1.
chem10b 13.1-44

A solution is prepared by dissolving 2.60 g of a strong electrolyte   in enough water to make 1.00 L of solution. The osmotic pressure of the solution is 1.25 atm at 25.0 °C. What is the van't Hoff factor (i) for the unknown solute?

Student Response	Correct Answer
A. 0	
B. 0.99	
C. 1.98	
D. 2.98	
E. 0.630	

2.

chem10b 13.1-32

The vapor pressure of pure water at 25 °C is 23.8 torr. Determine the vapor pressure (torr) of

water at   above a solution prepared by dissolving   of urea (a nonvolatile, non-electrolyte,

MW =   in   of water.

Student Response	Correct Answer
A. 0.88	
B. 2.9	
C. 21	
D. 27	
E. 3.3	

3.

chem10b 13.2-28

If the partial pressure of oxygen in the air a diver breathes is too great, _____.

Student Response	Correct Answer
A. the urge to breathe is reduced and not enough CO_2 is removed from the body	
B. hyperventilation results	
C. the urge to breathe is increased and excessive CO_2 is removed from the body	
D. respiratory tissue is damaged by oxidation	
E. No problems result from this situation.	

4.

chem10b 13.1-8

A sample of potassium nitrate (49.0 g) is dissolved in 101 g of water at 100 °C, with precautions taken to avoid evaporation of any water. The solution is cooled to 30.0 °C and no precipitate is

observed. This solution is _____.

Student Response	Correct Answer
A. hydrated	
B. supersaturated	
C. placated	
D. unsaturated	
E. saturated	

5.

chem10b 13.2-6

The phrase "like dissolves like" refers to the fact that _____.

Student Response	Correct Answer
A. solvents can only dissolve solutes of similar molar mass	
B. polar solvents dissolve polar solutes and nonpolar solvents dissolve nonpolar solutes	
C. gases can only dissolve other gases	
D. condensed phases can only dissolve other condensed phases	
E. polar solvents dissolve nonpolar solutes and vice versa	

6.

chem10b 13.1-25

The mole fraction of urea (MW = 60.0 g/mol) in a solution prepared by dissolving 16 g of urea in

of H_2O is _____.

Student Response	Correct Answer
A. 0.58	

B. 0.37
C. 0.13
D. 9.1
E. 0.11

7.

chem10b 13.2-20

Which one of the following substances is more likely to dissolve in benzene (C_6H_6)?

Student Response	Correct Answer
A. NH_3	
B. HBr	
C. NaCl	
D. CH_3CH_2OH	
E. CCl_4	

8.

chem10b 13.2-24

Pressure has an appreciable effect on the solubility of _____ in liquids.

Student Response	Correct Answer
A. solids	
B. solids and liquids	
C. gases	
D. liquids	
E. salts	

9.

chem10b 13.2-13

A solution with a concentration higher than the solubility is _____.

Student Response	Correct Answer
A. is unsaturated	
B. is supersaturated	
C. is not possible	
D. is saturated	
E. is supercritical	

10.

chem10b 13.2-25

Which of the following choices has the compounds correctly arranged in order of increasing solubility in water? (least soluble to most soluble)

Student Response	Correct Answer
A. $CH_4 < NaNO_3 < CHCl_3$	
B. $CH_3OH < CH_4 < LiF$	
C. $CH_3OH < Cl_4 < CHCl_3$	
D. $LiF < NaNO_3 < CHCl_3$	
E. $CCl_4 < CHCl_3 < NaNO_3$	

11.

chem10b 13.2-11

In a saturated solution of a salt in water, _____.

