AP Chemistry Quiz: Solution Concetration

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The concentration of lead nitrate ($Pb(NO_3)_2$) in a 0.726 M solution is _____ molal. The density of the solution is 1.202 g/mL.
   A) 0.650 B) 0.755 C) 0.476 D) 1.928 E) 0.819

2) 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 _____.
   A) 0.882 B) 60.0 C) 3.24 D) 3.53 E) 0.00353

3) 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 _____.
   A) 0.61 B) 0.86 C) 1.5 D) 0.11 E) 0.20

4) The concentration of sodium chloride in an aqueous solution that is 2.23 M and that has a density of 1.01 g/mL is _____% by mass.
   A) 45.3 B) 12.9 C) 10.1 D) 7.83 E) 2.21

5) After a can of Coca–Cola is opened, the soda will go "flat" after several hours. Which of the following statements best explains this behvior of Coca–Cola?
   A) The decrease in pressure incident on the solution caused by the opening of the can decreases the solubility of CO_2 in the solution.
   B) Oxygen in the air tends to displace the dissolved CO_2 in the soda.
   C) Unsaturated solutions of simple sugars will readily effervesce.
   D) Saturated solutions of simple sugars will readily effervesce.
   E) Nitrogen in the air tends to displace the dissolved CO_2 in the soda.

Answer Key
Testname: QUIZ_SOLUTION_CONCENTRATION_AP_CH_11.TST

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) B
ID: chem9b 13.1–54

2) C
ID: chem9b 13.1–57

3) A
ID: chem9b 13.1–62

4) B
ID: chem9b 13.1–68

5) A
ID: chem9b 13.2–11

AP Chemistry Quiz: Solution Concentration
Version A

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assume 1 L

(1) $\frac{0.726 \text{ mol solute}}{1 \text{ L solution}} \times 1 \text{ L} = 0.726 \text{ mol solute} \times \frac{331.2 \text{ g}}{1 \text{ mol}} = \underline{240.45} \text{ g } Pb(NO_3)_2$

Pb × 1 = 207.2
N × 2 = 28.0
O × 6 = 96.0
331.2 g/mol

$1 \text{ liter} \times \frac{1000 \text{ ml}}{1 \text{ liter}} \times \frac{1.202 \text{ g}}{1 \text{ ml}} = \underline{1202} \text{ g solution}$

1202 g solution
− 240.45 g solute
→ 961.55 g solvent ←

$961.55 \text{ g solvent} \times \frac{1 \text{ kg}}{1000 \text{ g}} = \underline{0.96155} \text{ kg solvent}$

$m = \frac{0.726 \text{ mol solute}}{0.96155 \text{ kg solvent}} = \boxed{0.755 \text{ molal}}$

(2) $\underset{NH_3}{15.0 \text{ g}} + \underset{H_2O}{250 \text{ g}} = 265 \text{ g solution}$

$265 \text{ g solution} \times \frac{1 \text{ ml}}{0.974 \text{ g}} \times \frac{1 \text{ L}}{1000 \text{ ml}} = 0.272 \text{ L solution}$

$15.0 \text{ g } NH_3 \times \frac{1 \text{ mol}}{17.03 \text{ g}} = \underline{0.8808} \text{ mol } NH_3$

$M = \frac{0.8808 \text{ mol } NH_3}{0.272 \text{ L}} = \boxed{3.24 \text{ M}}$

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(3) $4.0\,g\,He \times \frac{1\,mol}{4.00\,g} = \underline{1.0}$ mol He

$$X_{He} = \frac{1.0\,mol}{(1.0\,mol + 0.163 + 0.495)} = \frac{1.0}{1.658} \boxed{= 0.60}$$

$6.5\,g\,Ar \times \frac{1\,mol}{39.9\,g} = \underline{0.163}$ mol Ar

$10.0\,g\,Ne \times \frac{1\,mol\,Ne}{20.2\,g\,Ne} = \underline{0.495}$ mol Ne

(4) $\%\,mass = \frac{mass\ solute}{total\ mass} \times 100$

$$= \frac{130.34\,g}{1010} \times 100 = 0.129 \times 100 = \boxed{12.9\%}$$

$\frac{2.23\,mol}{1\,L} \times 1\,L \times \frac{58.45\,g}{1\,mol\,NaCl} = \underline{130.34}\,g$

$1\,L \times \frac{1000\,ml}{1\,L} \times \frac{1.01\,g}{1\,ml} = \underline{1010}\,g$

(5) A