

The following questions are 2 points each:

1. What is another name for a solution?

a homogeneous mixture

2. Why/how is water able to dissolve so many compounds?

it is a polar molecule

DEFINE the following terms. (1 point Each)

3. Supersaturated- holding more solute than should be possible at that temp.
4. Solute- What is dissolved, usually smaller amount.
5. Dilute solution- a relatively small amount of solute in solution
6. Solvent- What does the dissolving.
7. Aqueous solution- water is the solvent
8. Standard solution- a solution with an accurately known concentration
9. Saturated solution- holding the maximum amount of solute in solution for a given temp.
10. Unsaturated solution- holding less than the maximum amount of solute in the solution for a given temp.
11. Concentrated solution a relatively large amount of solute in solution

The following Questions are 3 points each:

12. What is the percent by mass of sodium acetate if I have 85 grams of sodium acetate dissolved into 750 grams of water?

$$750 + 85 = \frac{85}{835} \times 100 = 10.18\%$$

13. What is the percent by mass of calcium nitrate if I have 28 grams of calcium nitrate dissolved into 390 grams of water?

$$28 + 390 = \frac{28}{418} \times 100 = 6.70\%$$

14. What is the percent by mass of calcium chloride if in 730 grams of solution I have 98 grams of calcium chloride?

$$\frac{98}{730} \times 100 = 13.42\%$$

15. What is the percent by mass of calcium chloride if in 378 grams of solution I have 193 grams of calcium chloride?

$$\frac{193}{378} \times 100 = 51.06\%$$

16. If I need to make 3870 grams of a solution that is 23.8% by mass sugar, how many grams of sugar will I need to dissolve into the water?

$$23.8\% = \frac{X}{3870} \times 100$$

921.06 g Sugar

17. How many grams of water are in the above solution?

$$3870 - 921.06 = 2948.94 \text{ g H}_2\text{O}$$

18. If I need to make 835 grams of a solution that is 67.2% by mass salt, how many grams of salt will I need to dissolve into the water?

$$67.2\% = \frac{X}{835} \times 100$$

561.12 g Salt

19. How many grams of water are in the above solution?

$$835 - 561.12 = 273.88 \text{ g H}_2\text{O}$$

The following questions are worth 2 points each:

20. Describe how to dilute a solution.

Add more solvent to the solution.

21. During a dilution process, the AMOUNT of solute... (finish this statement)

does not change.

For the following problems, point values are shown for each.

22. If I dissolve 12.4 moles of potassium chloride in water to make 0.3 liters of solution, what is the molarity of my solution? (3 points)

$$\frac{12.4 \text{ mol}}{0.3 \text{ L}}$$

$$41.3 \text{ M}$$

23. If I dissolve 3.1 moles of lithium iodide in water to make 1.4 liters of solution, what is the molarity of my solution? (3 points)

$$\frac{3.1 \text{ mol}}{1.4 \text{ L}}$$

$$= 2.21 \text{ M}$$

24. How many grams of NaOH (Molar Mass = 40.0 grams /mole) would be required to produce a 2.7 M (molar) solution with a volume of 14 mL? (3 points)

$$\frac{14 \text{ mL}}{1000 \text{ mL}} = 0.014 \text{ L}$$

$$2.7 \text{ M} = \frac{x}{0.014 \text{ L}}$$

$$0.0378 \text{ mol} \left| \frac{40 \text{ g}}{1 \text{ mol}} \right.$$

$$1.512 \text{ g NaOH}$$

25. How many grams of NaCl (Molar Mass = 58.44 grams /mole) would be required to produce a 0.3 M (molar) solution with a volume of 4.2 L? (3 points)

$$0.3 \text{ M} = \frac{x}{4.2 \text{ L}}$$

$$1.26 \text{ mol} \left| \frac{58.44 \text{ g}}{1 \text{ mol}} \right. = 73.63 \text{ g NaCl}$$

26. If I have 550 mL of a 2.5 M solution of NaOH (Molar Mass = 40.0 grams /mole), how many grams of NaOH do I have? (3 points)

$$\frac{550 \text{ mL}}{1000 \text{ mL}} = 0.55 \text{ L}$$

$$2.5 \text{ M} = \frac{x}{0.55 \text{ L}}$$

$$1.375 \text{ mol} \left| \frac{40 \text{ g}}{1 \text{ mol}} \right.$$

$$55 \text{ g NaOH}$$

27. If I have 1.56 L of a 0.5 M solution of NaCl (Molar Mass = 58.44 grams /mole), how many grams of NaCl do I have? (3 points)

$$0.5 M = \frac{x}{1.56 L} \quad \frac{.78 \text{ mol} \mid 58.44 \text{ g}}{1 \text{ mol}} = 45.58 \text{ g NaCl}$$

28. If I have 2.80 L of a 12 M solution of HCl, what will my molarity be if I ~~dilute~~ ^{evaporate} this with enough water to create 1.5 liters of solution? (3 points)

$$(12 M)(2.80) = (x M)(1.5)$$

$$22.4 M$$

29. If I have 340 mL of a 5.5 M solution of HCl, what will my molarity be if I dilute this with enough water to create 2.5 liters of solution? (3 points)

$$\frac{340 \text{ mL} \mid 1 L}{1000 \text{ mL}} = .34 L \quad (5.5 M)(.34 L) = (x M)(2.5 L)$$

$$.748 M$$

30. What is the molarity of my final solution if I add 650 mL to 1.34 liters of a 3.5 M solution of NaCl? (4 points)

$$\frac{650 \text{ mL} \mid 1 L}{1000 \text{ mL}} = .65 L \quad \begin{array}{r} 1.34 \\ + .65 \\ \hline 1.99 L \end{array}$$

$$(3.5 M)(1.34 L) = (x M)(1.99 L)$$

$$2.35 M$$

31. What is the molarity of my final solution if I allow 250 mL of solvent to evaporate from 4.25 liters of a 0.75 M solution of NaCl? (4 points)

$$\frac{250 \text{ mL} \mid 1 L}{1000 \text{ mL}} = .25 L \quad \begin{array}{r} 4.25 \\ - .25 \\ \hline 4 L \end{array}$$

$$(0.75 M)(4.25 L) = (x M)(4 L)$$

$$.797 M$$