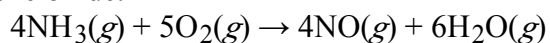


Chemistry 212
Fall 2017
Exam III - A

Name _____

MULTIPLE CHOICE. (1 point each) Choose the one alternative that best completes the statement or answers the question.

- 1) An important step in the synthesis of nitric acid is the conversion of ammonia to nitric oxide. 1) _____



Calculate $\Delta H^\circ_{\text{rxn}}$ for this reaction.

$\Delta H^\circ_f[\text{NH}_3(g)] = -45.9 \text{ kJ/mol}$; $\Delta H^\circ_f[\text{NO}(g)] = 90.3 \text{ kJ/mol}$; $\Delta H^\circ_f[\text{H}_2\text{O}(g)] = -241.8 \text{ kJ/mol}$

- A) -105.6 kJ
- B) -906.0 kJ
- C) -197.4 kJ
- D) 906.0 kJ
- E) 197.4 kJ

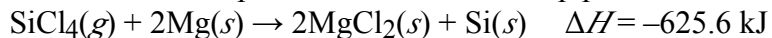
- 2) Which of the following gases will be the slowest to diffuse through a room? 2) _____

- A) carbon dioxide, CO_2
- B) methane, CH_4
- C) water, H_2O
- D) neon, Ne
- E) hydrogen sulfide, H_2S

3) Nitrogen will behave most like an ideal gas 3) _____

- A) at high temperature and high pressure.
- B) at low temperature and high pressure.
- C) at high temperature and low pressure.
- D) at low temperature and low pressure.
- E) at intermediate (moderate) temperature and pressure.

4) Sand is converted to pure silicon in a three step process. The third step is 4) _____



What is the enthalpy change when 25.0 mol of silicon tetrachloride is converted to elemental silicon?

- A) -7820 kJ
- B) -1.56×10^4 kJ
- C) -25.0 kJ
- D) -3.13×10^4 kJ
- E) None of these choices are correct.

5) The pressure of sulfur dioxide in a container is 159 kPa. What is this pressure in atmospheres? 5) _____

- A) 1.57 atm
- B) 0.637 atm
- C) 21.2 atm
- D) 15900 atm
- E) 0.209 atm

6) Cold packs, whose temperatures are lowered when ammonium nitrate dissolves in water, are carried by athletic trainers when transporting ice is not possible. Which of the following is true of this reaction? 6) _____

- A) $\Delta H = 0$, since cold packs are sealed
- B) $\Delta H < 0$, process is exothermic
- C) $\Delta H > 0$, process is exothermic
- D) $\Delta H < 0$, process is endothermic
- E) $\Delta H > 0$, process is endothermic

7) A sample of nitrogen gas at 298 K and 745 torr has a volume of 37.42 L. What volume will it occupy if the pressure is increased to 894 torr at constant temperature? 7) _____

- A) 31.2 L B) 44.9 L C) 112 L D) 380 L E) 22.3 L

8) A system receives 575 J of heat and delivers 425 J of work. Calculate the change in the internal energy, ΔE , of the system. 8) _____

- A) -1000 J B) 575 J C) 150 J D) -150 J E) 1000 J

9) Which one of the following is not a correct formation reaction? (products are correct) 9) _____

- A) $\text{H}_2(g) + \text{O}(g) \rightarrow \text{H}_2\text{O}(l)$
- B) $\frac{1}{2}\text{H}_2(g) + \frac{1}{2}\text{Cl}_2(g) \rightarrow \text{HCl}(g)$
- C) $6\text{C}(\text{graphite}) + 3\text{H}_2(g) \rightarrow \text{C}_6\text{H}_6(l)$
- D) $6\text{C}(\text{graphite}) + 6\text{H}_2(g) + 3\text{O}_2(g) \rightarrow \text{C}_6\text{H}_{12}\text{O}_6(s)$
- E) $\text{C}(\text{graphite}) \rightarrow \text{C}(\text{diamond})$

10) A Snickers® candy bar contains 280 Calories, of which the fat content accounts for 120 Calories. What is the energy of the fat content, in kJ? 10) _____

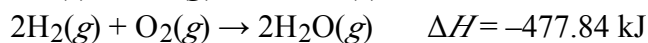
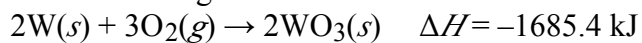
- A) 29 kJ
- B) 1.2×10^3 kJ
- C) 5.0×10^{-1} kJ
- D) 5.0×10^5 kJ
- E) 5.0×10^2 kJ

11) Select the gas with the highest average kinetic energy per mole at 298 K. 11) _____

- A) CO₂
- B) O₂
- C) H₂
- D) H₂O
- E) All have the same average kinetic energy.

12) Use Hess's Law to calculate the enthalpy change for the reaction
 $\text{WO}_3(s) + 3\text{H}_2(g) \rightarrow \text{W}(s) + 3\text{H}_2\text{O}(g)$ 12) _____

from the following data:



- A) 125.9 kJ
- B) 252.9 kJ
- C) 1207.6 kJ
- D) 364.9 kJ
- E) None of these choices are correct.

- 13) A 0.850-mole sample of nitrous oxide, a gas used as an anesthetic by dentists, has a volume of 20.46 L at 123°C and 1.35 atm. What would be its volume at 468°C and 1.35 atm? 13) _____
- A) 19.0 L B) 77.9 L C) 5.38 L D) 38.3 L E) 10.9 L

- 14) What is the density of carbon dioxide gas at -25.2°C and 98.0 kPa? 14) _____
- A) 2.09 g/L
B) 0.279 g/L
C) 0.232 g/L
D) 0.994 g/L
E) 1.74 g/L

SHORT ANSWER. (5 points each) Write the word or phrase that best completes each statement or answers the question. Must show all work for credit

- 15) Small quantities of hydrogen can be prepared by the addition of hydrochloric acid to zinc. A sample of 195 mL of hydrogen was collected over water at 25°C and 753 torr. What mass of hydrogen was collected? ($P_{\text{water}} = 24 \text{ torr at } 25^\circ\text{C}$) 15) _____

16) A 275-g sample of nickel at 100.0°C is placed in 100.0 mL of water at 22.0°C. What is the final temperature of the water? Assume that no heat is lost to or gained from the surroundings. Specific heat capacity of nickel = 0.444 J/(g·K) 16) _____

- 17) An unknown liquid is vaporized in a 273-mL flask by immersion in a water bath : 17) _____
99°C. The barometric pressure is 753 torr. If the mass of the vapor retained in the
flask is 1.362 g, what is its molar mass?

Answer Key

Testname: 212E3F17A

- 1) B
- 2) A
- 3) C
- 4) B
- 5) A
- 6) E
- 7) A
- 8) C
- 9) A
- 10) E
- 11) E
- 12) A
- 13) D
- 14) A
- 15) 0.0154 g
- 16) 39.6°C
- 17) 154 g/mol