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| 1. In a 0.1 molar solution of NaCl in water, which one of the following will be closest to 0.1?   |  |  |  | | --- | --- | --- | |  | a. | The mole fraction of NaCl. | |  | b. | The mass fraction of NaCl. | |  | c. | The mass percent of NaCl. | |  | d. | The molality of NaCl. | |  | e. | All of these are about 0.1. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 2. Which of the following concentration measures will change in value as the temperature of a solution changes?   |  |  |  | | --- | --- | --- | |  | a. | mass percent | |  | b. | mole fraction | |  | c. | molality | |  | d. | molarity | |  | e. | all of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 3. For an acid-base reaction, 1 *M* Al(OH)3 has a normality of 3 *N*. This is best explained because:   |  |  |  | | --- | --- | --- | |  | a. | The equivalent mass is three times the molar mass. | |  | b. | Each mole contains 3 moles of hydroxide ions that can react with 3 moles of hydrated protons. | |  | c. | The mole fraction is equal to 3 when aluminum hydroxide is mixed with water. | |  | d. | The normality is *always* three times stronger than the concentration of a solution. | |  | e. | At least two of the above statements are correct. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 4. How many milliliters of 18.2 *M* H2SO4 are needed to prepare 600.0 mL of 0.10 *M* H2SO4?   |  |  |  | | --- | --- | --- | |  | a. | 0.30 mL | |  | b. | 109 mL | |  | c. | 3.3 mL | |  | d. | 1.6 mL | |  | e. | 4.3 mL |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | molarity | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 5. 2.56 L of an aqueous solution containing 25.00 g of KCl dissolved in pure water is prepared. The molarity of the solution is:   |  |  |  | | --- | --- | --- | |  | a. | 0.131 *M* | |  | b. | 9.76 *M* | |  | c. | 7.63 *M* | |  | d. | 0.262 *M* | |  | e. | 0.0654 *M* |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | molarity | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 6. What volume of a 0.687 *M* solution of CaCl2 contains 1.28 g of solute?   |  |  |  | | --- | --- | --- | |  | a. | 59.6 mL | |  | b. | 16.8 mL | |  | c. | 1.86 mL | |  | d. | 7.92 mL | |  | e. | 83.2 mL |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | molarity | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 7. Determine the molarity of a solution containing 6.93 g BaCl2 in 750.0 mL of solution.   |  |  |  | | --- | --- | --- | |  | a. | 3.33 × 10–2 *M* | |  | b. | 2.50 × 10–2 *M* | |  | c. | 9.24 × 10–3 *M* | |  | d. | 4.44 × 10–2 *M* | |  | e. | 9.24 *M* |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | molarity | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 8. A solution containing 320.4 g of Mg(NO3)2 per liter has a density of 1.114 g/mL. The molarity of the solution is:   |  |  |  | | --- | --- | --- | |  | a. | 2.160 *M* | |  | b. | 1.939 *M* | |  | c. | 6.480 *M* | |  | d. | 2.406 *M* | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | molarity | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 9. Calculate the molality of C2H5OH in a water solution that is prepared by mixing 50.0 mL of C2H5OH with 114.2 mL of H2O at 20°C. The density of the C2H5OH is 0.789 g/mL at 20°C. (Assume the density of water at this temperature is 1.00 g/mL.)   |  |  |  | | --- | --- | --- | |  | a. | 0.0095778 *m* | |  | b. | 0.157 *m* | |  | c. | 0.133 *m* | |  | d. | 7.50 *m* | |  | e. | 9.5221 *m* |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | molarity | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 10. What is the molality of a solution of 55.8 g of propanol (CH3CH2CH2OH) in 152 mL water, if the density of water is 1.00 g/mL?   |  |  |  | | --- | --- | --- | |  | a. | 6.11 *m* | |  | b. | 0.00611 *m* | |  | c. | 0.164 *m* | |  | d. | 0.928 *m* | |  | e. | 9.28 *m* |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | molarity | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 11. A solution containing 292 g of Mg(NO3)2 per liter has a density of 1.108 g/mL. The molality of the solution is:   |  |  |  | | --- | --- | --- | |  | a. | 2.00 *m* | |  | b. | 2.41 *m* | |  | c. | 1.77 *m* | |  | d. | 6.39 *m* | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | molarity | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 12. A 3.140 molal solution of NaCl is prepared. How many grams of NaCl are present in a sample containing 2.492 kg of water?   |  |  |  | | --- | --- | --- | |  | a. | 782.5 g | |  | b. | 133.8 g | |  | c. | 277.4 g | |  | d. | 457.3 g | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | molarity | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 13. How many molecules of sucrose (table sugar), C12H22O11, dissolved in 450.0 g of water are needed to make a 1.66*m* solution?   |  |  |  | | --- | --- | --- | |  | a. | 4.50 × 1023 molecules | |  | b. | 7.47 × 1023 molecules | |  | c. | 2.22 × 1024 molecules | |  | d. | 2.50 × 1025 molecules | |  | e. | 1.63 × 1023 molecules |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | molarity | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 14. A 20.0-g sample of methyl alcohol (CH3OH, molar mass = 32.04 g/mol) was dissolved in 31.5 g of water. The mole fraction of CH3OH is:   |  |  |  | | --- | --- | --- | |  | a. | 0.357 | |  | b. | 0.624 | |  | c. | 0.388 | |  | d. | 3.80 | |  | e. | 0.263 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | mole fraction | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 15. What is the mole percent of ethanol (C2H5OH), which consists of 71.0 g of ethanol for every 12.8 g of water present?   |  |  |  | | --- | --- | --- | |  | a. | 68.4% | |  | b. | 2.17% | |  | c. | 12.306% | |  | d. | 84.7% | |  | e. | 31.6% |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | mole fraction | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:26 PM | | *DATE MODIFIED:* | 3/4/2016 4:26 PM | |

