Midterm 1: Exam Blueprint

CENG 340–Introduction to Environmental Engineering
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Learning Goals

Chapter 1

1. Describe three global environmental challenges presented in the chapter.
2. Describe how one global environmental challenges may affect the civil and environmental engineering professions.

Chapter 2 (relevant sections: 2.1–2.4, 2.5.1–2.5.3)

1. Calculate chemical concentrations in units of mass/mass, mass/volume, mole/volume, mole/mole, volume/volume, ppm_v, ppm_m, and partial pressure.
2. Demonstrate that you know when to use units of ppm_m (for liquid concentrations), ppm_v (for gas concentrations).
3. Calculate chemical concentration in common constituent units such as hardness (in units of eq/L and mg/L as $CaCO_3$), nitrogen (in units of "as N") , and greenhouse gases (in units of CO_2 equivalents). [We will cover alkalinity in Ch.3.].
4. Describe and, given the appropriate data, calculate concentration of the following types of solid particles in water : TS, TSS, TDS, VS, FS, FSS, VSS, FDS, VDS.

Chapter 10.1-10.3

1. Describe the characteristics of water: physical (Table 10.2), chemical (organic and inorganic), and biological (viruses, bacteria, protozoa). Refer to PPT file handed out on Monday, 9/9.
2. Use Table 10.8 from the text book (would be provided in an exam) to compare a given concentration of a pollutant to the regulated concentration.

Chapter 3 (3.1, 3.3, 3.5, 3.6)

1. Apply the law of conservation of mass to chemical equations to calculate masses of reactants and products.
2. Identify which chemical approach— equilibrium or kinetic— should be applied to a given environmental problem.
3. Apply equilibrium relationships to calculate chemical concentrations of pollutants in air, water, and soil.
4. Apply the following four types of equilibrium relationships:
   (a) Henry's Law for water gas partitioning. Be able to use K_H in the following units: $\frac{\text{mole}}{\text{L}\times\text{atm}}$, $\frac{\text{L}\times\text{atm}}{\text{mole}}$, $\frac{\frac{\text{mole}}{\text{L}}\text{gas}}{\frac{\text{mole}}{\text{L}}\text{aq}}$
   (b) Acid-Base
   (c) Precipitation Dissolution
   (d) Solid-Water Partitioning (sorption)