

University of Kentucky

Department of Chemistry

READ THESE DIRECTIONS CAREFULLY BEFORE STARTING THE EXAMINATION!

It is *extremely* important that you fill in the answer sheet EXACTLY as indicated, otherwise your test may not be processed; ALL entries are to be made on SIDE 1 of the answer sheet. Use a #2 pencil (or softer); fill in the circles completely and firmly. Erasures must be complete. Use only the following categories:

NAME:	Print your name starting at the first space, LAST NAME first, then a space, followed by your FIRST NAME, then another space, followed by your MIDDLE INITIAL. Fill in the <u>correct</u> circles below your printed name corresponding to the letters of your name; for the spaces, fill in the top blank circle.
STUDENT NUMBER:	This is VERY IMPORTANT! Under IDENTIFICATION NUMBER, put in your 8 DIGIT STUDENT ID NUMBER (do not use the 9 at the beginning of your number) beginning in column A and continuing through column H, column I will be blank, (do NOT use column J at this time); be sure to fill in the correct circles (a common error to be avoided is mistaking "0" for "1").
TEST FORM:	Fill in the "1" blank in the J column under IDENTIFICATION NUMBER (to indicate Hour Examination I).
SPECIAL CODES:	Use for course and section number; in positions K-P write in one of the following: <div style="text-align: center;"> Dr. Allison Soult 107001 or 107002 Dr. Lisa Blue 107003 or 107006 Dr. H. Ades 107005 </div>
SIGNATURE:	

Answering Questions:

Starting with answer "1" on SIDE 1, fill in the circle indicating the one best answer for each of the 30 questions in this examination. Your score is the sum of the appropriate credit for each response. Soon after the examination is finished, an examination key will be posted on Blackboard.

Grading and Reporting:

The examination scores will be posted in Blackboard within 96 hours after the examination. If an error has been made in scoring your answers, tell your instructor within 48 hours of the posting of your score.

BE SURE THAT YOUR TEST HAS 30 QUESTIONS, A PERIODIC TABLE, AND ONE SHEET OF SCRATCH PAPER. You may NOT use your own scratch paper during this examination. Cell phones and pagers are to be turned off and out of sight during the exams.

10. Which one of the following expressions is true?

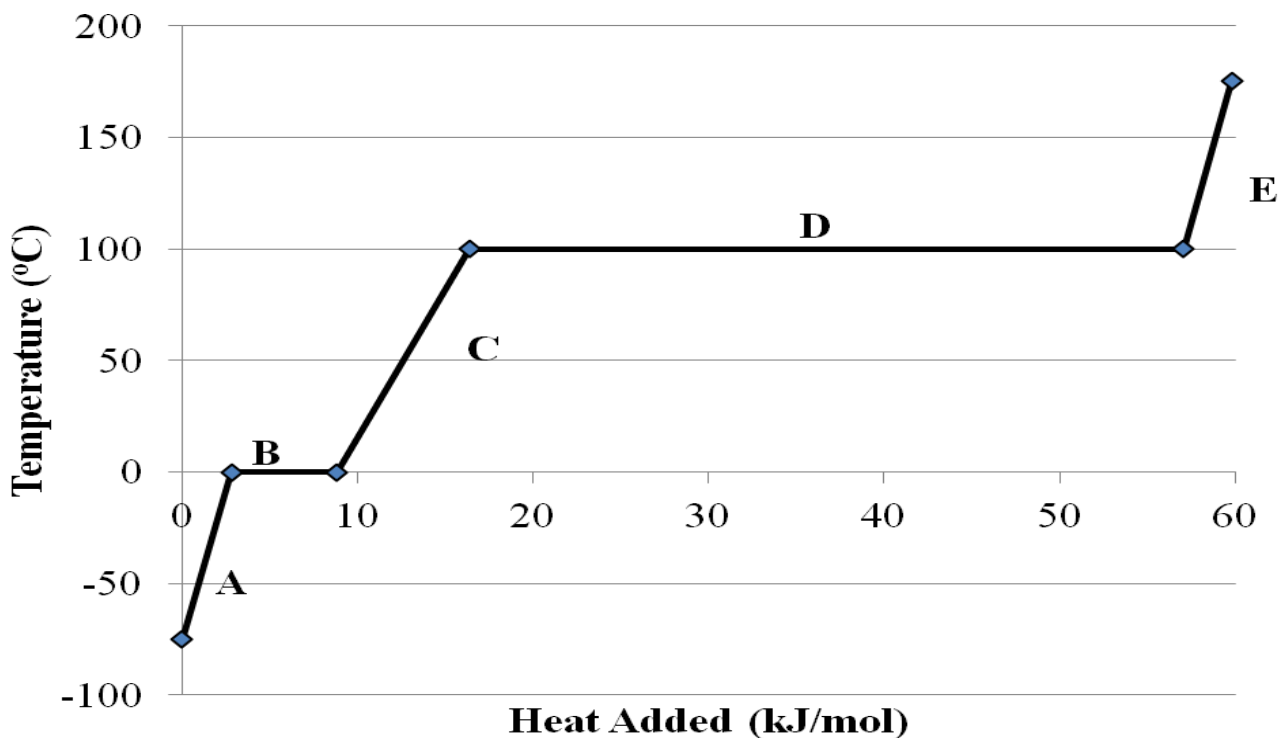
A. $\Delta H_{\text{fus}} = \Delta H_{\text{vap}}$

