Chemistry 431/5530A Physical Chemistry I Lesson Plan

Lecturer's name: Sai Siva Kumar Pinnepalli

Date: November 4, 2019

Time: 5.30 – 6.45 pm

Duration: 1 hour 15 minutes

Grade level: Undergraduate/Graduate

Semester: Fall 2019

Department: Chemistry

Lesson Plan Subject: Molecules in motion

Reference:
Atkins and de Paula, "*Physical Chemistry: Thermodynamics, Structure, and Change, 10th Ed*," W.H. Freeman, 2014; ISBN 978-1429290197 (required); Available from the UMKC Bookstore. Alternatively, the 11th Ed is also fine ISBN: 978-0-19-876986-6.

Focus:

- Transport of molecules in gases
- Motion of molecules in liquids
- Diffusion process

Student Learning Outcomes/Objectives:

- Students will be able to understand the mechanism of motion in gas and liquid states of matter.
- Students will be able to define scientific parameters of transport and motion: concentration, flux, diffusion, viscosity etc.
- Students will be able to draw a relation between physical processes and mathematical derivations.
- Students will be able to apply knowledge to understand other complex mechanisms.
- Students will be able to synthesize mathematical model for a given problem.

Pre-requisites:

- Basic knowledge of calculus and problem solving

Resources:

- Whiteboard pens; Powerpoint presentation, Microphone, Video Recording

Instructional Strategies:

- Direct Instruction
- Cooperative Learning (Pair Share and Discussion)

Motivation:

- Why study 'Molecules in Motion'?
  - Discuss the applications in cellular transport, nerve impulses, vehicle engines, corrosion and chemical plant.
  - Explain the need of mathematical models to express motion.
  - Show research advancements in this topic and provide an overview about job opportunities.

Lesson Learning Activities

Time	Content & Teaching Activity	Student Activity	Resource
5.30	• Introduction about the topic • Discussion on SLOs • Motivate students on why learn this topic	• Discussion among students about their notion of molecules and motion/prior knowledge	Teacher facilitated discussion
5.45	• Discuss definitions: diffusion coefficient, thermal conductivity, viscosity, effusion. • Utilize the graphics.	• Listening & notes taking • Explain to each other the concepts for 2 min	Powerpoint
6.00	• Introduce the related equations and transport parameters. • Solve an example problem on white board.	• Problem solving • Cross check with peers for 2 min	Powerpoint, Whiteboard discussion
6.30	• Brief the concepts of motion in liquids: electrolyte solutions, ion mobilities and the Einstein relations.	• Student teacher discussion on the concepts • Notes taking • Q & A session	Powerpoint and oral discussion
6.40	• Lesson reflection/summary • Announce the topic for next class and/or related deadlines	• Write in 2-3 sentences of what students learnt in the class	Powerpoint
6.45	• Class ends	NA	NA

Lesson Assessment:

Pop-up quiz at the end of lecture to serve the purpose of self-evaluation for students.
The students will be assessed in the following concepts as part of homework II and exam II:

- Problems on energy transfer concept
- Problems on ion mobilities and conductivity
- Definition of transport parameters: viscosity, conductivity, gradient, flux etc.

Office hours:

- Tuesday 2-4 pm