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| 16. If 2.00 g of helium gas and 5.29 g of oxygen gas are mixed together, what is the mole fraction of helium in the solution?   |  |  |  | | --- | --- | --- | |  | a. | 0.274 | |  | b. | 0.249 | |  | c. | 0.751 | |  | d. | 0.165 | |  | e. | 1.33 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | mole fraction | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 17. Calculate the mole fraction of NaCl in a solution prepared by dissolving 117 g NaCl in 1.11 kg H2O.   |  |  |  | | --- | --- | --- | |  | a. | 9.91 × 10–1 | |  | b. | 1.12 × 10–2 | |  | c. | 6.29 × 10–2 | |  | d. | 1.57 × 10–2 | |  | e. | 3.15 × 10–2 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | mole fraction | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 18. Find the mass percent of CuSO4 in a solution whose density is 1.30 g/mL and whose molarity is 1.36 *M*.   |  |  |  | | --- | --- | --- | |  | a. | 83.3% | |  | b. | 1.77% | |  | c. | 16.7% | |  | d. | 2.66% | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | mass percentage of solute | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 19. Find the mass percent of CaCl2 in a solution whose molarity is 2.05*M* and whose density is 1.17 g/mL.   |  |  |  | | --- | --- | --- | |  | a. | 19.4% | |  | b. | 24.1% | |  | c. | 80.6% | |  | d. | 22.8% | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | mass percentage of solute | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 20. A solution of hydrogen peroxide is 26.3% H2O2 by mass and has a density of 1.11 g/cm3. The molarity of the solution is:   |  |  |  | | --- | --- | --- | |  | a. | 8.06 *M* | |  | b. | 0.292 *M* | |  | c. | 8.58 *M* | |  | d. | 8.95 *M* | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | conversion of concentration units | expressing concentration | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 21. The term "proof" is defined as twice the percent by volume of pure ethanol in solution. Thus, a solution that is 95% (by volume) ethanol is 190 proof. What is the molarity of ethanol in a 92 proof ethanol/water solution?   |  |  |  | | --- | --- | --- | |  | density of ethanol | = 0.80 g/cm3 | |  | density of water | = 1.0 g/cm3 | |  | mol. wt. of ethanol | = 46 g/mol |  |  |  |  | | --- | --- | --- | |  | a. | 0.46 *M* | |  | b. | 0.80 *M* | |  | c. | 0.92 *M* | |  | d. | 8.0 *M* | |  | e. | 17 *M* |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | conversion of concentration units | expressing concentration | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 22. Calculate the molarity of a solution of magnesium chloride with a concentration of 23.5 mg/mL.   |  |  |  | | --- | --- | --- | |  | a. | 0.494 *M* | |  | b. | 0.247 *M* | |  | c. | 0.123 *M* | |  | d. | 4.05 *M* | |  | e. | 0.393 *M* |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | conversion of concentration units | expressing concentration | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 23. What is the molarity of a HNO3 solution prepared by adding 290.7 mL of water to 350.0 mL of 12.3 *M* HNO3?   |  |  |  | | --- | --- | --- | |  | a. | 14.8 *M* | |  | b. | 7.88 *M* | |  | c. | 6.72 *M* | |  | d. | 2.76 *M* | |  | e. | 3.58 *M* |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | dilution calculation | expressing concentration | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 24. When 0.794 g of NH4NO3 was added to 150.0 g of water in a Styrofoam cup, the temperature dropped by 0.413°C. The heat capacity of H2O is 4.18 J/g°C. Assume the specific heat of the solution equals that of pure H2O and that the calorimeter neither absorbs nor leaks heat. The molar heat of solution of solid NH4NO3 is:   |  |  |  | | --- | --- | --- | |  | a. | +262 J/mol | |  | b. | +26.2 kJ/mol | |  | c. | +2.62 kJ/mol | |  | d. | –2.62 kJ/mol | |  | e. | –262 J/mol |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | solution formation | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 25. Which of the following chemical or physical changes is an endothermic process?   |  |  |  | | --- | --- | --- | |  | a. | the evaporation of water | |  | b. | the combustion of gasoline | |  | c. | the mixing of sulfuric acid and water | |  | d. | the freezing of water | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 26. How many of the following help determine whether or not a solution forms?   |  |  |  | | --- | --- | --- | |  | I. | the polarities of the solute and solvent | |  | II. | the densities of the solute and solvent | |  | III. | the probability of the mixed state (of the solution) | |  | IV. | the energies needed for the solution formation to occur | |  | V. | the state of matter of the solute (solid, liquid, gas) |   ​   |  |  |  | | --- | --- | --- | |  | a. | 1 | |  | b. | 2 | |  | c. | 3 | |  | d. | 4 | |  | e. | 5 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/3/2017 6:41 AM | |

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| 27. Rank the following compounds according to increasing solubility in water.   |  |  | | --- | --- | | I. | CH3–CH2–CH2–CH3 | | II. | CH3–CH2–O–CH2–CH3 | | III. | CH3–CH2–OH | | IV. | CH3–OH |   ​   |  |  |  | | --- | --- | --- | |  | a. | I < III < IV < II | |  | b. | I < II < IV < III | |  | c. | III < IV < II < I | |  | d. | I < II < III < IV | |  | e. | None of these (A-D) is correct. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | solubility | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/3/2017 6:41 AM | |

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| 28. Which statement about hydrogen bonding is true?   |  |  |  | | --- | --- | --- | |  | a. | Hydrogen bonding is the intermolecular attractive forces between two hydrogen atoms in solution. | |  | b. | The hydrogen bonding capabilities of water molecules cause CH3CH2CH2CH3 to be more soluble in water than CH3OH. | |  | c. | Hydrogen bonding of solvent molecules with a solute will not affect the solubility of the solute. | |  | d. | Hydrogen bonding interactions between molecules are stronger than the covalent bonds within the molecule. | |  | e. | Hydrogen bonding arises from the dipole moment created by the unequal sharing of electrons within certain covalent bonds within a molecule. |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | solubility | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 29. Which of the following favors the solubility of an ionic solid in a liquid solvent?   |  |  |  | | --- | --- | --- | |  | a. | a large magnitude of the solvation energy of the ions | |  | b. | a small magnitude of the lattice energy of the solute | |  | c. | a large polarity of the solvent | |  | d. | all of the above | |  | e. | none of the above |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | ionic solution | solubility | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 30. Solid KF has a lattice energy of 804 kJ/mol and a heat of solution (in water) of –15 kJ/mol. RbF has a lattice energy of 768 kJ/mol and a heat of solution (in water) of –24 kJ/mol. Which salt forms stronger attractions with water?   |  |  |  | | --- | --- | --- | |  | a. | KF, since it has a larger lattice energy. | |  | b. | RbF, since it has a smaller lattice energy. | |  | c. | KF, since it has a more negative heat of hydration. | |  | d. | RbF, since it has a more negative heat of hydration | |  | e. | They form equally strong attractions with water, since they both have negative heats of mixing. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | ionic solution | solubility | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 31. The lattice energy of NaBr is 732 kJ/mol and its heat of solution is –1 kJ/mol. Calculate the hydration of energy of NaBr(*s*).   |  |  |  | | --- | --- | --- | |  | a. | –2.0 kJ/mol | |  | b. | –731.0 kJ/mol | |  | c. | –733.0 kJ/mol | |  | d. | 731.0 kJ/mol | |  | e. | 733.0 kJ/mol |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | general chemistry | ionic solution | solubility | solution formation | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 32. When a substance dissolves in water, heat energy is released if:   |  |  |  | | --- | --- | --- | |  | a. | The lattice energy is positive. | |  | b. | The hydration energy is positive. | |  | c. | The hydration energy is more negative than the lattice energy is positive. | |  | d. | The hydration energy is negative. | |  | e. | None of these (A-D). |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | ionic solution | solubility | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 33. We can predict the solubility of a compound by looking at the sign of the enthalpy of solution.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 34. Use the following drawing of a gaseous solute in equilibrium with a solution to help answer the question below.  Which of the following statements are true when the piston is pushed in (downward)?   |  |  |  | | --- | --- | --- | |  | a. | This will cause the pressure of the gas to increase and the concentration of the dissolved gas to go down. | |  | b. | This will cause the pressure of the gas to decrease and the concentration of the dissolved gas to go down. | |  | c. | This will cause the pressure of the gas to increase and the concentration of the dissolved gas to go up. | |  | d. | This will cause the volume of the gas to decrease and the concentration of the dissolved gas to go down. | |  | e. | This will cause the volume of the gas to increase and the concentration of the dissolved gas to go up. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | effect of temperature and pressure on solubility | general chemistry | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 35. Which of the following correctly states the relationship between temperature and the solubility of a substance in water?   |  |  |  | | --- | --- | --- | |  | a. | The solubility of a substance in water increases as the temperature rises, especially for gases. | |  | b. | The solubility of a substance in water decreases as the temperature rises, especially for ionic solids. | |  | c. | The solubility of a substance in water with temperature cannot be accurately predicted, especially for ionic solids. | |  | d. | The solubility of a substance in water decreases as the temperature lowers, especially for gases. | |  | e. | Both A and D are correct. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | effect of temperature and pressure on solubility | general chemistry | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 36. When solid Ca(CH3COO)2 is dissolved in a nearly saturated solution of Ca(CH3COO)2, the solution becomes warmer. This information indicates that if the temperature of a solution is decreased:   |  |  |  | | --- | --- | --- | |  | a. | Δ*H* will become negative. | |  | b. | Δ*H* will become zero. | |  | c. | The solubility of Ca(CH3COO)2 will decrease. | |  | d. | The solubility of Ca(CH3COO)2 will increase. | |  | e. | The solubility of Ca(CH3COO)2 will not change. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | effect of temperature and pressure on solubility | general chemistry | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 37. A correct statement of Henry's law is:   |  |  |  | | --- | --- | --- | |  | a. | The concentration of a gas in solution is inversely proportional to temperature. | |  | b. | The concentration of a gas in solution is directly proportional to the mole fraction of solvent. | |  | c. | The concentration of a gas in solution is independent of pressure. | |  | d. | The concentration of a gas in a solution is inversely proportional to pressure. | |  | e. | None of these. |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | effect of temperature and pressure on solubility | general chemistry | Henry's law | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 38. The solubility of O2 in water is 0.590 g/L at an oxygen pressure of around 14.7 atm. What is the Henry's law constant for O2 (in units of mol/L·atm)?   |  |  |  | | --- | --- | --- | |  | a. | 4.01 × 10–2 | |  | b. | 1.25 × 10–3 | |  | c. | 7.97 × 102 | |  | d. | 2.71 × 10–1 | |  | e. | None of the above are within 5% of the correct answer. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | effect of temperature and pressure on solubility | general chemistry | Henry's law | solution formation | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 39. What partial pressure of oxygen gas is required in order for 0.00316 g of the gas to dissolve in 16.8 mL of pure water? The Henry's law constant for oxygen gas is 1.3 × 10–3 *M* atm–1.   |  |  |  | | --- | --- | --- | |  | a. | 2.4 × 10–7 atm | |  | b. | 2.2 × 10–1 atm | |  | c. | 4.5 × 100 atm | |  | d. | 1.3 × 10–7 atm | |  | e. | 4.2 × 10–2 atm |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | effect of temperature and pressure on solubility | general chemistry | Henry's law | solution formation | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 40. The solubility of a gas usually increases with increasing temperature.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | effect of temperature and pressure on solubility | general chemistry | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 41. The vapor pressure of water at 25.0°C is 23.8 torr. Determine the mass of glucose (molar mass = 180 g/mol) needed to add to 500.0 g of water to change the vapor pressure to 22.8 torr.   |  |  |  | | --- | --- | --- | |  | a. | 21.9 g | |  | b. | 219 g | |  | c. | 180 g | |  | d. | 6.21 kg | |  | e. | 188 g |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | vapor pressure lowering | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 42. A solution is prepared from 64.4 g of a nonvolatile, nondissociating solute and 85.0 g of water. The vapor pressure of the solution at 60°C is 132 torr. The vapor pressure of water at 60°C is 150. torr. What is the molar mass of the solute?   |  |  |  | | --- | --- | --- | |  | a. | 73.2 g/mol | |  | b. | 13.7 g/mol | |  | c. | 41.4 g/mol | |  | d. | 196 g/mol | |  | e. | 100.0 g/mol |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | vapor pressure lowering | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 2/14/2017 3:54 AM | |

