

Chemistry 201 - Practice Exam Two
Summer 2009

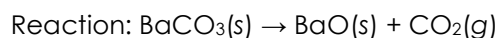
- 60.0 g of a certain gas occupies 106 L at 300.0°C and 720.0 torr. The gas could be which of the following?
a. Cl₂ b. H₂ c. N₂ d. HCl e. none of these
- The density of ethane (C₂H₆) at 25°C and 1.10 atm pressure is:
a. 1.15 g/L b. 1.20 g/L c. 1.25 g/L d. 1.30 g/L e. 1.35 g/L
- A 150.0 g sample of metal at 80.0°C is added to 150.0 g of H₂O at 20.0°C. The temperature rose to 23.3°C. Assuming that the calorimeter is a perfect insulator, what is the specific heat of the metal?
a. 0.24 J/g° b. 0.48 J/g° c. 0.72 J/g° d. 0.96 J/g° e. none of these
- Calculate the amount of heat evolved in the complete oxidation of 6.44 g of Aluminum at 25°C and 1.00 atm pressure.
a. 50.0 kJ b. 100. kJ c. 200. kJ d. 400. kJ e. 800. kJ
- Something that heats up quickly and cools off quickly:
a. has a higher specific heat than something that heats up slowly and cools off slowly.
b. has a lower specific heat than something that heats up slowly and cools off slowly.
c. has the same specific heat as something that heats up slowly and cools off slowly.
- What is the molar heat capacity of heptane, C₇H₁₆ if its specific heat is 2.25 J/g°?
a. 175 J/mol° b. 200. J/mol° c. 225 J/mol° d. 250. J/mol° e. 300. J/mol°
- A gas is expanded from an initial volume of 20.5 L at 0.92 atm at 23°C to a final volume of 34.6 L. During the expansion the gas cools to 12.0°C. What is the final pressure?
a. 0.28 atm b. 0.52 atm c. 0.57 atm d, 1.9 atm e. none of these
- Which of the following gases can be used as a fuel?
a. nitrogen b. oxygen c. carbon dioxide d. hydrogen e. all of these
- How many liters of acetylene gas are produced by the reaction of excess water with 5.00 g of calcium carbide, CaC₂, at 1.00 atm and 25.0°C?
a. 1.91 L b. 7.84 L c. 1.27 L d. 0.524 L e. none of these
- A solution is prepared by dissolving 4.40 g of KSCN in enough water to make 340.0mL of solution. What is the concentration of the solution?
a. 0.0440 M b. 0.0543 M c. 0.129 M d. 0.133 M e. none of these
- A sample of 10.6 g of KNO₃ is dissolved in 251.0 g of water at 25.0°C in a calorimeter. The maximum temperature of the well mixed solution was recorded to be 21.5°C. What is the molar heat of solution of potassium nitrate?
a. +3.8 kJ/mol b. -3.8 kJ/mol c. +35 kJ/mol d. -37 kJ/mol e. none of these
- Solid calcium carbonate decomposes at high temperature to form carbon dioxide gas and solid calcium oxide. Determine the heat of reaction for 1.00 mole of calcium carbonate using standard heat of formation data.
a. +2240 kJ/mol b. -966 kJ/mol c. 394 kJ/mol d. +178 kJ/mol e. none of these

13. What is the rms velocity (average speed of effusion) for water vapor at 300.°C?
 a. 933 m/s b. 966 m/s c. 890. m/s d. 0.00103 m/s e. 50.0 m/s
14. A mixture has the following composition of gases: the mole fraction of carbon dioxide is 0.167, the mole fraction of helium is 0.333, and the mole fraction of methane is 0.500. Which gas has the highest partial pressure?
 a. He b. CH₄ c. CO₂ d. they all have the same partial pressure
15. Under what set of conditions is a gas most likely to exhibit ideal gas behavior?
 a. low pressure and low temperature
 b. low pressure and high temperature
 c. high pressure and low temperature
 d. high pressure and high temperature
 e. gases always exhibit ideal gas behavior

Part Two

1. Using complete sentences, briefly explain what is meant by the terms "endothermic chemical reaction" and "exothermic chemical reaction".
2. $2\text{Ba}(s) + \text{O}_2(g) \rightarrow 2\text{BaO}(s) \Delta H^\circ = -1107.0 \text{ kJ}$
 $\text{Ba}(s) + \text{CO}_2(g) + \frac{1}{2}\text{O}_2(g) \rightarrow \text{BaCO}_3(s) \Delta H^\circ = -822.5 \text{ kJ}$

Given the data above, calculate ΔH° for the reaction below.



3. Data:
 $2\text{C}_8\text{H}_{18}(l) + 25\text{O}_2(g) \rightarrow 16\text{CO}_2(g) + 18\text{H}_2\text{O}(l) \Delta H^\circ = -11,200. \text{ kJ}$

Standard enthalpies of formation, ΔH°_f :

$\text{CO}_2(g)$, -393.5 kJ/mol; $\text{H}_2\text{O}(l)$, -285.8 kJ/mol

Use the above data to calculate the standard enthalpy of **formation** of octane, $\text{C}_8\text{H}_{18}(l)$.

4. A sample of hydrogen gas was collected over water at 36 °C and 855 mmHg. The volume of the container was 6.50 L. Calculate the number of moles of H₂ collected. (Vapor pressure of water is 44.6 torr at 36 °C)