Reservoarfluider og Strømning
Reservoir Fluids and Flow
Course TPG 4145

Problem 1 –
CO2-H2O Problem

Handed Out: Aug. 29, 2011
<u>Due Date</u>: Thursdsay Sept. 5 midnight

Excel Solution:
Based on lectures Aug. 29 and output from the PhazeComp calculations, make the following Excel solution:

1. Plot on same figure, linear vapor pressure curves for CO2 and for H2O. Choose any units you like.

2. Plot on same figure, log (axis) vapor pressure curves versus linear absolute temperature for CO2 and for H2O. Choose any units you like.

3. Plot on same figure, log (axis) vapor pressure curves versus 1/T (absolute temperature) for for CO2 and for H2O. [Extra challenge (not required): determine the best-fit of the data in the temperature range (from critical temperature and lower) where a clear linear trend exists.]

4. Plot for H2O the pressure (kPa) versus volume (L) at 100oC with three series: (liquid-like data, vapor-like data, and saturated data). Clearly mark the saturated liquid and saturated vapor points with solid circle symbols, while all other data are with open circles. Draw the separate series horizontal long-dashed line between the saturated volumes. Use log-log axes.

5. Use the NIST website to calculate properties of CO2 and H2O at their normal boiling point (T_b), then compare with output from PhazeComp: (a) vapor pressure at T_b, and (b) saturated liquid and saturated gas densities. Make a nice, simple table showing comparisons.

Problem update: Because the triple point of CO2 is somewhat higher than the normal boiling point, you can use 217 K (just above the triple point) instead of the normal boiling point to make the comparison of PhazeComp and NIST data. The triple point is 216.592 K. At the normal boiling point, CO2 vapor comes from a solid phase ("dry ice"). If you already solved the problem, using PhazeComp results but no comparison, that is OK (this is not mandatory because of the original, misleading problem).

Each figure should be on a separate Excel sheet – do NOT embed figures inside a sheet.

Use one data sheet for CO2 and a separate data sheet for H2O. The two sheets should have the same/very-similar format (columns, rows, headers, etc.), just different data and number of data.

Make one sheet that contains a copy (by copy-and-paste) of the PhazeComp **input** file (*Problem-1.phz*). The font used here should be a fixed-pitch Courier 10 pt.

Practice copy-and-paste(special) your figures into (a) Word document using a table insert with 1 column and 2 rows; and (b) Powerpoint. Use "Picture(Enhanced metafile)" special-paste option.

Turn your solution into ItsLearning, with a *single* xls file for grading. Use comments and annotations in your file to show clearly what you have done. Use the following naming convention:

TPG4145-Problem1-FirstName(LastName).xls

Wrong file naming convention, no grade!

No working in groups, everyone does their own solution!