

環境工程概論

一、解釋下列專有名詞：(每小題 5 分，共計 30 分)

- (一) Endocrine disruptors
- (二) Cavitation
- (三) Break-point chlorination
- (四) Peroxacetyl-nitrate
- (五) Bioaccumulation
- (六) Biomonitoring

二、請作圖並說明沉澱四種類型的特性(每一種類型各佔 2.5 分，共計 10 分)

三、請畫出劑量反應曲線(dose-response relationship)並標定其相關之名詞 (NOEL, FEL 等) 且說明其代表意義。(10 分；未畫出曲線或曲線畫錯扣五分，共有 5 點，寫出中或英文名詞一個 1 分，解釋一個名詞 1 分)

四、A 工廠圍牆外，連續測四次 5 分鐘測得之平均噪音量為 83dB、78dB、85dB 及 82dB，試求在該 20 分鐘之噪音平均值為多少？(10 分)

五、一座效率 40% 的 1000 MW(10^6 W)燃煤發電廠的 SO_2 排放率為法定容許值 0.6 lb/ 10^6 Btu，煙囪的有效高度為 300 m，平均風速計測得風速為 4.9 m/s，目前為晴朗有雲的 7 月，請回答下列問題(1 kWh=3412 Btu, 1 kg= 2.2 lb)：

- (一) 請寫出 Gaussian dispersion model。(10 分)
- (二) 預測在正順風處 4 km 的二氧化硫地面濃度為多少 $\mu\text{g}/\text{m}^3$ ？(10 分)
(設 4 km 處的 $\sigma_y=359$ m, $\sigma_z=216$ m)

六、由車庫駛至收集路線起點要花費 24 分，在路線和處置廠之間行駛花費 24 分鐘，由處置場重返車庫花費 15 分鐘。若垃圾車在處置場花費 12 分鐘卸貨。清潔隊員每天有兩次 30 分鐘休息時間，且允許 1 小時的未預期耽誤(計 2 小時)，若每日來回處置場兩趟，則 8 小時清運中實際垃圾收集使用了多少小時？(10 分)

七、閱讀以下與文章，提出自己的看法並且說出於環境上可行的解決方案。(10 分)

Exploring new energy resources, such as biodiesel fuel, is of growing importance in recent years. Biodiesel, derived from vegetable oil or animal fats, is recommended for use as a substitute for petroleum-based diesel mainly because biodiesel is a renewable, domestic resource with an environmentally friendly emission profile and is readily biodegradable. The use of biodiesel a fuel has been widely investigated. Its commercial use as a diesel substitute began in Europe in the late 1980s.

At present, the most common way to produce biodiesel is to transesterify triacylglycerols in vegetable oil animal fats with an alcohol in the presence of an alkali or acid catalyst. Methanol is the commonly used alcohol in this process, due in part to its low cost. The products, fatty acid methyl esters (FAME), are called biodiesel and include

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glycerine as a by-product. Alkalically catalyzed transesterification has been most frequently used industrially, mainly due to its fast reaction rate. Sodium hydroxide or potassium hydroxide is the usual alkali catalyst. In contrast, acid-catalyzed transesterification has received less attention because it has a relatively slow reaction rate. Nevertheless, it is insensitive to free fatty acids in feedstock oil compared to the alkalically catalyzed system. (This article was from the part of the paper “Y. Zhang, M.A. Dube , D.D. McLean, M. Kates. Biodiesel production from waste cooking oil: 2. Economic assessment and sensitivity analysis” Bioresource Technology 90 (2003) 229–240.