Student Response	Correct Answer
A. the rate of crystallization = the rate of dissolution	
B. seed crystal addition may cause massive crystallization	

C. the rate of dissolution > the rate of crystallization
D. the rate of crystallization > the rate of dissolution
E. addition of more water causes massive crystallization

12.

chem10b 13.5-11

A solution is prepared by adding 30.00 g of lactose (milk sugar) to 110.0 g of water at _____ The partial pressure of water above the solution is _____ torr. The vapor pressure of pure water

at 55 °C is 118 torr. The MW of lactose is

Student Response	Correct Answer
A. 116.3	
B. 1.670	
C. 94.1	
D. 92.7	
E. 169.4	

1.

chem10b 13.1-6

On a clear day at sea level, with a temperature of 25 °C, the partial pressure of N_2 in air is 0.78

atm and the concentration of nitrogen in water is _____ When the partial pressure of N_2 is

_____ atm, the concentration in water is

Student Response	Correct Answer
A. 1.0 atm	
B. 0.63 atm	

C. 2.1 atm	
D. 0.78 atm	
E. 1.6 atm	

2.

chem10b 13.1-31

The vapor pressure of pure water at 25 °C is 23.8 torr. What is the vapor pressure (torr) of water above a solution prepared by dissolving 18.0 g of glucose (a nonelectrolyte, MW = 180.0 g/mol) in 95.0 g of water?

Student Response	Correct Answer
A. 23.4	
B. 0.443	
C. 0.451	
D. 24.3	
E. 23.8	

3.

chem10b 13.2-34

Of the concentration units below, only _____ is temperature dependent.

Student Response	Correct Answer
A. molarity	
B. molality	
C. mass %	
D. ppm	
E. ppb	

4.

chem10b 13.2-15

The principal reason for the extremely low solubility of NaCl in benzene (C_6H_6) is the _____.

Student Response	Correct Answer
A. increased disorder due to mixing of solute and solvent	
B. weak solvation of Na^+ and Cl^- by C_6H_6	
C. strength of the covalent bond in NaCl	
D. strong solvent-solvent interactions	
E. hydrogen bonding in C_6H_6	

5.

chem10b 13.1-38

Calculate the freezing point (0°C) of a 0.05500 m aqueous solution of glucose. The molal

freezing-point-depression constant of water is

Student Response	Correct Answer
A. 0.0286	
B. -0.05627	
C. 0.1023	
D. -0.2046	
E. -0.1023	

6.

chem10b 13.2-26

The Procter & Gamble Company product called olestra[TM] is formed by combining a sugar molecule with _____.

Student Response	Correct Answer

A. alcohols
B. vitamin A
C. protein
D. cholesterol
E. fatty acids

7.

chem10b 13.2-35

A solution contains 11% by mass of sodium chloride. This means that _____.

Student Response	Correct Answer
A. the molality of the solution is 11	
B. 100 mL of the solution contains 11 g of sodium chloride	
C. the density of the solution is 11 g/mL	
D. there are 11 g of sodium chloride in in 1.0 mL of this solution	
E. 100 g of the solution contains 11 g of sodium chloride	

8.

chem10b 13.2-52

Which of the following is not a colloid?

Student Response	Correct Answer
A. smoke	
B. fog	
C. air	
D. whipped cream	
E. homogenized milk	

9.

chem10b 13.2-48

Which one of the following solutes has a limiting van't Hoff factor (i) of 3 when dissolved in water?

Student Response	Correct Answer
A. KNO_3	
B. Na_2SO_4	
C. CCl_4	
D. CH_3OH	
E. sucrose	

Score: 1/1

10.

chem10b 13.2-27

Which component of air is the primary problem in a condition known as "the bends?"

Student Response	Correct Answer
A. CO	
B. He	
C. N_2	
D. CO_2	
E. O_2	

Score: 1/1

11.

chem10b 13.1-1

The process of solute particles being surrounded by solvent particles is known as _____.

Student Response	Correct Answer
A. dehydration	

B. agglomeration
C. agglutination
D. salutation
E. solvation

12.

chem10b 13.2-3

Hydration is a specific example of the phenomenon known generally as _____.

Student Response	Correct Answer
A. solvation	
B. dilution	
C. disordering	
D. salutation	
E. condensation	

Score: 1/1

1.

chem10b 13.5-4

A solution is prepared by dissolving 16.2 g of benzene (C_6H_6) in 282 g of carbon tetrachloride

The concentration of benzene in this solution is _____ molal. The molar masses of

and CCl_4 are   and   respectively.