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| 43. An ideal solution is formed from a mixture of the nonvolatile solute urea, CO(NH2)2, and methanol, CH3OH. The vapor pressure of pure methanol at 20°C is 89 mmHg. If 5.4 g of urea is mixed with 35.0 g of methanol, calculate the vapor pressure of the methanol solution.   |  |  |  | | --- | --- | --- | |  | a. | 6.8 mmHg | |  | b. | 77 mmHg | |  | c. | 69 mmHg | |  | d. | 20 mmHg | |  | e. | 82 mmHg |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | vapor pressure lowering | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 44. A salt solution sits in an open beaker. Assuming constant temperature and pressure, the vapor pressure of the solution   |  |  |  | | --- | --- | --- | |  | a. | increases over time | |  | b. | decreases over time | |  | c. | stays the same over time | |  | d. | need to know which salt is in the solution to answer this | |  | e. | need to know the temperature and pressure to answer this |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| For each of the following solutions, describe the deviation with respect to Raoult's Law. |

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| 45. hexane (C6H14) and chloroform (CHCl3)   |  |  |  | | --- | --- | --- | |  | a. | relatively ideal | |  | b. | positive deviation | |  | c. | negative deviation | |  | d. | more information needed | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 11-1 | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 46. acetone (C3H6O) and water   |  |  |  | | --- | --- | --- | |  | a. | relatively ideal | |  | b. | positive deviation | |  | c. | negative deviation | |  | d. | more information needed | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 11-1 | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solubility | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 47. hexane (C6H14) and octane (C8H18)   |  |  |  | | --- | --- | --- | |  | a. | relatively ideal | |  | b. | positive deviation | |  | c. | negative deviation | |  | d. | more information needed | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *PREFACE NAME:* | Ref 11-1 | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 48. At a given temperature, you have a mixture of benzene (vapor pressure of pure benzene = 745 torr) and toluene (vapor pressure of pure toluene = 290. torr). The mole fraction of benzene in the solution is 0.590. Assuming ideal behavior, calculate the mole fraction of toluene in the vapor above the solution.   |  |  |  | | --- | --- | --- | |  | a. | 0.213 | |  | b. | 0.778 | |  | c. | 0.641 | |  | d. | 0.359 | |  | e. | 0.590 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solubility | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 49. At a given temperature, you have a mixture of benzene (vapor pressure of pure benzene = 745 torr) and toluene (vapor pressure of pure toluene = 290 torr). The mole fraction of benzene *in the vapor* above the solution is 0.590. Assuming ideal behavior, calculate the mole fraction of toluene *in the solution*.   |  |  |  | | --- | --- | --- | |  | a. | 0.213 | |  | b. | 0.778 | |  | c. | 0.641 | |  | d. | 0.359 | |  | e. | 0.590 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 50. At 40°C, heptane has a vapor pressure of about 91.6 torr and octane has a vapor pressure of about 31.2 torr. Assuming ideal behavior, what is the vapor pressure of a solution that contains twice as many moles of heptane as octane?   |  |  |  | | --- | --- | --- | |  | a. | 61.1 torr | |  | b. | 51.3 torr | |  | c. | 71.5 torr | |  | d. | 81.9 torr | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 51. A solution contains 1 mole of liquid A and 3 moles of liquid B. This solution has a vapor pressure of 314 torr at 25°C. At 25°C, liquid A has a vapor pressure of 265 torr and liquid B has a vapor pressure of 355 torr. Which of the following is true?   |  |  |  | | --- | --- | --- | |  | a. | This solution exhibits a positive deviation from Raoult's Law. | |  | b. | This solution exhibits a negative deviation from Raoult's Law. | |  | c. | This solution is ideal. | |  | d. | More information is needed to answer this question. | |  | e. | None of these (A-D). |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 52.   |  |  | | --- | --- | |  | Vapor pressure at 25°C | | benzene (C6H6) | 94.4 torr | | chloroform (CHCl3) | 172.0 torr |   Using the above data, calculate the vapor pressure of chloroform over a chloroform-benzene solution at 25°C, which contains 48.2 g CHCl3 and 48.2 g C6H6. Assume the solution behaves ideally.   |  |  |  | | --- | --- | --- | |  | a. | 68.0 torr | |  | b. | 37.3 torr | |  | c. | 104 torr | |  | d. | 86.0 torr | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| Solutions of benzene and toluene obey Raoult’s law. The vapor pressures at 20°C are: benzene, 76 torr; toluene, 21 torr. |

