

Stoichiometry Review

Area 4: Solution Stoichiometry

Set 1

1. Calculate the molarity of a solution made by dissolving 1.30 moles of NaOH in enough water to make 0.750 L of solution
2. What is the molarity of a solution made by dissolving 35 g of NaCl in enough water to make 250 mL of solution?
3. How many moles of CuCl_2 are needed to make 125 mL of 1.5 M solution?
4. How much KOH (in g) is needed to make 1.00 L of 0.150 M KOH?
5. What volume (in mL) is needed to dissolve 3.5 moles of FeCl_3 to make a 0.50 M solution?
6. What is the molarity of a solution made by diluting 25 mL of 0.25 M solution to 100. mL?
7. What volume of 0.250 M KCl is needed to make 100.0 ml of 0.100 M solution?
8. If 20.0 mL of 2.0 M hydrochloric acid react with excess magnesium, how many g of magnesium chloride are produced? The equation is $\text{Mg(s)} + 2\text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$
9. How many L of oxygen are produced at STP in the decomposition of 100.0 mL of 0.20 M potassium chlorate? The equation is $2\text{KClO}_3\text{(s)} \rightarrow 2\text{KCl(s)} + 3\text{O}_2\text{(g)}$
10. If 50.0 mL of 0.30 M ammonium sulfate reacts with 100 mL of 1.0 M calcium hydroxide, how many moles of ammonia are produced. The equation is : $(\text{NH}_4)_2\text{SO}_4\text{(aq)} + \text{Ca(OH)}_2\text{(s)} \rightarrow \text{CaSO}_4\text{(s)} + 2\text{NH}_3\text{(g)} + 2\text{H}_2\text{O(l)}$
11. Calculate the molality of a solution made by dissolving 2.4 mol of HCl in 1.0 kg of water.
12. Calculate the molality of a solution made by dissolving 4.2 g of CuCl_2 in 350 g of water.
13. How much water is needed to dissolve 18 g of NaCl if a 0.45 m NaCl solution is needed?
14. What mass of $\text{Fe(NO}_3)_3$ is needed to add to 250 g of water if a 0.23 m solution is needed?
15. Chloroform, CHCl_3 , boils at 61.7°C . If the K_b for chloroform is 3.63°C/molal , what is the boiling point of a solution of 15.0 g of CHCl_3 and 0.515 kg of acenaphthalene, $\text{C}_{12}\text{H}_{10}$?
16. Sucrose, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$, is a nonvolatile nonelectrolyte. What is the freezing point of a solution of 3.50 g of sucrose in 20.0 g of water? ($K_f = -1.86^\circ\text{C/m}$)
17. What is the boiling point of 0.25 m NaCl? (K_b of water is 0.51°C/m)
18. What is the freezing point of a solution made by adding 22 g of $\text{Fe(NO}_3)_3$ to 250 g of water? (K_f of water is -1.86°C/m)
19. What is the molality of a solution of cupric chloride that raises the boiling point of water by 0.35°C ?
20. What is the molality of a solution of sugar that raises the boiling point of water by 0.35°C ?

