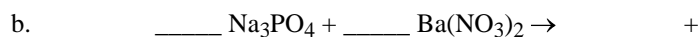
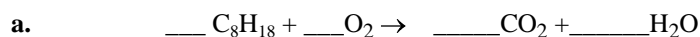


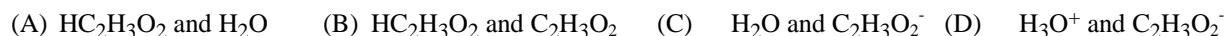
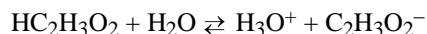
1. Balance the equations for the following reactions, using no fractional coefficients.



2. According to the Brønsted–Lowry definition, which chemical species can function **both** as an acid and as a base?



3. In this reaction, which substances are bases according to the Brønsted–Lowry definition?



4. A 6.80 g coin was dissolved in nitric acid and 6.21 g of  $\text{AgCl}$  was precipitated by the addition of excess sodium chloride,  $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s})$ . Calculate the percentage silver in the coin.

5. A 40.0 mL portion of a 0.10 M  $\text{MgSO}_4$  solution contains how many grams of  $\text{MgSO}_4$ ?

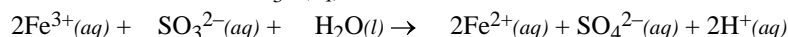
6. What mass of  $\text{MgCl}_2$  is required to prepare 2.00 L of 0.550 M solution?

7. What mass of  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$  is required to prepare 500.0 mL of 0.20 M  $\text{Na}_2\text{SO}_4$  solution?

8. What is the concentration of  $\text{CH}_3\text{OH}$  in 0.20 L of aqueous solution which contains 55 g  $\text{CH}_3\text{OH}$ ?

9. To what volume in liters must 105 mL of hydrochloric acid, containing 47.5 g of  $\text{HCl}$ , be diluted to make a 1.05 M solution?

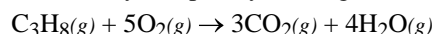
10. What volume of 0.100 M  $\text{SO}_3^{2-}(\text{aq})$  is needed to titrate 24.0 mL of 0.200 M  $\text{Fe}^{3+}(\text{aq})$ ?



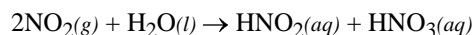
11. In the reaction  $3\text{Ca}(\text{OH})_2(\text{s}) + 2\text{H}_3\text{PO}_4(\text{aq}) \rightarrow \text{Ca}_3(\text{PO}_4)_2(\text{s}) + 6\text{H}_2\text{O}(\text{l})$  how many grams of  $\text{Ca}(\text{OH})_2$  are required to neutralize 10.0 L of 0.60 M  $\text{H}_3\text{PO}_4$  solution?

12. If 26.32 mL of 0.100 M  $\text{H}_2\text{SO}_4$  is exactly neutralized by 34.56 mL of  $\text{NaOH}$  solution, what is the molar concentration of the original base solution?

13. How many liters of  $\text{CO}_2$  gas at STP can be obtained by completely burning one mole of  $\text{C}_3\text{H}_8$ ?

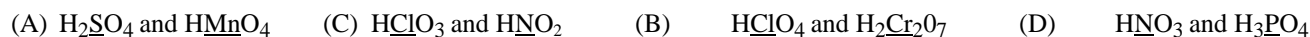


14. If 11.2 L of  $\text{NO}_2(\text{g})$  at STP reacted with water, how many moles of  $\text{HNO}_2$  would form?



15. What is the oxidation number of phosphorus in  $\text{H}_3\text{PO}_2$ ?

16. Identify the pair of compounds having underlined atoms with the same oxidation number.



17. In this reaction, which substance behaves as the oxidizing agent?  $\text{Pb} + \text{PbO}_2 + 2\text{H}_2\text{SO}_4 \rightarrow 2\text{PbSO}_4 + 2\text{H}_2\text{O}$

18. If oxygen gas and hydrogen gas are kept at the same temperature and pressure, what is the relationship of the average velocities of their molecules?

19. The Kelvin temperature of one liter of gas is doubled and its pressure is tripled, volume will then be\_\_\_\_\_?
20. A 10.0 cm<sup>3</sup> container of helium is sealed at 22.0 °C and 1.00 atm pressure. What pressure would be exerted by the helium if the container were heated to 220 °C?
21. Four identical balloons are inflated to the same extent with the indicated gases. Which balloon will be the first to collapse?  
 (A) Ne      (B) N<sub>2</sub>      (C) O<sub>2</sub>      (D) CH<sub>4</sub>
22. If 6.60 g of a gaseous compound occupy a volume of 1.20 L at 27 °C and 0.967 atm, the molar mass of the compound is  
 (A) 109 g·mol<sup>-1</sup>      (C) 140 g·mol<sup>-1</sup>  
 (B) 123 g·mol<sup>-1</sup>      (D) 165 g·mol<sup>-1</sup>
23. Real gases are most like ideal gases at  
 (A) high pressure and high temperature.  
 (B) low pressure and low temperature.  
 (C) high pressure and low temperature.  
 (D) low pressure and high temperature.
24. The partial pressures of a gaseous mixture are given in the table. What is the mole percent of hydrogen?

Partial Pressures	
hydrogen	200 mmHg
carbon dioxide	150 mmHg
methane	320 mmHg
ethylene	105 mmHg

25. Given a mixture of gases: 1.00 g He, 14.0 g N<sub>2</sub> and 10.0 g NO. What is the total pressure (in atm) at 27.0 °C if the gases are confined in a 2.00 L container?

At the same temperature and pressure, CH<sub>4</sub> effuses

Molar Masses	
CH <sub>4</sub>	16. g·mol <sup>-1</sup>
SO <sub>2</sub>	64. g·mol <sup>-1</sup>

- (A) one-half as fast as O<sub>2</sub>    (B) two times as fast as O<sub>2</sub>    (C) at the same rate as O<sub>2</sub>    (D) one-fourth as fast as O<sub>2</sub>

ANSWERS:

1. a.  $2C_8H_{18} + 25O_2 \rightarrow 16CO_2 + 18H_2O$     b.  $2Na_3PO_4 + 3Ba(NO_3)_2 \rightarrow 6NaNO_3 + Ba_3(PO_4)_2$   
 2. D    3. C    4. 68.7%    5. 0.48 g    6. 105 g    7. 32 g    8. 8.6M    9. 1.24 L    10. 34.0 mL  
 11. 390 g    12. 0.152 M    13. 67.2 L    14. 0.25 mol    15. +1    16. D    17. PbO<sub>2</sub>  
 18. move faster than the oxygen molecules  
 19. 2/3 L  
 20. 1.67 atm  
 21. D  
 22. C  
 23. D  
 24. 25.2  
 25. 13.3atm  
 26. B