Student Response	Correct Answer
A. 5.43	
B. 7.36×10^{-4}	
C. 0.736	

D. 0.0543

E. 0.102

Score: 1/1

2.

chem10b 13.1-28

What is the molarity of sodium chloride in solution that is 13.0% by mass sodium chloride and that has a density of 1.10 g/mL?

Student Response	Correct Answer
A. 2.56	
B. 2.23	
C. 1.43×10^{-2}	
D. 143	
E. 2.45	

3.

chem10b 13.2-54

Hydrophobic colloids _____.

Student Response	Correct Answer
A. will separate into two phases if they are stabilized	
B. can be stabilized by coagulation	
C. can be stabilized by adsorption of ions	
D. are those that do not contain water	
E. are those that contain water	

Score: 1/1

4.

chem10b 13.1-14

The concentration of nitrate ion in a solution that contains 0.900 M aluminum nitrate is _____ M.

Student Response	Correct Answer
A. 0.900	
B. 2.70	
C. 0.450	
D. 1.80	
E. 0.300	

5.

chem10b 13.1-43

Determine the freezing point (°C) of a 0.015 molal aqueous solution of $MgSO_4$. Assume i = 2.0 for

$MgSO_4$. The molal freezing-point-depression constant of water is

Student Response	Correct Answer
A. -0.056	
B. -0.17	
C. 0.000	
D. -0.084	
E. -0.028	

6.

chem10b 13.4-5

Emulsifying agents typically have a hydrophobic end and a hydrophilic end.

Student Response	Value	Correct Answer

7.

chem10b 13.1-26

The concentration of urea (MW = 60.0 g/mol) in a solution prepared by dissolving 16 g of urea in 39 g of H_2O is _____ molal.

Student Response	Correct Answer
A. 6.9	
B. 6.3	
C. 96	
D. 0.68	
E. 0.11	

8.

chem10b 13.1-44

A solution is prepared by dissolving 2.60 g of a strong electrolyte   in enough water to make 1.00 L of solution. The osmotic pressure of the solution is 1.25 atm at 25.0 °C. What is the van't Hoff factor (i) for the unknown solute?

Student Response	Correct Answer
A. 0	
B. 0.99	
C. 1.98	
D. 2.98	
E. 0.630	

9.

chem10b 13.2-46

Which of the following aqueous solutions will have the highest boiling point?

Student Response	Correct Answer
A. 0.20 m glucose	
B. 0.25 m sucrose	
C. 0.10 m NaCl	
D. 0.10 m Na$_2$SO$_4$	
E. 0.10 m SrSO$_4$	

10.

chem10b 13.1-19

A solution is prepared by dissolving 15.0 g of NH$_3$ in 250 g of water. The density of the resulting solution is 0.974 g/mL. The molarity of NH$_3$ in the solution is _____.

Student Response	Correct Answer
A. 3.53	
B. 0.882	
C. 3.24	
D. 60.0	
E. 0.00353	

11.

chem10b 13.1-8

A sample of potassium nitrate (49.0 g) is dissolved in 101 g of water at 100 °C, with precautions taken to avoid evaporation of any water. The solution is cooled to 30.0 °C and no precipitate is observed. This solution is _____.

Student Response	Correct Answer

A. saturated	
B. hydrated	
C. supersaturated	
D. unsaturated	
E. placated	

12.

chem10b 13.2-27

Which component of air is the primary problem in a condition known as "the bends?"

Student Response	Correct Answer
A. O_2	
B. He	
C. CO_2	
D. N_2	
E. CO	

1.

chem10b 13.2-45

Of the following, a 0.1 M aqueous solution of _____ will have the lowest freezing point.

Student Response	Correct Answer
A. NaCl	
B. Na_2SO_4	
C. K_2CrO_4	
D. $Al(NO_3)_3$	
E. sucrose	

2.

chem10b 13.1-24

The mole fraction of He in a gaseous solution prepared from 4.0 g of He, 6.5 g of Ar, and 10.0 g of Ne is _____.

Student Response	Correct Answer
A. 0.61	
B. 0.11	
C. 0.86	
D. 1.5	
E. 0.20	

3.

chem10b 13.1-5

The solubility of Ar in water at 25 °C is 1.6×10^{-3} M when the pressure of the Ar above the solution is 1.0 atm. The solubility of Ar at a pressure of 2.5 atm is _____ M.