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| 53. What is the mole fraction of benzene in a benzene-toluene solution whose vapor pressure is 57 torr at 20°C?   |  |  |  | | --- | --- | --- | |  | a. | 0.20 | |  | b. | 0.35 | |  | c. | 0.65 | |  | d. | 0.75 | |  | e. | 0.80 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *PREFACE NAME:* | Ref 11-2 | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 54. If the mole fraction of benzene in a particular benzene-toluene solution is 0.63, what is the mole fraction of benzene in the vapor phase in equilibrium with that solution?   |  |  |  | | --- | --- | --- | |  | a. | 0.24 | |  | b. | 0.49 | |  | c. | 0.63 | |  | d. | 0.78 | |  | e. | 0.86 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *PREFACE NAME:* | Ref 11-2 | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 55. A benzene-toluene solution is allowed to come to equilibrium with its vapor. The vapor is then condensed and found to contain 50.0 mole percent of each component. Calculate the composition (mole percent) of the original solution. The vapor pressures of pure benzene and toluene at this temperature are: 750. torr and 300. torr, respectively.   |  |  |  | | --- | --- | --- | |  | a. | 50.2% benzene | |  | b. | 28.6% benzene | |  | c. | 71.0% benzene | |  | d. | 40.0% benzene | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 56. A solution is made by adding 0.100 mole of ethyl ether to 0.813 mole of ethyl alcohol. If the vapor pressure of ethyl ether and ethyl alcohol at 20°C are 375 torr and 20.0 torr, respectively, the vapor pressure of the solution at 20°C (assuming ideal behavior) is:   |  |  |  | | --- | --- | --- | |  | a. | 58.9 torr | |  | b. | 336 torr | |  | c. | 23.3 torr | |  | d. | 395 torr | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 57. A solution of two liquids, A and B, shows negative deviation from Raoult's law. This means that:   |  |  |  | | --- | --- | --- | |  | a. | The molecules of A interact strongly with other A-type molecules. | |  | b. | The two liquids have a positive heat of solution. | |  | c. | Molecules of A interact weakly, if at all, with B molecules. | |  | d. | The molecules of A hinder the strong interaction between B molecules. | |  | e. | Molecules of A interact more strongly with B than A with A, or B with B. |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 58. Benzene and toluene form an ideal solution. At 298 K, what is the mole fraction of benzene in the liquid that is in equilibrium with a vapor that has equal partial pressures of benzene and toluene? At 298 K, the vapor pressures of pure benzene and pure toluene are 95 and 28 torr, respectively.   |  |  |  | | --- | --- | --- | |  | a. | 0.50 | |  | b. | 0.77 | |  | c. | 0.23 | |  | d. | 0.30 | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 59. A solution of CH3OH in H2O would most likely   |  |  |  | | --- | --- | --- | |  | a. | be ideal | |  | b. | show positive deviations from Raoult's law | |  | c. | show negative deviations from Raoult's law | |  | d. | not be ideal, but the deviations cannot be predicted | |  | e. | obey Raoult's law |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 60. A liquid-liquid solution is called an ideal solution if:   |  |  | | --- | --- | | I. | It obeys *PV* = *nRT*. | | II. | It obeys Raoult's law. | | III. | Solute-solute, solvent-solvent, and solute-solvent interactions are very similar. | | IV. | Solute-solute, solvent-solvent, and solute-solvent interactions are quite different. |   ​   |  |  |  | | --- | --- | --- | |  | a. | I, II, III | |  | b. | I, II, IV | |  | c. | II, III | |  | d. | II, IV | |  | e. | I, III, IV |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/3/2017 6:43 AM | |

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| 61. Liquid A and liquid B form a solution that behaves ideally according to Raoult's law. The vapor pressures of the pure substances A and B are 228 torr and 135 torr, respectively. Determine the vapor pressure over the solution if 1.12 moles of liquid A is added to 5.30 moles of liquid B.   |  |  |  | | --- | --- | --- | |  | a. | 151 torr | |  | b. | 183 torr | |  | c. | 212 torr | |  | d. | 760 torr | |  | e. | 39.8 torr |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 62. Two liquids form a solution and release a quantity of heat. How does the pressure above the solution compare to that predicted by Raoult's law?   |  |  |  | | --- | --- | --- | |  | a. | It will be greater. | |  | b. | It will be less. | |  | c. | It will be the same. | |  | d. | It will show positive deviation. | |  | e. | None of these. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 63. Consider a solution containing liquids A and B where the mole fraction of B is 0.60. Assuming ideality, calculate the mole fraction of A in the vapor at equilibrium with this solution at 25°C. (The vapor pressures of pure liquid A and B at 25°C are 153.5 torr and 400.0 torr, respectively.)   |  |  |  | | --- | --- | --- | |  | a. | 0.20 | |  | b. | 256 | |  | c. | 0.37 | |  | d. | 2.61 × 10–3 | |  | e. | 4.11 × 10–3 |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 64. Consider a solution containing liquids A and B where the mole fraction of B is 0.60. Assuming ideality, calculate the mole fraction of B in the vapor at equilibrium with this solution at 25°C. (The vapor pressures of pure liquid A and B at 25°C are 147.0 torr and 400.0 torr, respectively.)   |  |  |  | | --- | --- | --- | |  | a. | 0.20 | |  | b. | 0.25 | |  | c. | 0.36 | |  | d. | 0.76 | |  | e. | 0.80 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 65. A solution with a positive enthalpy of solution (Δ*H*soln) is expected to show positive deviations from Raoult's law.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | True | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | Raoult's law | solutions | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 66. Determine the mass of a nonvolatile, nonionizing compound that must be added to 3.90 kg of water to lower the freezing point to 98.70°C. The molar mass of the compound is 50.0 g/mol and the *K*f for water is 1.86°C kg/mol.   |  |  |  | | --- | --- | --- | |  | a. | 207 g | |  | b. | 136 g | |  | c. | 472 g | |  | d. | 8.96 g | |  | e. | 18.3 g |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/7/2017 3:58 AM | |

