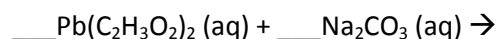


Introductory Chemistry

1. What is the molarity of a solution that contains 500 grams of NaCl in 1.2 L of water?
2. What is the molarity of a solution that contains 2.3 milligrams of CaCl₂ and 500 ml of water?
3. What is the molality of a solution that contains 60 grams of KOH and 200 grams of water?
4. What is the mass per volume percent of a solution that contains 25 grams of NaCl in 800 ml of water?
5. How many grams are in 10 ml of a 0.6 M solution of CaI₂?
6. What is the molality and molarity of a solution that contains 40 grams of NaBr and has a total volume of 650 ml and an average density of 1.02 g/ml?
7. What is the boiling point and the freezing point of a water and glycerol (C₃H₈O₃) mixture that contains 500 grams of water and 72 grams of glycerol? (K_b for water is 0.56 °C/m and the K_f is 1.86 °C/m)
8. What is the boiling point and freezing point of a water and glucose (C₆H₁₂O₆) mixture that contains 600 ml of water and 150 grams of glucose? (K_b for water is 0.56 °C/m and the K_f is 1.86 °C/m and the average density of water is 1.0 g/ml)
9. How many grams of sucrose (C₁₂H₂₂O₁₁) are needed to depress the freezing point of 750 grams of water by 5.5°C? (K_f of water is 1.86 °C/m)
10. How much energy is needed to raise of the temperature of water from 10°C to 75°C? (heat capacity of water is 4.184 J/g °C)
11. How much energy is needed to vaporize 50 grams of water that is initially at 100°C? (ΔH_{vap} = 40.7 kJ/mol)
12. How much energy is needed to convert 15 grams of ice initially at -15°C to liquid water at 25°C? (Heat capacity of ice is 2.03 J/g °C, the heat capacity of liquid water is 4.184 J/g °C and the ΔH_{fus} = 6.02 kJ/mol)
13. What is the temperature change of a solution of 600 grams of liquid water that acquired 5.02*10⁴ J of energy? (Heat capacity of liquid water is 4.184 J/g °C)
14. If 40 ml of 5.0 M HCl is diluted to 500 ml. What is the final concentration of the solution?
15. Balance the following reaction and answer the following questions:
$$\underline{\hspace{1cm}} \text{C}_{12}\text{H}_{26} (\text{l}) + \underline{\hspace{1cm}} \text{O}_2 (\text{g}) \rightarrow \underline{\hspace{1cm}} \text{CO}_2 (\text{g}) + \underline{\hspace{1cm}} \text{H}_2\text{O} (\text{l})$$
- 15a. If 5 kg of C₁₂H₂₂ reacts with 10 kg of O₂, how many grams of CO₂ will be produced?

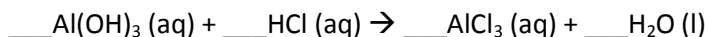
15b. If 500 ml of $C_{12}H_{22}$ (density = 0.8756 g/ml) reacts with excess oxygen. How many liters of CO_2 will be produced at: STP conditions? $100^\circ C$ and 1.3 atm? $150^\circ F$ and 820 torr?

16. Complete the following reaction:



16a. If 5 grams of lead (II) acetate reacts with 10 grams of sodium carbonate how many grams of your solid product will form?

17. Balance the following reaction:



17a. If 40 ml of aluminum hydroxide is needed to neutralize 50 ml of 1.2 M HCl then what is the concentration of aluminum hydroxide?

17b. If 70 ml of HCl produced 15 grams an $AlCl_3$ complex then what is the concentration of the HCl solution?

18. If a system is initially at a pressure of 2.0 atm and a volume of 7 L, what is the final volume if the pressure is decreased to 430 mmHg?

19. A balloon contains 2.0 L of air and the pressure and temperature of the outside is 0.9 atm and $30^\circ C$ respectively. If the balloon is submerged under water where the temperature decreases to $20^\circ C$ and a pressure of 1.2 atm. What is the new volume of the balloon?

20. How many grams of NO_2 are in a system that expands to a volume of 5.0 L, a pressure of 1.3 mmHg and a temperature of $70^\circ C$?

21. Give the Lewis Dot structure for the following molecules (State the molecular geometry):



22. How many moles of $CaCl_2$ are in 50 grams of a sample?

23. How many moles of phosphate are there in 600 grams of $Ca_3(PO_4)_2$?

24. How many grams are there in 1.5 moles of NaCl

25. How many grams of oxygen are there in 500 grams of NH_4NO_3 ?

26. How many ammonia molecules are there in 70 grams of NH_3 ?

27. How many gold atoms are there in 120 grams of Gold

28. How many formula units are there in $CaCl_2$?

29. How many oxygen atoms are there in a 50 gram sample of KNO_3 ?

30. How many grams of Na_3PO_4 are in a sample that contains 7.07×10^{25} atoms of oxygen?

