KMU 501 Advanced Chemical Engineering Thermodynamics
Take-Home Examination, Fall 2010-2011
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Date due: Jan. 20, 2010 for class presentation and electronic submission to hukmu501@gmail.com
Submit hard copies by Jan. 21, 2010

This assignment is for groups of two or three students. Please choose three of the following topics listed below, list them in order of preference and email to hukmu501@gmail.com along with the names of the group members.

Project 1:
Prepare a 15 minute lecture (Power point presentation) and a simple review paper (in the format of a journal paper) of at least three basic papers on various applications of "statistical entropy". The work should give a definition of statistical entropy and its history (one slide), describe in which areas it is used and how it is applied to solve different problems, emphasize for each application the relation between statistical aspects and thermodynamic aspects if there exist any.

Project 2:
Prepare a 15 minute lecture (Power point presentation) and a simple review paper (in the format of a journal paper) of at least three basic papers on the application of "exergy". The work should give a definition of exergy and its history (one slide), describe when it is used, what it implies and how it is applied to analyze different problems, emphasize for each application the reasons for its preference for analysis.

Project 3:
Prepare a 15 minute lecture (Power point presentation) and a simple review paper (in the format of a journal paper) of at least three technical papers on the metastable phase diagram of NaCl-water solution. Give information on the physical and chemical properties of the system. Explain the experimental and mathematical methods that were used to develop the phase diagram. Give more information on the types of solid phases present and specifically amorphous phases if there exist any.

Project 4 (for group of two students only):
Prepare a 15 minute lecture (Power point presentation) and a simple review paper (in the format of a journal paper) using Baker's PhD dissertation (http://mit.dspace.org/bitstream/handle/1721.1/35357/25055546.pdf?sequence=1) and any supporting documents (journal papers, book chapters, etc) to explain the increase in the chemical potential of the solute during a fast freezing process. Explain how Baker and his PhD advisor Cahn came up with this idea and how they proved it.

Format for paper:
Use a standard technical paper format, including an abstract, introduction, etc.

- Use Times New Roman 10 pt and single spacing to reduce the amount of paper used
- Leave 2.5 cm margin space on both left and right sides
- Leave 2.0 cm spacing on top and bottom
- Label all tables and figures
- Show units with all values in the text, tables and figures
- Refer to all the references used as necessary, use your own words and avoid plagiarism

Format for presentation:
Your presentation should include (but is not limited to) the following:
- A title slide including the title of your presentation, your names and affiliations, date and place
- A slide showing an outline of your speech
- A slide explaining the goals of your presentations
- Slides explaining the material (should have font size minimum 20pt, i.e. readable by the audience; should be bulleted, i.e. do not use long paragraphs or sentences)
- References next to pictures and figures adopted from web or literature
- A conclusion/summary slide

Slides should:
- look professional
- not contain unclear information
- be clear and brief (no long sentences)
- be just enough to keep you within the time limitation