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| 67. The freezing point (*T*f) for t-butanol is 25.50°C and *K*f is 9.1°C/*m*. Usually t-butanol absorbs water on exposure to the air. If the freezing point of a 14.8-g sample of t-butanol is measured as 24.59°C, how many grams of water are present in the sample?   |  |  |  | | --- | --- | --- | |  | a. | 0.10 g | |  | b. | 0.027 g | |  | c. | 10. g | |  | d. | 2.7 g | |  | e. | 27 g |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 68. The molar mass of a solid as determined by freezing point depression is 10% higher than the true molar mass. Which of the following experimental errors could not account for this discrepancy?   |  |  |  | | --- | --- | --- | |  | a. | Not all the solid was dissolved. | |  | b. | More than the recorded amount of solvent was pipetted into the solution. | |  | c. | The solid dissociated slightly into two particles when it dissolved. | |  | d. | Some solid was left on the weighing paper. | |  | e. | Before the solution was prepared, the container was rinsed with solvent and not dried. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 69. A solution consisting of 0.250 mol of methylbenzene, C6H5CH3, in 246 g of nitrobenzene, C6H5NO2, freezes at –1.1°C. Pure nitrobenzene freezes at 6.0°C. What is the freezing-point depression constant of nitrobenzene?   |  |  |  | | --- | --- | --- | |  | a. | 4.4°C/*m* | |  | b. | 3.5°C/*m* | |  | c. | 28°C/*m* | |  | d. | 7.0°C/*m* | |  | e. | 14°C/*m* |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 70. A 7.27-gram sample of a compound is dissolved in 250. grams of benzene. The freezing point of this solution is 1.02°C below that of pure benzene. What is the molar mass of this compound? (Note: *K*f for benzene = 5.12°C/m.) Ignore significant figures for this problem.   |  |  |  | | --- | --- | --- | |  | a. | 36.5 g/mol | |  | b. | 146 g/mol | |  | c. | 292 g/mol | |  | d. | 5.79 g/mol | |  | e. | 73.0 g/mol |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 71. Thyroxine, an important hormone that controls the rate of metabolism in the body, can be isolated from the thyroid gland. If 0.455 g of thyroxine is dissolved in 10.0 g of benzene, the freezing point of the solution could be measured as 5.144°C. Pure benzene freezes at 5.444°C and has a value for the molal freezing point depression constant of *K*f of 5.12°C/m. What is the approximate molar mass of thyroxine?   |  |  |  | | --- | --- | --- | |  | a. | 7.77 × 105 g/mol | |  | b. | 777 g/mol | |  | c. | 7.77 g/mol | |  | d. | 11.3 g/mol | |  | e. | 42.8 g/mol |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 72. When a 49.0-g sample of an unknown compound is dissolved in 500.g of benzene, the freezing point of the resulting solution is 3.77°C. The freezing point of pure benzene is 5.48°C and *K*f for benzene is 5.12°C/m. Calculate the molar mass of the unknown compound.   |  |  |  | | --- | --- | --- | |  | a. | 147 g/mol | |  | b. | 28.7 g/mol | |  | c. | 251 g/mol | |  | d. | 587 g/mol | |  | e. | 293 g/mol |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 73. To calculate the freezing point of an ideal dilute solution of a single, nondissociating solute of a solvent, the minimum information one must know is:   |  |  |  | | --- | --- | --- | |  | a. | the molality (of the solute) | |  | b. | the molality (of the solute) and the freezing point depression constant of the solvent | |  | c. | the same quantities as in B, plus the freezing point of the pure solvent | |  | d. | all of the quantities in C, plus the molecular weight of the solute | |  | e. | all of the quantities in C, plus the weight of the solvent |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 74. Which of the following will cause the calculated molar mass of a compound determined by the freezing-point depression method to be greater than the true molar mass?   |  |  |  | | --- | --- | --- | |  | a. | Water gets into the solvent after the freezing point of the pure solvent is determined. | |  | b. | Some of the solute molecules break apart. | |  | c. | The mass of solvent is smaller than determined from the weighing. | |  | d. | While adding the solute, some was spilled on the lab bench. | |  | e. | All of the above. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 75. Determine the change in boiling point for 373.9 g of carbon disulfide (*K*b = 2.34°C kg/mol) if 35.0 g of a nonvolatile, nonionizing compound is dissolved in it. The molar mass of the compound is 70.0 g/mol and the boiling point of the pure carbon disulfide is 46.2°C.   |  |  |  | | --- | --- | --- | |  | a. | 0.219 °C | |  | b. | 1.75 °C | |  | c. | 6.26 °C | |  | d. | 26.4 °C | |  | e. | 3.13 °C |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | boiling point elevation | Chemistry | colligative properties | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 76. What is the boiling point change for a solution containing 0.582 moles of naphthalene (a nonvolatile, nonionizing compound) in 250. g of liquid benzene? (*K*b = 2.53°C/m for benzene)   |  |  |  | | --- | --- | --- | |  | a. | 5.89 °C | |  | b. | 1.08 °C | |  | c. | 4.35 °C | |  | d. | 1.47 °C | |  | e. | 0.368 °C |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | boiling point elevation | Chemistry | colligative properties | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 77. A solute added to a solvent raises the boiling point of the solution because:   |  |  |  | | --- | --- | --- | |  | a. | The temperature to cause boiling must be great enough to boil not only the solvent but also the solute. | |  | b. | The solute particles lower the solvent's vapor pressure, thus requiring a higher temperature to cause boiling. | |  | c. | The solute particles raise the solvent's vapor pressure, thus requiring a higher temperature to cause boiling. | |  | d. | The solute increases the volume of the solution, and an increase in volume requires an increase in the temperature to reach the boiling point (derived from *PV* = *nRT*). | |  | e. | Two of the above are correct. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | boiling point elevation | Chemistry | colligative properties | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 78. Adding salt to water decreases the freezing point of the water since it lowers the vapor pressure of the ice.   |  |  |  | | --- | --- | --- | |  | a. | True | |  | b. | False |  |  |  | | --- | --- | | *ANSWER:* | False | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | True / False | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 79. When a nonvolatile solute is added to a volatile solvent, the solution vapor pressure \_\_\_\_\_\_\_\_\_\_, the boiling point \_\_\_\_\_\_\_\_\_\_, the freezing point \_\_\_\_\_\_\_\_\_\_, and the osmotic pressure across a semipermeable membrane \_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | decreases, increases, decreases, decreases | |  | b. | increases, increases, decreases, increases | |  | c. | increases, decreases, increases, decreases | |  | d. | decreases, decreases, increases, decreases | |  | e. | decreases, increases, decreases, increases |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 80. All of the following are colligative properties except:   |  |  |  | | --- | --- | --- | |  | a. | osmotic pressure | |  | b. | boiling point elevation | |  | c. | freezing point depression | |  | d. | density elevation | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 81. A cucumber is placed in a concentrated salt solution. What will most likely happen?   |  |  |  | | --- | --- | --- | |  | a. | Water will flow from the cucumber to the solution. | |  | b. | Water will flow from the solution to the cucumber. | |  | c. | Salt will flow into the cucumber. | |  | d. | Salt will precipitate out. | |  | e. | No change will occur. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 82. Polyethylene is a synthetic polymer or plastic with many uses. 1.42 g of a polyethylene sample was dissolved in enough benzene to make 100. mL of solution, and the osmotic pressure was found to be 1.86 torr at 25oC. What is the approximate molar mass of the polyethylene?   |  |  |  | | --- | --- | --- | |  | a. | 187 g/mol | |  | b. | 1.19 × 104 g/mol | |  | c. | 7.04 × 103 g/mol | |  | d. | 1.30 × 105 g/mol | |  | e. | 1.42 × 105 g/mol |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 83. A 0.2 molar solution of a solute, X, in benzene, displays an osmotic pressure given by the formula π = (0.1)*RT*. Which of the following is most likely to be the case?   |  |  |  | | --- | --- | --- | |  | a. | X exists in benzene as X. | |  | b. | X exists in benzene as X2. | |  | c. | X exists in benzene dissociated into two particles. | |  | d. | This solution strongly deviates from ideal behavior. | |  | e. | None of these is plausible. |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 84. Osmotic pressure depends on all but which of the following?   |  |  |  | | --- | --- | --- | |  | a. | atmospheric pressure | |  | b. | the molarity of the solution | |  | c. | temperature | |  | d. | the ratio of moles of solute to solution volume | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 85. A solution of water and a nonvolatile, nonionizing compound is placed in a tube with a semipermeable membrane on one side. The tube is placed in a beaker of pure water. What initial net effect will occur?   |  |  |  | | --- | --- | --- | |  | a. | Water will flow from the beaker to the tube. | |  | b. | Water will flow from the tube to the beaker. | |  | c. | The compound will pass through the membrane into the solution. | |  | d. | Nothing will move through the membrane either way. | |  | e. | Equilibrium is immediately established. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 86. Determine the osmotic pressure of a solution that contains 0.042 g of a hydrocarbon solute (molar mass = 340 g/mol) dissolved in benzene to make a 350-mL solution. The temperature is 20.0°C.   |  |  |  | | --- | --- | --- | |  | a. | 0.44 torr | |  | b. | 2.2 torr | |  | c. | 2.9 torr | |  | d. | 6.4 torr | |  | e. | 6.0 torr |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 87. Consider pure water separated from an aqueous sugar solution by a semipermeable membrane, which allows water to pass freely but not sugar. After some time has passed, the concentration of sugar solution:   |  |  |  | | --- | --- | --- | |  | a. | will have increased | |  | b. | will have decreased | |  | c. | will not have changed | |  | d. | might have increased or decreased depending on other factors | |  | e. | will be the same on both sides of the membrane |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 88. In osmosis:   |  |  |  | | --- | --- | --- | |  | a. | Knowing the osmotic pressure can help determine the molar mass of a solute dissolved in a solvent. | |  | b. | The semipermeable membrane is used to change the freezing and melting points of a solution. | |  | c. | Solutions cannot have identical osmotic pressures. | |  | d. | Temperature does not affect the osmotic pressure of a solution. | |  | e. | At least two of the above statements are correct. |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 89. What is reverse osmosis?   |  |  |  | | --- | --- | --- | |  | a. | the application, to a concentrated solution, of a pressure that is greater than the osmotic pressure, such that solvent flows from the concentrated solution to the dilute solution | |  | b. | the application, to a dilute solution, of a pressure that is greater than the osmotic pressure, such that solvent flows from the concentrated solution to the dilute solution | |  | c. | the application, to a concentrated solution, of a pressure that is greater than the osmotic pressure, such that solute flows from the concentrated solution to the dilute solution | |  | d. | the application, to a dilute solution, of a pressure that is greater than the osmotic pressure, such that solute flows from the concentrated solution to the dilute solution | |  | e. | the application, to a concentrated solution, of a pressure that is greater than the osmotic pressure, such that solvent flows from the dilute solution to the concentrated solution |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 90. Solutions that have identical osmotic pressures are called \_\_\_\_\_\_\_\_\_\_ solutions.   |  |  |  | | --- | --- | --- | |  | a. | hypertonic | |  | b. | isotonic | |  | c. | hypotonic | |  | d. | hemolytic | |  | e. | dyalitic |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.6 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | isotonic solution | osmotic pressure | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 91. Calculate the molarity of a solution containing KCl and water whose osmotic pressure at 33.3°C is 125 torr. Assume complete dissociation of the salt.   |  |  |  | | --- | --- | --- | |  | a. | 0.00654 *M* | |  | b. | 4.97 *M* | |  | c. | 0.0301 *M* | |  | d. | 0.00327 *M* | |  | e. | 0.0602 *M* |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 92. The observed van't Hoff factor for an electrolyte is less than the expected factor because of \_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | electrolytic repulsion | |  | b. | complete dissociation | |  | c. | coagulation | |  | d. | ion pairing | |  | e. | gelation |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 93. Which of the following solutions would have the highest osmotic pressure?   |  |  |  | | --- | --- | --- | |  | a. | 0.15 *M* NaCl, sodium chloride | |  | b. | 0.15 *M* CaCl2, calcium chloride | |  | c. | 0.2 *M* CH3OH, methanol | |  | d. | 0.2 *M* C6H12O6, glucose | |  | e. | 0.2 *M* C12H22O11, sucrose |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 94. Which of the following solutions has the *lowest* boiling point?   |  |  |  | | --- | --- | --- | |  | a. | 0.15 *M* Na2S | |  | b. | 0.10 *M* MgBr2 | |  | c. | 0.15 *M* Ba(NO2)2 | |  | d. | 0.20 *M* C2H6O2 | |  | e. | 0.10 *M* Fe(NO3)3 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | True | | *KEYWORDS:* | boiling point elevation | Chemistry | colligative properties | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/7/2017 4:33 AM | |

