CIVE 3331 - ENVIRONMENTAL ENGINEERING
Spring 2003

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Purpose: Exercises related to Lecture # 13. These exercises develop skills in selected environmental groundwater quality problems. Critical thinking is exercised in determination of analogies between lecture examples and the problems in this exercise set. Direct relationships to various accreditation objectives are highlighted in **Bold** type in the following sections. The exercises start on the next page.

Relevant ABET EC 2000 Criteria: Criterion 3 Program Outcomes and Assessment

(3-a) an ability to **apply knowledge of** mathematics**, science,** and engineering.
(3-e) an ability to identify, formulate, and solve engineering problems.
(3-k) **an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.**

Relevant CEE Educational Objectives:

(3) Emphasize problem-identification, problem-formulation and **communication skills**, **problem-solving techniques** and the **many facets of engineering design** throughout the curriculum.

(5) **Prepare every student to develop the skills for critical thinking and lifelong learning.**

Relevant CEE Program Outcomes:

ii. **Students should acquire the ability to solve practical civil engineering problems by applying the knowledge of mathematics, science**, **engineering, modern techniques**, **skills and practical tools they gained in their courses.**

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Exercise_013-1

What hydrocarbon, RH, reacting with the OH* radical in (Eqn. 7.16) would produce formaldehyde, HCHO, in (Eqn. 7.19)?

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Exercise_013-2

Suppose propene, CH_2=CH-CH_3 is the hydrocarbon RH athat reacts with the hydroxyl radical OH* in reaction 7.16. Write the set of chemical reactions that end up with an aldehyde. What is the final aldehyde?

Exercise_013-3

In 1989, 0.39×10^{12} g of particulates were released when 685 million (2000lb) tons of coal were burned in power plants that produced 1400 billion kWh of electricity. Assume that the average heat content of the coal is 10,000 Btu/lb. What was the average efficiency (heat to electricity) in these plants? How much particulate matter would have been released if all the plants met the New Osurce Performance Standards that limit particulate emissions to 0.03 lb per 10^6 Btu of heat?