Set 2

1. What is the molarity of a solution made by diluting 35 mL of 0.23 M solution to 250 mL?
2. If 45.0 mL of 2.0 M ammonium sulfate reacts with 80. mL of 1.2 M calcium hydroxide, how many moles of ammonia are produced. The equation is :
 $(\text{NH}_4)_2\text{SO}_4(\text{aq}) + \text{Ca}(\text{OH})_2(\text{s}) \rightarrow \text{CaSO}_4(\text{s}) + 2\text{NH}_3(\text{g}) + 2\text{H}_2\text{O}(\text{l})$
3. Calculate the molality of a solution made by dissolving 1.3 g of CuCl_2 in 250 g of water.
4. Chloroform, CHCl_3 , boils at 61.7°C . If the K_b for chloroform is 3.63°C/molal , what is the boiling point of a solution of 24.0 g of $\text{C}_{12}\text{H}_{10}$ and 0.345 kg of chloroform?
5. Calculate the molarity of a solution made by dissolving 1.36 moles of NaOH in enough water to make 0.850 L of solution
6. What is the molality of a solution of sugar that raises the boiling point of water by 0.31°C ?
7. What mass of $\text{Fe}(\text{NO}_3)_3$ is needed to add to 150 g of water if a 0.43 m solution is needed?
8. How much KOH (in g) is needed to make 0.850 L of 0.180 M KOH ?
9. How many L of oxygen are produced at STP in the decomposition of 200.0 mL of 0.40 M potassium chlorate? The equation is $2\text{KClO}_3(\text{s}) \rightarrow 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$
10. What is the boiling point of 0.65 m NaCl ? (K_b of water is 0.51°C/m)
11. Calculate the molality of a solution made by dissolving 3.5 mol of HCl in 2.2 kg of water.
12. What volume of 0.350 M KCl is needed to make 200.0 ml of 0.300 M solution?
13. What is the molality of a solution of cupric chloride that raises the boiling point of water by 0.46°C ?
14. What is the molarity of a solution made by dissolving 25 g of NaCl in enough water to make 550 mL of solution?
15. If 30.0 mL of 1.5 M hydrochloric acid react with excess magnesium, how many g of magnesium chloride are produced? The equation is $\text{Mg}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{MgCl}_2(\text{aq}) + \text{H}_2(\text{g})$
16. How much water is needed to dissolve 32 g of NaCl if a 0.15 m NaCl solution is needed?
17. Sucrose, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$, is a nonvolatile nonelectrolyte. What is the freezing point of a solution of 1.50 g of sucrose in 30.0 g of water? ($K_f = -1.86^\circ\text{C/m}$)
18. What is the freezing point of a solution made by adding 82 g of $\text{Fe}(\text{NO}_3)_3$ to 450 g of water? (K_f of water is -1.86°C/m)
19. How many moles of CuCl_2 are needed to make 135 mL of 1.8 M solution?
20. What volume (in mL) is needed to dissolve 4.5 moles of FeCl_3 to make a 0.80 M solution?

Set 3

1. What is the molarity of a solution made by diluting 45 mL of 0.35 M solution to 200.0 mL?
2. How many L of oxygen are produced at STP in the decomposition of 140.0 mL of 0.26 M potassium chlorate? The equation is $2\text{KClO}_3(\text{s}) \rightarrow 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$
3. Calculate the molarity of a solution made by dissolving 2.40 moles of NaOH in enough water to make 1.50 L of solution
4. Calculate the molality of a solution made by dissolving 3.5 mol of HCl in 1.5 kg of water.
5. Chloroform, CHCl_3 , boils at 61.7°C . If the K_b for chloroform is 3.63°C/molal , what is the boiling point of a solution of 25.3g of $\text{C}_{12}\text{H}_{10}$ and 0.700 kg of Chloroform,?
6. If 120 mL of 0.40 M ammonium sulfate reacts with 100. mL of 2.0 M calcium hydroxide, how many moles of ammonia are produced. The equation is :
 $(\text{NH}_4)_2\text{SO}_4(\text{aq}) + \text{Ca}(\text{OH})_2(\text{s}) \rightarrow \text{CaSO}_4(\text{s}) + 2\text{NH}_3(\text{g}) + 2\text{H}_2\text{O}(\text{l})$
7. If 50.0 mL of 1.5 M hydrochloric acid react with excess magnesium, how many g of magnesium chloride are produced? The equation is $\text{Mg}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{MgCl}_2(\text{aq}) + \text{H}_2(\text{g})$
8. How much water is needed to dissolve 35 g of NaCl if a 0.50 m NaCl solution is needed?
9. What is the molality of a solution of sugar that raises the boiling point of water by 0.28°C ?
10. What volume of 0.650 M KCl is needed to make 300.0 ml of 0.200 M solution?
11. Sucrose, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$, is a nonvolatile nonelectrolyte. What is the freezing point of a solution of 4.60 g of sucrose in 120.0 g of water? ($K_f = -1.86^\circ\text{C/m}$)
12. What is the molality of a solution of cupric chloride that raises the boiling point of water by 0.15°C ?
13. Calculate the molality of a solution made by dissolving 8.2 g of CuCl_2 in 320 g of water.
14. What is the molarity of a solution made by dissolving 45 g of NaCl in enough water to make 500 mL of solution?
15. What mass of $\text{Fe}(\text{NO}_3)_3$ is needed to add to 750. g of water if a 0.570 m solution is needed?
16. What is the freezing point of a solution made by adding 19 g of $\text{Fe}(\text{NO}_3)_3$ to 150 g of water? (K_f of water is 1.86°C/m)
17. How much KOH (in g) is needed to make 1.50 L of 0.180 M KOH?
18. What is the boiling point of 0.15 m NaCl? (K_b of water is 0.51°C/m)
19. How many moles of CuCl_2 are needed to make 200. mL of 1.20 M solution?
20. What volume (in mL) is needed to dissolve 2.5 moles of FeCl_3 to make a 0.40 M solution?