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| 95. What is the freezing point of an aqueous 1.80 molal KCl solution? (*K*f = 1.86°C/*m*)   |  |  |  | | --- | --- | --- | |  | a. | –3.35°C | |  | b. | 3.35°C | |  | c. | –6.70°C | |  | d. | 6.70°C | |  | e. | 0.00°C |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 96. What is the expected boiling point of a solution prepared by dissolving 7.27 g of sodium iodide (NaI) in 74.7 g of water (H2O)? For water, *T*b = 100.00oC and *K*b = 0.512oC *m*–1.   |  |  |  | | --- | --- | --- | |  | a. | 0.66oC | |  | b. | 100.33oC | |  | c. | 103.72oC | |  | d. | 100.66oC | |  | e. | 0.33oC |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | boiling point elevation | Chemistry | colligative properties | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 97. 333.7 g of NaCl completely dissolves (producing Na+ and Cl– ions) in 1.00 kg of water at 25.0°C. The vapor pressure of pure water at this temperature is 23.8 torr. Determine the vapor pressure of the solution.   |  |  |  | | --- | --- | --- | |  | a. | 19.7 torr | |  | b. | 21.6 torr | |  | c. | 18.2 torr | |  | d. | 17.5 torr | |  | e. | 23.8 torr |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | vapor pressure lowering | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 98. The vapor pressure of water at 90°C is 0.692 atm. What is the vapor pressure (in atm) of a solution made by dissolving 3.39 mole(s) of CsF(s) in 1.00 kg of water? Assume that Raoult's law applies.   |  |  |  | | --- | --- | --- | |  | a. | 0.652 atm | |  | b. | 0.777 atm | |  | c. | 0.617 atm | |  | d. | 0.692 atm | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | vapor pressure lowering | vapor pressure of a solution | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 99. You have a 10.40-g mixture of table sugar (C12H22O11) and table salt (NaCl). When this mixture is dissolved in 150. g of water, the freezing point is found to be –2.24°C. Calculate the percent by mass of sugar in the original mixture.   |  |  |  | | --- | --- | --- | |  | a. | 39.0% | |  | b. | 43.8% | |  | c. | 53.9% | |  | d. | 61.0% | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 100. A 4.53-gram sample of a compound is dissolved in enough water to form 100.0 mL of solution. This solution has an osmotic pressure of 25.0 torr at 25°C. If it is assumed that each molecule of the solute dissociates into two particles (in this solvent), what is the molar mass of this solute?   |  |  |  | | --- | --- | --- | |  | a. | 8.86 × 101 g/mol | |  | b. | 5.65 × 103 g/mol | |  | c. | 3.37 × 103 g/mol | |  | d. | 6.74 × 104 g/mol | |  | e. | none of these |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 101. Calculate the osmotic pressure (in torr) of 6.00 L of an aqueous 0.976 *M* solution at 30.°C, if the solute concerned is totally ionized into three ions (e.g., it could be Na2SO4 or MgCl2).   |  |  |  | | --- | --- | --- | |  | a. | 72.8 torr | |  | b. | 5.53 × 104 torr | |  | c. | 3.29 × 104 torr | |  | d. | 1.84 × 104 torr | |  | e. | 6.15 × 103 torr |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 102. A 0.20 *M* solution of MgSO4 has an observed osmotic pressure of 7.8 atm at 25°C. Determine the observed van't Hoff factor for this experiment.   |  |  |  | | --- | --- | --- | |  | a. | 19 | |  | b. | 0.32 | |  | c. | 1.6 | |  | d. | 1.8 | |  | e. | 2.0 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 103. The osmotic pressure of a 0.0100 *M* solution of NaCl in water at 25°C is found to be different from 372 torr because:   |  |  |  | | --- | --- | --- | |  | a. | Osmotic pressures are hard to measure. | |  | b. | Na+ and Cl– ions are strongly hydrated. | |  | c. | Na+ and Cl– ions can form ion pairs. | |  | d. | NaCl does not dissociate in water. | |  | e. | None of these. |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | osmotic pressure | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 104. The most likely reason for colloidal dispersion is \_\_\_\_\_\_\_\_\_\_.   |  |  |  | | --- | --- | --- | |  | a. | the Tyndall effect | |  | b. | coagulation | |  | c. | precipitation | |  | d. | emulsion formation | |  | e. | electrostatic repulsion |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colloid | colloid formation | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 105. What type of colloid is formed when a solid is dispersed in a gas?   |  |  |  | | --- | --- | --- | |  | a. | foam | |  | b. | aerosol | |  | c. | emulsion | |  | d. | sol | |  | e. | gel |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colloid | colloid formation | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 106. What type of colloid is formed when a liquid is dispersed in a liquid?   |  |  |  | | --- | --- | --- | |  | a. | emulsion | |  | b. | gel | |  | c. | foam | |  | d. | sol | |  | e. | aerosol |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.8 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | True | | *KEYWORDS:* | Chemistry | colloid | colloid formation | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 107. Shaving cream is an example of which colloid type?   |  |  |  | | --- | --- | --- | |  | a. | aerosol | |  | b. | foam | |  | c. | emulsion | |  | d. | sol | |  | e. | coagulate |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.8 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colloid | colloid formation | general chemistry | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 108. Calculate the mole fraction of H2SO4 in 9.61 *M* H2SO4. The density of the solution is 1.520 g/mL.   |  |  | | --- | --- | | *ANSWER:* | 0.231  Assume 1 L (1000 mL) of solution. moles H2SO4 in 1 L = 9.61 mol H2SO4 mass of H2SO4 in solution = 9.61 mol \* (98.09g/mol) = 943 g H2SO4 mass of 1 L solution = 1000 mL \* 1.520 g/mL = 1520. g solution mass of H2O in solution = 1520. g - 943 g = 577 g H2O moles H2O in solution = 577 g \* (1 mol/18.02 g) = 32.0 mol H2O mole fraction H2SO4 = 9.61/(9.61 + 32.0) = 0.231 | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | conversion of concentration units | expressing concentration | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 109. What is the percent by mass of ethanol (C2H5OH) in a 1.5-*m* aqueous solution?   |  |  | | --- | --- | | *ANSWER:* | 6.5%    1.5 *m* = 1.5 mol C2H5OH/1.0 kg water 1.5 mol \* 46.07 g/mol = 69 g ethanol 69/(1000 + 69) = 6.5% | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | conversion of concentration units | expressing concentration | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 110. Diagram and label a vapor pressure diagram for an ideal solution of two volatile liquids. Indicate the deviation predicted by an endothermic heat of solution.   |  |  | | --- | --- | | *ANSWER:* | positive deviation; see Figure 11.13b, Sec. 11.4 of Zumdahl, *Chemistry*. | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 11.4 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | vapor pressure of a solution | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 111. A chemist is given a white solid that is suspected of being pure cocaine. When 1.22 g of the solid is dissolved in 15.60 g of benzene, the freezing point is lowered by 1.32°C. Calculate the molar mass of the solid. The molal freezing point constant (*K*f) for benzene is 5.12°C/*m*.   |  |  | | --- | --- | | *ANSWER:* | 303 g/mol  1.32°C = 5.12°C/*m* \* (*n* mol/0.01560 kg); *n* = 0.00402 mol molar mass = 1.22 g/0.00402 mol = 303 g/mol | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 112. A chemist is given a white solid that is suspected of being pure cocaine (molar mass = 303.35 g/mol). When 1.22 g of the solid is dissolved in 15.60 g of benzene, the freezing point is lowered by 1.32°C. The molar mass is calculated from these data to be 303 g. Assuming the following uncertainties, can the chemist be sure the substance is not codeine (molar mass 299.36)? *K*f for benzene is 5.12°C/*m*.                Uncertainties                Mass of solid = ±0.01 g                Mass of benzene = ±0.01 g                Δ*T* (freezing point lowering) = ±0.04°C                *K*f = ±0.01                Support your answer with calculations.   |  |  | | --- | --- | | *ANSWER:* | We want to find the minimum molar mass given these errors. First we want the largest possible *m* value.           *m* =           max mol present = .2661 × .01561 = 4.154 × 10–3molar mass = = 291 g           Clearly, the solid could be codeine. | | *POINTS:* | 1 | | *DIFFICULTY:* | Difficult | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 113. What is the molar mass of glucose if 22.5 g gives a freezing point of –0.930°C when dissolved in 250.0 g of water? If the empirical formula is CH2O, what is the molecular formula?   |  |  | | --- | --- | | *ANSWER:* | 180. g/mol, C6H12O6  0.930°C = 1.86°C/*m* \* (*n* mol/0.2500 kg); *n* = 0.125 mol molar mass = 22.5 g/0.125 mol = 180. g/mol empirical mass CH2O = 30.0; *n* = 180/30.0 = 6 molecular formula = 6(CH2O) = C6H12O6 | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 114. When 92.0 g of a compound is dissolved in 1000. g of water, the freezing point of the solution is lowered to –3.72°C. Determine the molar mass of the compound.   |  |  | | --- | --- | | *ANSWER:* | 46.0 g/mol  3.72°C = 1.86°C/*m* \* (*n* mol/1.000 kg); *n* = 2.00 mol molar mass = 92.0 g/2.00 mol = 46.0 g/mol | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | freezing point depression | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 115. Calculate both the boiling point and the freezing point if 46.0 g of glycerol, C3H5(OH)3, is dissolved in 500.0 g of H2O.   |  |  | | --- | --- | | *ANSWER:* | freezing point = –1.86°C     boiling point = 100.51°C  46.0 g/92.09 g/mol = 0.500 mol glycerol molality of solution = 0.500 mol/0.5000 kg = 1 *m* boiling point = 100.00°C + (0.51°C/*m* \* 1*m*) = 100.51°C freezing point = 0.00°C – (1.86°C/*m* \* 1*m*) = –1.86°C | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.5 | | *QUESTION TYPE:* | Subjective Short Answer | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 116. Calculate the molarity of an aqueous solution that is 12.8% by mass NaCl, given that the density of the solution is 1.08 g/mL.   |  |  |  | | --- | --- | --- | |  | a. | 2.03 *M* | |  | b. | 2.19 *M* | |  | c. | 2.36 *M* | |  | d. | 2.71 *M* | |  | e. | 13.8 *M* |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | conversion of concentration units | expressing concentration | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 2/14/2017 5:39 AM | |

