

### Chapter 14 Worksheet 3 (vapor pressure)

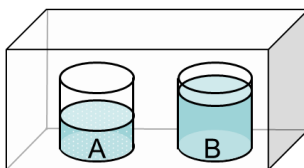
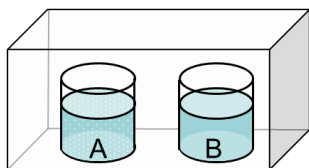
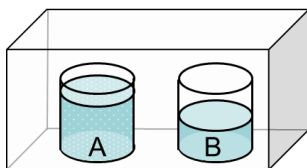
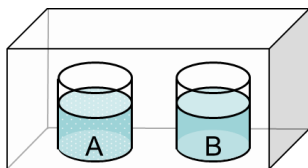
Name:

UGA ID:

#### Instructions:

- Please enter your first and last name as it appears on the eLC roster (do not use a nickname).
- Your UGA myID is a combination of letters and numbers (example: mine is sre13137). **Do not use your 81x number.**
- If you do not have a printer, type your answers in the then upload the worksheet template to Gradescope by Friday, October 2 at 11:59 pm. Write your work on separate sheets of paper, convert to a PDF and upload to eLC.
- If you have a printer download the worksheet, convert it to a PDF and upload to Gradescope by Friday, October 2 at 11:59 pm. You do not need to upload anything to eLC.

1. The diagram shows a closed system containing two salt water solutions. The solution labeled A is more concentrated than the one labeled B. Which of the diagrams below best represents the system at an infinite time after preparation?



2. What is the vapor pressure of a solution that is 30.3% w/w ethylene glycol (MW = 62.07 g/mol) in water at 90 °C. The vapor pressure of pure water is 525.8 torr at 90 °C.

mm Hg

3. What is the vapor pressure of a solution that is 30.3% w/w ethylene glycol (MW = 62.07g/mol) in water at 100 °C.

Torr

4. As the water evaporates from this saturated solution

- A. the vapor pressure above the solution increases.
- B. the vapor pressure above the solution decreases.
- C. the vapor pressure above the solution remains constant.



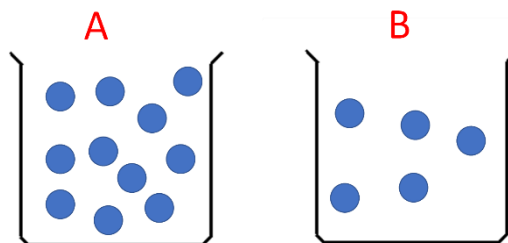
5. The concentration of alcohol in adult beverages is typically expressed as proof. Proof is simply double the % by volume (% v/v). Assuming that vodka is a solution of only water and ethanol, what is the *total* vapor pressure above an 80 proof vodka at 25 °C?

Water: density = 1.00 g/mL; VP @ 25 °C = 23.8 mm Hg; MW = 18 g/mol

Ethanol: density = 0.789 g/mL; VP @ 25 °C = 58.7 mm Hg; MW = 46 g/mol

mm Hg

6. Only the solutes are shown in the following solutions. Which lettered beaker has the lowest vapor pressure?



7. At room temperature and 1 atm, the vapor pressure of isobutyl benzoate is 237 mm Hg, and the vapor pressure of vinyl acetate is 72.5 mm Hg. What is the total vapor pressure over a solution composed of these two substances when  $X_{\text{isobutyl benzoate}} = 0.850$ .

mm Hg

8. Choose the aqueous solution with the **lowest** vapor pressure. These are all solutions of nonvolatile solutes and you should assume ideal van't Hoff factors where applicable.

- A. 0.120 *m* C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>
- B. 0.040 *m* (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>
- C. 0.060 *m* Li<sub>2</sub>CO<sub>3</sub>
- D. 0.030 *m* RbC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>
- E. They all have the same vapor pressure.

9. Which of the following should have the largest Henry's law constant ( $k_H$ ) in water?

- A. Ne
- B. CO
- C. Br<sub>2</sub>
- D. CH<sub>3</sub>CH<sub>3</sub>
- E. CO<sub>2</sub>

10. The vapor pressure of a solution is always \_\_\_\_\_ that of the pure solvent

- A. equal to
- B. twice
- C. one half
- D. higher than
- E. lower than**

11. What are the ideal van't Hoff factors for these compounds:  $\text{Ba}(\text{OH})_2$ ,  $\text{C}_6\text{H}_{12}\text{O}_6$ ,  $\text{K}_3\text{PO}_4$ ,  $\text{HNO}_3$  ?

- A. 1, 1, 1, 1
- B. 2, 1, 2, 2
- C. 3, 1, 4, 2
- D. 6, 3, 5, 5
- E. none of the above**