

Dr. Rogers**Solutions Homework**

1. Give the name for the following compounds and state whether they are ionic or not

- | | |
|--|-------|
| A. $\text{Ba}(\text{NO}_3)_2$ | _____ |
| B. NaH | _____ |
| C. PCl_5 | _____ |
| D. CO | _____ |
| E. NH_4OH | _____ |
| F. $\text{Ca}(\text{MnO}_4)_2$ | _____ |
| G. N_2O_4 | _____ |
| H. NaHSO_4 | _____ |
| I. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ | _____ |
| J. SnCl_4 | _____ |
| K. KCH_3CO_2 | _____ |
| L. CaS | _____ |
| M. AlBr_3 | _____ |
| N. $\text{CH}_3\text{CH}_2\text{CH}_3$ | _____ |
| O. CuO | _____ |
| P. PbS | _____ |

2. Give the chemical formula for the following named compounds.

- | | |
|-----------------------------------|-------|
| A. gold(III)nitrate | _____ |
| B. barium acetate | _____ |
| C. potassium dihydrogen phosphate | _____ |
| D. Calcium oxylate | _____ |
| E. Tetraphosphous heptasulfide | _____ |
| F. Tin(IV) chloride | _____ |
| G. Lithium hydride | _____ |
| H. Ethanol | _____ |
| I. Aluminum Nitrate nonahydrate | _____ |
| J. Ammonium bromide | _____ |
| K. Iron(III)dichromate | _____ |
| L. Ethene | _____ |
| M. Hydrogen sulfite | _____ |

3. What is the charge on the cation in $(\text{NH}_4)_3\text{PO}_4$?

4. What is the charge on the anion in $\text{K}_2\text{Cr}_2\text{O}_7$?

5. An ionic compound has the formula M_2CO_3 . What is the charge on M?

6. What is the molar mass of ammonium nitrate?

7. How many oxygen atoms are present in 1.00×10^{-3} mole of ozone, O_3 ?

8. What is the mass percent oxygen in copper(II) sulfate pentahydrate?

9. The molar mass of hydrazine is 32 g/mol and its empirical formula is NH_2 . What is its molecular formula?

10. Ketoprofen is an anti-inflammatory drug which is 75.57% C, 5.55% H, and 18.88% O. If the molecular mass of ketoprofen is 254 g/mol, what is its molecular formula?
11. How many oxygen atoms are in 1.00 mol SO_3 is _____.
12. Which of the following 1.0 M solutions contains the most particles?
- A) magnesium sulfate
 - B) sodium sulfate
 - C) glucose
 - D) ethylene glycol
 - E) potassium chloride
13. How many grams of solid NaOH are needed to make 500.0. mL of a 2.0 M NaOH solution?
14. How many grams of CaCl_2 are required to prepare a 250 mL solution with a concentration of 0.46 M?
15. What is the concentration of Aluminum cations in a 0.43 M solution of aluminum sulfate?
16. If a 160. mL solution of 0.50 M HNO_3 is diluted to a total volume of 600. mL. What is the molarity of the resulting solution?
17. Calculate the molarity of a solution that contains 4.6 g of NaCl in 350 mL of solution.
18. What is the total ion concentration of a 0.43 M solution of potassium oxalate?
19. How many grams of potassium sulfate are needed to make 300 mL of a 0.062 M solution?
20. A Chemistry student goes into the laboratory and takes 25.0 mL of 0.60 M HCl and **ADDS** 75.0 mL of water. What is the final concentration of the dilution?
21. A 0.45 M solution of acetic acid with a volume of 10 ml was added to 153 ml of water. What is the new concentration of the acetic acid solution?
22. A stock solution of sodium acetate was made with a concentration of 2.0 M. What volume of the stock solution and water must you add together to make 50.0 ml of a 0.80 M solution?

23. When the mole fraction of solute is 1.0, there is

- A) 1.0 g of solute per 100 g of solution.
- B) a 1:1 ratio of solute to solvent.
- C) only solute present.
- D) 1.0 mole of solute and 99 moles of solvent.
- E) only solvent present.

24. Calculate the mole fraction of sucrose (molar mass, 342.3 g/ mol) in a solution prepared by dissolving 50.0 g of sucrose in 200.0 g of water (molar mass, 18.0 g/ mol).

25. How many moles of glucose should be added to 450 g of water to prepare a 0.600 m solution?

26. What is the molality of a solution prepared by dissolving 15.1 g KNO_3 in 250 g water?

27. The mole fraction of glucose in an aqueous solution is 0.100. Calculate the molality of glucose in the solution. The molar mass of glucose is 342 g/ mol and that of water is 18.0 g/ mol

28. Commercial nitric acid (molar mass, 63.0 g/ mL) has a density of 1.42 g/mL. If the molarity of $\text{HNO}_3(\text{aq})$ is 16.0 M, calculate the molality of $\text{HNO}_3(\text{aq})$.