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| 117. Calculate the molality of an aqueous solution that is 12.8% by mass NaCl, given that the density of the solution is 1.08 g/mL.   |  |  |  | | --- | --- | --- | |  | a. | 2.03 *M* | |  | b. | 2.19 *M* | |  | c. | 2.36 *M* | |  | d. | 2.51 *M* | |  | e. | 13.8 *M* |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | conversion of concentration units | expressing concentration | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 118. A solution is made by dissolving 27.8 g of nicotine (molar mass = 160 g/mol) in 145 g of cyclohexane (C6H12) to form 142 mL of solution.  Calculate the mole fraction of the solute and the molarity, respectively, of this solution.   |  |  |  | | --- | --- | --- | |  | a. | 0.174, 1.22 M | |  | b. | 0.101, 12.1 M | |  | c. | 0.101, 1.22 M | |  | d. | 0.091, 1.22 M | |  | e. | 0.174, 12.1 M |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | expressing concentration | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 119. A solution is made by dissolving 100. g of cobalt(III)chloride in 250. g of water. to make a solution that has a density of 1.25 g/mL.  Calculate (I) the molality and (II) the molarity of the solution.   |  |  |  | | --- | --- | --- | |  | a. | (I) 2.42 m           (II)  2.16 M | |  | b. | (I) 2.16 m           (II)  2.42 M | |  | c. | (I)  0.400 m        (II)  0.500 M | |  | d. | (I)  0.0417 m      (II)  0.0522 M | |  | e. | (I)  0.0522 m      (II)  0.0417 M |  |  |  | | --- | --- | | *ANSWER:* | a | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.1 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | conversion of concentration units | expressing concentration | general chemistry | solutions | | *OTHER:* | Quantitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 2/14/2017 5:44 AM | |

