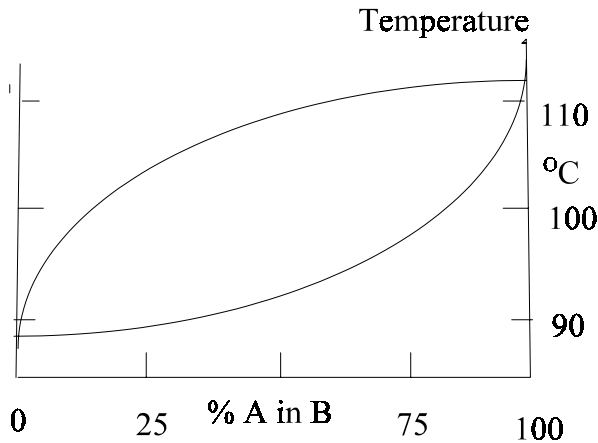


2. a) Student M converted methylcyclohexanol to a mixture of methylcyclohexenes. Beginning with 24.8 g of alcohol, she obtained 12.1 g of alkene after drying. What was her percent yield for the experiment? (8 points)

b) Student P obtained 22.5 g in this experiment. Please comment on the differences between the results of student M and student P. (4 points)

3. Please make a labelled sketch of the apparatus used for separation of a purified solid from its solution, showing all clamps and identifying the necessary utilities. (12 points)

4. Sketched below is a graph of boiling temperature as a function of composition for a two-component solution, in this case, of A and B.



- a) Label each part of the graph (delineated by the lines shown) with the states of matter and compounds found there. (8 points)
- b) Assume you have a solution that is 70% A in B and you have brought it to a boil in a very short *simple* distillation apparatus (assume one theoretical plate). Please give the following information for these materials or this experiment (16 points):
- the temperature of the liquid in the "pot" (Note - you did not do this experiment)
 - the composition of the vapor above the boiling liquid
 - the temperature read by the thermometer in the distillation "head" (3-way adapter)
 - the composition of the liquid condensed and collected
 - the boiling point of pure A
 - the boiling point of pure B

5. Make a sketch of the appearance of the solution at the molecular level, using O's for solvent molecules and Δ 's for solute molecules at the following stages (9 points):

immediately after adding solvent to crystals	hot solution, all dissolved	after cooling, crystals and solution

6. Below please find a copy of a notebook entry for an experiment. This notebook was kept by a beginning graduate student who did not have Dr. Sweeting as an instructor in CHEM 331. What information is missing that you would need to replicate this experiment? You can put your comments off to either side. (15 points)

Dehydration of Methylcyclohexanol

5 mL conc. phosphoric acid

10 mL methylcyclohexanol

Assemble fractional distillation apparatus with separatory funnel as receiver.

Observations - oily layer, some black slimy stuff in/on that; boiling stones floated between the layers.

Distillate had 2 layers, both a little cloudy but colorless.

Total volume of distillate hard to judge - about 1 inch in bottom of separatory funnel.

Added 10 mL water. Repeated the washing process twice more, but using saturated sodium bicarbonate (it had white solid in the bottom). The first generated lots of CO₂. Drain remaining upper layer (the organic layer) into a vial. Visible droplets of water on side. On instructor's advice, removed these with a dropper. Added anhydrous MgSO₄.

Filtered through into another vial.

vial plus sample	27.2
vial	21
product	6.2 g

Note that spectroscopy questions cannot be easily converted to pdf's, as they are pasted with real tape. Please use class problems, problems in your lab packet and your lecture text for sample problems.

