/min)；t 为采样时间(min)。

(6) 测定结果 见表 3。

由表 3 看出，二选厂、一选厂及处于下风向的县招待所石棉粉尘浓度较高，大漩和二中的情况较好。这与上述大气 TSP 的污染规律基本一致。

表 3 大气中石棉粉尘测定结果

采样点	测定结果(t/c)/min·(根/ml)$^{-1}$]			3 日均值 /根·ml
	08-22	08-23	08-24	
大漩	50/0.022	30/0.046	40/0.009	0.026
二选厂	50/0.067	30/0.072	40/0.028	0.056
二中	50/0.012	30/0.014	40/0.021	0.016
一选厂	25/0.122	30/0.197	30/0.278	0.199
县招待所	40/0.101	30/0.007	50/0.047	0.052
南水公司	40/0.089	30/0.046	50/0.006	0.047