C. $\Delta H_{\text{fus}} < \Delta H_{\text{sub}}$

B. $\Delta H_{\text{vap}} < \Delta H_{\text{fus}}$

D. $\Delta H_{\text{fus}} = -\Delta H_{\text{vap}}$

11. In the heating curve for water, region D represents



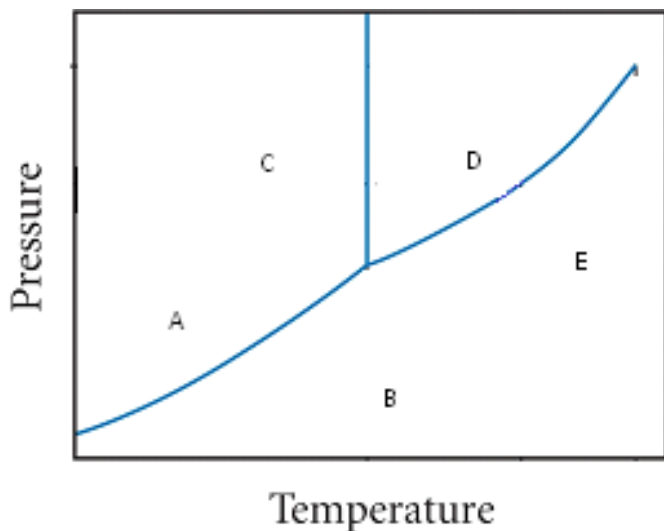
A. ice melting to liquid water.

B. steam warming.

C. liquid water warming.

D. liquid water vaporizing to steam.

-
12. According to the phase diagram below, moving along a straight line from point _____ to point _____ would represent melting of the species?



- A. from A to B
B. from C to D
C. from E to D
D. from B to C
-
13. In a cubic unit cell, atoms on edges contribute _____ of the atom to the unit cell while atoms on the corners contribute _____.

- A. $1/4$, $1/2$
B. $1/8$, $1/2$
C. $1/8$, $1/4$
D. $1/4$, $1/8$

-
14. A crystalline unit cell contains two halide atoms, X, located completely inside the cell and eight metal atoms, M, on all the corners of the cell. Determine the correct formula for the ionic compound.

- A. M_4X
B. MX_2
C. M_4X_2
D. M_2X_2
-

19. A saturated solution

- A. is always unstable.
- B. must have more solute than solvent.
- C. has more solute dissolved than predicted by the solubility.
- D. has a precipitated solute in equilibrium with the dissolved solute.

20. The solubility of potassium nitrate (KNO_3) is 37 g KNO_3 per 100 g of water. If a student adds 37 g KNO_3 with stirring to 105 g of water, what type of solution will result?

- A. A supersaturated solution.
- B. A supercritical solution.
- C. An unsaturated solution.
- D. A saturated solution.

21. The solubility of $\text{O}_2(g)$ in water at 20°C and 1.0 atm $\text{O}_2(g)$ pressure is 1.3×10^{-3} mol/L. What minimum partial pressure of $\text{O}_2(g)$, at 20°C is needed to maintain a dissolved oxygen concentration of 1.4×10^{-4} mol/L, the concentration necessary to maintain fish life?

- A. 0.98 atm
- B. 0.21 atm
- C. 0.055 atm
- D. 0.11 atm

22. What is the molality of a solution prepared from 47.2 g KBr in 500.0 mL of water at 25°C ? Assume the density of water is 1.00 g/mL.

- A. 0.793 *m*
 - B. 1.47 *m*
 - C. 0.0944 *m*
 - D. 2.48 *m*
-

23. Find the ppm concentration when 17.7 mg sucrose is dissolved in 1.25 L of water.

- A. 1.89×10^3 ppm
B. 14.2 ppm
C. 17.7 ppm
D. 7.06 ppm

24. What is the percent NaOCl by mass in an aqueous 5.00 *m* NaOCl solution?

- A. 35.5%
B. 5.00%
C. 67.4%
D. 27.1%

25. What is the molality of an aqueous 1.25 M solution of MgCl₂ given the density is 1.02 g/mL?

- A. 1.28 *m*
B. 1.39 *m*
C. 1.20 *m*
D. 1.31 *m*

26. Which one of the following concentration units is temperature dependent?

- A. molality
B. mole percent
C. mole fraction
D. molarity

27. The vapor pressure of benzene, C₆H₆, at 26 °C is 100.0 torr. How many moles of a nonvolatile solute need to be added to 0.500 mol of benzene to reduce the vapor pressure of the solution to 70.0 torr?

- A. 0.333 mol
B. 0.167 mol
C. 0.214 mol
D. 0.667 mol
-

28. What is the freezing point of a 2.1 *m* solution of a molecular compound in chloroform?
 K_f of chloroform = $4.70\text{ }^\circ\text{C}/m$ and the normal freezing point of chloroform is $-63.5\text{ }^\circ\text{C}$.

A. $-9.00\text{ }^\circ\text{C}$

C. $-73.4\text{ }^\circ\text{C}$

B. $-51.3\text{ }^\circ\text{C}$

D. $9.00\text{ }^\circ\text{C}$

29. Calculate the osmotic pressure of 5.27 g NaCl dissolved in enough water to make 500. mL of solution at $25.0\text{ }^\circ\text{C}$.

A. 0.740 atm

C. 8.82 atm

B. 4.41 atm

D. 2.51 atm

30. Which one of the following aqueous solutions will have an osmotic pressure closest to that of a 0.15 M NaCl solution?

A. 0.15 M $\text{C}_6\text{H}_6\text{O}_{12}$

C. 0.050 M $\text{Al}(\text{NO}_3)_3$

B. 0.10 M CaCl_2

D. 0.075 M CH_3OH

CHE 107 SPRING 2013 Exam 1 Key

1. C
2. B
3. C
4. B
5. B
6. A
7. D
8. D
9. B
10. C
11. D
12. B
13. D
14. B
15. C
16. C
17. C
18. A
19. D
20. C
21. D
22. A
23. B
24. D
25. B
26. D
27. C
28. C
29. C
30. B