Student Response	Correct Answer
A. 6.4×10^{-4}	
B. 1.6×10^{-3}	
C. 1.6×10^{3}	
D. 7.5×10^{-2}	
E. 4.0×10^{-3}	

4.

chem10b 13.2-36

A solution contains 15 ppm of benzene. The density of the solution is   This means that _____.

Student Response	Correct Answer
A. the solution is 15% by mass of benzene	
B. the molarity of the solution is 15	
C. there are 15 mg of benzene in 1.0 L of this solution	
D. 100 g of the solution contains 15 g of benzene	
E. 100 g of the solution contains 15 mg of benzene	

5.

chem10b 13.2-17

Which of the following substances is more likely to dissolve in water?

Student Response	Correct Answer
A. $CH_3(CH_2)_8CH_2OH$	
B. $HOCH_2CH_2OH$	
C. CCl_4	
D. $CHCl_3$	
E. O $CH_3(CH_2)_9CH$	

6.

chem10b 13.2-31

A solution is prepared by dissolving calcium chloride in water and diluting to   If this solution

contains   chloride ions, the concentration of calcium ions is _____ ppm.

Student Response	Correct Answer

A. 22
B. 44
C. 11
D. 500
E. 88

7.

chem10b 13.1-43

Determine the freezing point (°C) of a 0.015 molal aqueous solution of $MgSO_4$. Assume i = 2.0 for

$MgSO_4$. The molal freezing-point-depression constant of water is

Student Response	Correct Answer
A. -0.028	
B. -0.17	
C. -0.084	
D. 0.000	
E. -0.056	

8.

chem10b 13.2-1

The dissolution of water in octane (C_8H_{18}) is prevented by _____.

Student Response	Correct Answer
A. ion-dipole attraction between water and octane molecules	
B. dipole-dipole attraction between octane molecules	
C. repulsion between like-charged water and octane molecules	
D. London dispersion forces between octane molecules	
E. hydrogen bonding between water molecules	

9.

chem10b 13.1-18

A solution is prepared by dissolving 15.0 g of NH_3 in 250 g of water. The density of the resulting solution is 0.974 g/mL. The mole fraction of NH_3 in the solution is _____.

Student Response	Correct Answer
A. 0.0597	
B. 0.940	
C. 0.0640	
D. 0.922	
E. 16.8	

10.

chem10b 13.5-9

Calculate the freezing point of a solution containing 40.0 grams of KCl and 4400.0 grams of

water. The molal-freezing-point-depression constant (K_f) for water is

Student Response	Correct Answer
A. +0.45 °C	
B. -0.23 °C	
C. -0.45 °C	
D. +0.23 °C	
E. 1.23 °C	

Score: 1/1

11.

chem10b 13.1-41

A 0.15 m aqueous solution of a weak acid has a freezing point of -0.31 °C. What is the percent ionization of this weak acid at this concentration? The molal freezing-point-depression constant of

water is

Student Response	Correct Answer
A. 35	
B. 89	
C. 31	
D. 11	
E. 17	

12.

chem10b 13.2-7

Ammonium nitrate (NH_4NO_3) dissolves readily in water even though the dissolution is endothermic by 26.4 kJ/mol. The solution process is spontaneous because _____.

Student Response	Correct Answer
A. of the increase in enthalpy upon dissolution of this strong electrolyte	
B. of the increase in disorder upon dissolution of this strong electrolyte	
C. of the decrease in enthalpy upon addition of the solute	
D. osmotic properties predict this behavior	
E. the vapor pressure of the water decreases upon addition of the solute	

Score: 1/1

1. **chem10b 13.5-5**

    At 20°C, an aqueous solution that is 24.00% by mass in ammonium chloride has a density of 1.0674 g/mL. What is the molarity of ammonium chloride in the solution? The formula weight of NH_4Cl is 53.50 g/mol

Student Response	Correct Answer
A. 5.90	
B. 0.0445	
C. 4.79	
D. 0.479	
E. 22.5	

Score: 1/1

2. chem10b 13.2-32

Molality is defined as the _____ .