29. Calculate the molality of 9.98 M $\text{NaOH}(\text{aq})$. The density of the solution is 1.33 g/ mL.

30. Calculate the molality of ethyl alcohol in a bottle of wine that is 19.0% $\text{C}_2\text{H}_5\text{OH}$ by mass.

31. A solution contains 4.50 g of calcium nitrate in 430.0 g of water. Express the concentration as

- A. Mass percent _____
- B. Mole fraction _____
- C. Molality _____

32. How many moles of hydrogen peroxide are present in 25.0 g of a 3.0% solution?

33. What is the molality of silver nitrate in an aqueous 0.10% solution of that compound?

34. A solution contains 12.0 g of hexane (C_6H_{14}), 20.0g of octane (C_8H_{18}) and 98.0 g of benzene (C_6H_6) what is the mole fraction of benzene in the solution?

35. What is the mole fraction of nitrous oxide (N_2O) in an aqueous 0.020 molal solution?

36. A water solution of sodium hypochlorite ($NaOCl$) is used as a laundry bleach. The concentration of sodium hypochlorite is 0.75 m Express this concentration as mole fraction.

37. A 10.0 percent solution of sucrose ($C_{12}H_{22}O_{11}$) in water has a density of 1.038 g/ ml Express the concentration of the sugar as

- A. Molality _____
- B. Molarity _____
- C. Mole fraction _____

38. Vinegar is a 5.0% solution of acetic acid (CH_3CO_2H) in water. The density of vinegar is 1.0055 g/ mL. Express the concentration of acetic acid as:

- A. Molality _____
- B. Molarity _____
- C. Mole fraction _____

38. Vinegar is a 5.0% solution of acetic acid (CH_3CO_2H) in water. The density of vinegar is 1.0055 g/ mL. Express the concentration of acetic acid as:

- A. Molality _____
- B. Molarity _____
- C. Mole fraction _____

39. A 0.631 M H_3PO_4 solution in water has a density of 1.031 g/ mL. Express the concentration of this solution as:

- A Molality _____
- B Molarity _____
- C Mole fraction _____

40. Complete the following table for ammonia (NH_3) solutions in water

Density	Molality	Molarity	Mass %	Mole fraction
A. 0.973			6.00	
B. 0.939		8.80		
C. 0.950	8.02			
D. 0.969				0.0738

Answers:

1. A. Barium nitrate (I)
B. Sodium hydride
C. Phosphorous pentachloride
D. Carbon monoxide
E. Ammonium hydroxide (I)
F. Calcium permanganate (I)
G. Dinitrogen tetroxide
H. Sodium hydrogen sulfate (I)
I. Copper (II) sulfate pentahydrate
J. Tin(IV) chloride
K. Potassium acetate (I)
L. Calcium sulfide (I)
M. Aluminum bromide (I)
N. Propane
O. Copper(II) oxide (I)
P. Lead sulfide (I)

2. A. $\text{Au}(\text{NO}_3)_3$
B. $\text{Ba}(\text{CH}_3\text{CO}_2)_2$
C. KH_2PO_4
D. CaC_2O_4
E. P_5S_7
F. SnCl_4
G. LiH
H. $\text{CH}_3\text{CH}_2\text{OH}$
I. $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$
J. NH_4Br
K. $\text{Fe}_2(\text{Cr}_2\text{O}_7)_3$
L. C_2H_4
M. H_2SO_3

3. +1
6. 80.05 g/mol
9. N_2H_4
12. B
15. 0.86 M Al^{3+}
18. 1.3 M
21. 0.03 M
23. C
26. 0.60 m
29. 10.7 m
B. 0.00115; C. 0.0637 m
34. 0.801
37. A. 0.324 m; B. 0.303 M; C. 5.81×10^{-3}
B. 0.83 M; C. 0.015
40. a. 3.44 M, 3.76 m, mole fraction is 0.0635
b. 11.2 m, 16%, mole fraction is 0.168
c. 6.68 M, 12%, mole fraction is 0.126
d. 4.42 m, 3.97 M, 7.00%
4. -2
7. 1.81×10^{21} atoms
10. $\text{C}_{16}\text{H}_{14}\text{O}_3$
13. 40. g
16. 0.13 M HNO_3
19. 3 g K_2SO_4
22. 20 ml sodium acetate/ 30 ml water
24. 0.0130
27. 6.17 m
30. 5.09 m
32. 0.022 mol
35. 3.6×10^{-4}
39. A. 5.99%; B. 0.0116; C. 0.651

5. +1
8. 57.7%
11. 1.81×10^{24} atoms
14. 13 g CaCl_2
17. 0.23 M NaCl
20. 0.15 M
25. 0.270
28. 39 m
31. . A. 1.04% ;
33. 0.0059 m
36. 0.013
38. A. 0.87 m