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| 120. Which of the following statements is true?   |  |  |  | | --- | --- | --- | |  | a. | Ionic compounds with a high lattice energy will be very soluble. | |  | b. | The solubility of a gas in a liquid always increases as the temperature rises. | |  | c. | Some mixtures that have an ENDOTHERMIC heat of solution will happen due to a decrease in entropy. | |  | d. | NaCl(s) has a smaller (less exothermic) ΔHhyd than MgS(s). | |  | e. | All of these are false. |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | solubility | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 121. Which of the following substances should be the most soluble in ethanol (CH3CH2OH)?   |  |  |  | | --- | --- | --- | |  | a. | CH4 | |  | b. | O2 | |  | c. | CH2Cl2 | |  | d. | NaCl | |  | e. | Mg3(PO4)2 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | solubility | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 122. Which one of each of the following pairs would be more soluble in water? I. CH3OH or CH4 II. NaCl or AgCl; III. CH3CH2OH or CH3CH2CH2CH2CH2CH2CH2CH2CH2OH   |  |  |  | | --- | --- | --- | |  | a. | CH3OH, NaCl, CH3CH2CH2CH2CH2CH2CH2CH2CH2OH | |  | b. | CH3OH, NaCl, CH3CH2OH | |  | c. | CH4, NaCl, CH3CH2OH | |  | d. | CH4, AgCl, CH3CH2CH2CH2CH2CH2CH2CH2CH2OH | |  | e. | CH3OH, AgCl, CH3CH2OH |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | solubility | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 123. Which of the following statements is/are true? I. Because ionic forces are so much stronger than hydrogen bonds, no ionic compound will be soluble in ethanol (CH3CH2OH) II. Making of any solution in which a solid is dissolved in a liquid will always have a positive entropy. III. the heats of hydration of ions increase (become more exothermic) as ionic charge increases   |  |  |  | | --- | --- | --- | |  | a. | I and II only | |  | b. | I and III only | |  | c. | II and III only | |  | d. | all three are true | |  | e. | none are true |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.2 | | *QUESTION TYPE:* | Multi-Mode (Multiple choice) | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | general chemistry | ionic solution | solubility | solution formation | solutions | | *OTHER:* | Qualitative | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 124. Which of the following statements is/are true?  I. Supersaturated solutions are very stable  II. The solubility of gases in liquids increases as the temperature is raised  III. The solubility of gases in liquids is independent of the external pressure  ​   |  |  |  | | --- | --- | --- | |  | a. | I and II only | |  | b. | I and III only | |  | c. | II and III only | |  | d. | II only | |  | e. | none are true |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Easy | | *REFERENCES:* | 11.3 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | effect of temperature and pressure on solubility | general chemistry | solution formation | solutions | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/3/2017 6:46 AM | |

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| 125. Which of the following aqueous solutions will have the LOWEST vapor pressure?   |  |  |  | | --- | --- | --- | |  | a. | 0.20 m C6H12O6 | |  | b. | 0.20 m NaCl | |  | c. | 0.10 m CaCl2 | |  | d. | 0.40 m C2H5OH | |  | e. | 0.20 m Na2SO4 |  |  |  | | --- | --- | | *ANSWER:* | e | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | van't Hoff effect | vapor pressure | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/4/2016 4:27 PM | |

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| 126. Which of these solutions 0.1 m NaCl, 0.15 m glucose, 0.1 m CaCl2 would have  I. the highest vapor pressure  II. the lowest boiling point  ​   |  |  |  | | --- | --- | --- | |  | a. | 0.1 m CaCl2, 0.1 m CaCl2 | |  | b. | 0.15 m glucose, 0.1 m CaCl2 | |  | c. | 0.1 m CaCl2, 0.15 m glucose | |  | d. | 0.15 m glucose, 0.15 m glucose | |  | e. | 0.1 m NaCl, 0.1 m CaCl2 |  |  |  | | --- | --- | | *ANSWER:* | d | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | van't Hoff effect | vapor pressure | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/3/2017 6:46 AM | |

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| 127. Which of these solutions 0.1 m NaCl, 0.15 m glucose, 0.1 m CaCl2 would have  I. the lowest vapor pressure  II. the lowest boiling point  ​   |  |  |  | | --- | --- | --- | |  | a. | 0.1 m CaCl2, 0.1 m CaCl2 | |  | b. | 0.15 m glucose, 0.1 m CaCl2 | |  | c. | 0.1 m CaCl2, 0.15 m glucose | |  | d. | 0.15 m glucose, 0.15 m glucose | |  | e. | 0.1 m NaCl, 0.1 m CaCl2 |  |  |  | | --- | --- | | *ANSWER:* | c | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | van't Hoff effect | vapor pressure | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/3/2017 6:47 AM | |

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| 128. Which of these solutions 0.1 m NaCl, 0.15 m glucose, 0.1 m CaCl2 would have  I. the highest vapor pressure  II. the highest boiling point  ​   |  |  |  | | --- | --- | --- | |  | a. | 0.1 m CaCl2, 0.1 m CaCl2 | |  | b. | 0.15 m glucose, 0.1 m CaCl2 | |  | c. | 0.1 m CaCl2, 0.15 m glucose | |  | d. | 0.15 m glucose, 0.15 m glucose | |  | e. | 0.1 m NaCl, 0.1 m CaCl2 |  |  |  | | --- | --- | | *ANSWER:* | b | | *POINTS:* | 1 | | *DIFFICULTY:* | Moderate | | *REFERENCES:* | 11.7 | | *QUESTION TYPE:* | Multiple Choice | | *HAS VARIABLES:* | False | | *KEYWORDS:* | Chemistry | colligative properties | general chemistry | solutions | van't Hoff effect | vapor pressure | | *OTHER:* | Conceptual | | *DATE CREATED:* | 3/4/2016 4:27 PM | | *DATE MODIFIED:* | 3/3/2017 6:47 AM | |