Student Response	Correct Answer
A. moles solute/kg solution	
B. moles solute/kg solvent	
C. moles solute/moles solvent	
D. moles solute/Liters solution	
E. none (dimensionless)	

3. chem10b 13.1-11

The solubility of $MnSO_4$ monohydrate in water at 20 °C is 70.0 g per 100.0 mL of water. A solution at 20 °C that is 4.22 M in $MnSO_4$ monohydrate is best described as a(n) _____ solution. The formula weight of $MnSO_4$ monohydrate is 168.97 g/mol.

Student Response	Correct Answer
A. solvated	
B. unsaturated	
C. saturated	
D. supersaturated	
E. hydrated	

4. chem10b 13.2-36

A solution contains 15 ppm of benzene. The density of the solution is 1.00 g/mL. This means that _____ .

Student Response	Correct Answer
A. the molarity of the solution is 15	
B. 100 g of the solution contains 15 g of benzene	
C. there are 15 mg of benzene in 1.0 L of this solution	
D. the solution is 15% by mass of benzene	
E. 100 g of the solution contains 15 mg of benzene	

5. **chem10b 13.2-27**

Which component of air is the primary problem in a condition known as "the bends?"

Student Response	Correct Answer
A. CO_2	
B. O_2	
C. He	
D. CO	
E. N_2	

6. **chem10b 13.1-1**

The process of solute particles being surrounded by solvent particles is known as _____.

Student Response	Correct Answer
A. solvation	
B. agglomeration	
C. agglutination	
D. dehydration	
E. salutation	

7. **chem10b 13.1-34**

What is the freezing point (°C) of a solution prepared by dissolving 11.3 g of Ca(NO3)2 (formula weight = 164 g/mol) in 115 g of water? The molal freezing point depression

constant for water is 1.86 °C /m.

Student Response	Correct Answer
A. -3.34	
B. -1.11	
C. 3.34	
D. 1.11	
E. 0.00	

8. chem10b 13.5-7

At 20°C, a 3.54 M aqueous solution of ammonium chloride has a density of 1.0512 g/mL. What is the mass % of ammonium chloride in the solution? The formula weight of NH_4Cl is 53.50 g/mol.

Student Response	Correct Answer
A. 3.36	
B. 0.297	
C. 4.10	
D. 18.00	
E. 6.95	

9. chem10b 13.2-24

Pressure has an appreciable effect on the solubility of _____ in liquids.

Student Response	Correct Answer
A. liquids	
B. solids and liquids	
C. salts	
D. gases	
E. solids	

10. chem10b 13.2-28

If the partial pressure of oxygen in the air a diver breathes is too great, _____.

Student Response	Correct Answer
A. the urge to breathe is reduced and not enough CO_2 is removed from the body	
B. hyperventilation results	
C. the urge to breathe is increased and excessive CO_2 is removed from the body	
D. respiratory tissue is damaged by oxidation	
E. No problems result from this situation.	

11. chem10b 13.4-2

Adding solute to a solution decreases the vapor pressure of the solution.

Student Response	Value	Correct Answer

12. chem10b 13.1-37

A solution is prepared by dissolving 6.00 g of an unknown nonelectrolyte in enough water to make 1.00 L of solution. The osmotic pressure of this solution is 0.750 atm at 25.0 °C. What is the molecular weight (g/mol) of the unknown solute?

Student Response	Correct Answer
A. 5.12×10^{-3}	
B. 195	
C. 30.6	
D. 16.4	
E. 110	

13. chem10b 13.1-6

On a clear day at sea level, with a temperature of 25 °C, the partial pressure of N_2 in air is 0.78 atm and the concentration of nitrogen in water is 5.3x10^-4 M. When the partial pressure of N_2 is _____ atm, the concentration in water is 1.1x10^-3 M.

Student Response	Correct Answer
A. 2.1 atm	
B. 1.0 atm	
C. 0.78 atm	
D. 0.63 atm	
E. 1.6 atm	

14. chem10b 13.2-44

Which produces the greatest number of ions when one mole dissolves in water?

