ENVIRONMENTAL CHEMISTRY

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INTENDED AUDIENCE : Environmental engineering professionals and students pursuing a degree with emphasis in Environmental engineering

PREREQUISITES : Entry level chemistry course

INDUSTRIES SUPPORT : CPCB, SPCB, Degremont, ERM, Ramky Enviro Engineers, Veolia Water, SFC Environmental Technologies Pvt. Ltd., Nalco Water, VA Tech Wabag, Ther

COURSE OUTLINE : The course deals with the fundamentals and critical analysis of chemical processes one encounters in the field of Environmental Engineering. The course deals with:

- Application of equilibrium equations and material balance equations to calculate conditions in environmental systems at equilibrium using the concept of components.
- Use of chemical equilibrium programs such as VMINTEQ to calculate conditions in environmental systems at equilibrium
- Application of kinetic equations, stoichiometric relationships and material balances to calculate conditions in environmental systems in which reactions occur that are not at equilibrium.
- Application of fundamental aspects of thermodynamics to describe equilibrium conditions in environmental systems.
- Defining equilibrium and kinetic limitations as relating to environmental systems and the relative importance of each for chemical processes in environmental systems.
- Knowledge of important terminology for chemical processes occurring in environmental systems

ABOUT INSTRUCTOR : Prof. Bhanu Prakash Vellanki, is an Assistant Professor at IIT Roorkee. He holds a PhD in Civil Engineering with a specialization in Environmental Engineering from Texas A&M University. During the course of his doctoral work, Dr. Vellanki developed a new class of treatment processes, called the Advanced Reduction Processes. His research interests include Advanced Redox Processes, industrial/hazardous waste treatment, and emerging contaminants.

Course layout

Week 1

I. Introduction
II. Fundamentals of chemical processes

Week 2
(3) Generalized Approach

Week 3:
III. Acid/Base Reactions

Week 4
b) Ionization Fractions

Week 5
1. Log C-pH Graphs

Week 6
Buffer Intensity at various pH ranges
5. Alkalinity, acidity

Week 7
(4) Relationship among ALK,ACD, Ct,co3
(5) Mixing Problems
(6) Conservative quantities
(7) Example: Complex Acid/Base Problems

Week 8
IV. Aqueous Complex Formation
V. Precipitation

Week 9
3.Controlling precipitation

Week 10
VI. Oxidation/Reduction

Week 11
C. Equilibrium

Week 12
3. Oxidation-Reduction Potential (ORP) Measurement
4. Predominance Area Diagrams
5. Corrosion