Student Response	Correct Answer
A. NH_4NO_3	
B. NaCl	
C. NH_4Cl	
D. Na_2SO_4	
E. sucrose	

15. chem10b 13.1-32

The vapor pressure of pure water at 25 °C is 23.8 torr. Determine the vapor pressure (torr) of water at 25 °C above a solution prepared by dissolving 35 g of urea (a nonvolatile, non-electrolyte, MW = 60.0 g/mol in 75 g of water.

Student Response	Correct Answer
A. 27	
B. 3.3	
C. 21	
D. 2.9	
E. 0.88	

16. chem10b 13.1-10
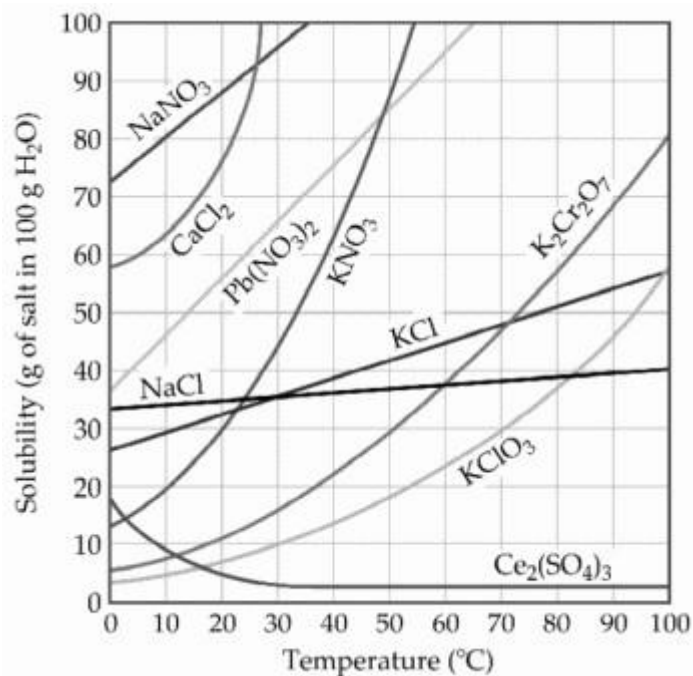
A sample of potassium nitrate (49.0 g) is dissolved in 101 g of water at 100 C with precautions taken to avoid evaporation of any water. The solution is cooled to 30.0 C and a small amount of precipitate is observed. This solution is _____.

Student Response	Correct Answer
A. saturated	
B. unsaturated	
C. placated	
D. hydrated	
E. supersaturated	

17. chem10b 13.2-11

In a saturated solution of a salt in water, _____.

Student Response	Correct Answer
A. the rate of dissolution > the rate of crystallization	
B. seed crystal addition may cause massive crystallization	
C. addition of more water causes massive crystallization	
D. the rate of crystallization = the rate of dissolution	

E. the rate of crystallization > the rate of dissolution

18. chem10b 13.1-36

A solution is prepared by dissolving 0.60 g of nicotine (a nonelectrolyte) in water to make 12 mL of solution. The osmotic pressure of the solution is 7.55 atm at 25 °C. The molecular weight of nicotine is _____ g/mol.

Student Response	Correct Answer
A. 28	
B. 0.60	
C. 43	
D. 160	
E. 50	

19. chem10b 13.1-40

An aqueous solution of a soluble compound (a nonelectrolyte) is prepared by dissolving 33.2 g of the compound in sufficient water to form 250 mL of solution. The solution has an osmotic pressure of 1.2 atm at 25 C.   What is the molar mass (g/mL) of the compound?

Student Response	Correct Answer
A. 6.8×10^2	
B. 1.0×10^3	
C. 2.7×10^3	
D. 2.3×10^2	
E. 28	

20. chem10b 13.2-31

A solution is prepared by dissolving calcium chloride in water and diluting to 500 mL. If this solution contains 44 ppm chloride ions, the concentration of calcium ions is _____ ppm.

Student Response	Correct Answer
A. 44	

B. 22
C. 88
D. 11
E. 500