

CH 121

General Chemistry

Exam 2

June 10, 2003

KEY

Name: _____
(please print)

SSN: * * * - * * - _____
(last 4 digits)

Each question is worth 1 point.

Circle your answer clearly, otherwise no credit will be given.

Circle only one answer. If you circle two or more, you will receive no credit.

1. Identify the spectator ion or ions (if any) in the redox reaction of a solution of lead(II) nitrate with zinc metal.

c. NO_3^-

2. The oxidation number of sulfur in $\text{S}_2\text{O}_3^{2-}$ is

e. +2.

3. Which of the following reactions is **NOT** a redox reaction?

c. $\text{H}_2\text{CO}_3(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$

4. If 4.00 mL of water is added to 6.00 mL of 0.0250 M CuSO_4 , what is the concentration of copper (II) sulfate in the diluted solution?

b. 0.0150 M

5. What is the **total** concentration of ions in a 0.0360 M solution of Na_2CO_3 ?

d. 0.108 M

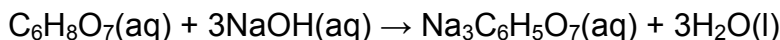
6. In the photographic process, silver bromide is dissolved by adding sodium thiosulfate.



If you want to dissolve 0.250 g of AgBr (molar mass = 187.8 g/mol), how many milliliters of 0.0138 M $\text{Na}_2\text{S}_2\text{O}_3$ should you add?

b. 193 mL

7. A soft drink contains an unknown amount of citric acid, $\text{C}_6\text{H}_8\text{O}_7$. If 100. mL of the soft drink require 33.51 mL of 0.0102 M NaOH to neutralize completely the citric acid, how many grams of citric acid (molar mass = 192.13 g/mol) does the soft drink contain per 100 mL? The reaction of citric acid and NaOH is

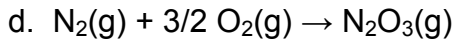


a. 0.0219 g

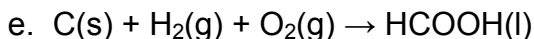
8. When 80. J of energy is absorbed by 0.50 mol of water, how much does the temperature rise? The specific heat of water is 4.184 J/g•K.

b. 2.1 K

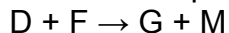
9. The equation for the standard enthalpy of formation of N_2O_3 is



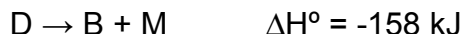
10. Which of the following equations represents an enthalpy change at 25 °C and 1 atm that is equal to ΔH°_f ?



11. Calculate the enthalpy of reaction for the process

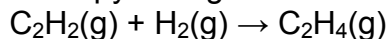


using the following equations and data:



a. -132 kJ

12. Calculate the standard enthalpy change for the reaction



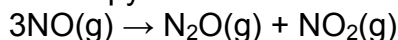
based on the following standard enthalpies of formation:

$$\Delta H^\circ_f[\text{C}_2\text{H}_2(\text{g})] = +226.7 \text{ kJ/mol}$$

$$\Delta H^\circ_f[\text{C}_2\text{H}_4(\text{g})] = +52.3 \text{ kJ/mol}$$

c. -174.4 kJ

13. Calculate the standard enthalpy of reaction for the process



using the standard enthalpies of formation:

$$\text{NO} = 90 \text{ kJ/mol}; \text{N}_2\text{O} = 82.1 \text{ kJ/mol}; \text{NO}_2 = 34.0 \text{ kJ/mol}$$

a. -153.9 kJ

14. According to the experiments concerned with the photoelectric effect, what was the result of increasing the intensity of the light striking the metal surface?

a. The number of electrons emitted was increased.

15. What is the binding energy of an electron in a photosensitive metal in J/mol if light of the frequency of $6.0 \times 10^{14} \text{ s}^{-1}$ impinging on the metal surface is just able to eject electrons?

c. $2.4 \times 10^5 \text{ J/mol}$

16. Which of the following electronic transitions in a hydrogen atom would have the longest wavelength?
- d. $n = 4$ to $n = 3$
17. Which of the following transitions in the hydrogen atom results in the emission of light of the highest energy?
- b. $n = 3$ to $n = 1$
18. What type of orbital is designated $n = 4, l = 3, m_l = -1$?
- e. 4f
19. What type of orbital (if any) is designated $n = 3, l = 1, m_l = -2$?
- e. no orbital is identified
20. What name is given to a region of an electron probability density graph where the probability of finding the electron is zero?
- a. node
21. A precipitate will form when an aqueous solution of lead(II) nitrate is added to an aqueous solution of
- e. NaCl
22. The solution which results from the reaction NaOH(aq) and HCl(aq) is the same as the result of the reaction of
- d. $\text{Na}_2\text{CO}_3\text{(aq)}$ and HCl(aq) .
23. How many joules are equivalent to 37.7 cal?
- e. 158 J
24. When 115 grams of water at $22.0\text{ }^\circ\text{C}$ is mixed with an unknown mass of water at a temperature of $58.0\text{ }^\circ\text{C}$, the final temperature of the resulting mixture is $45.0\text{ }^\circ\text{C}$. What was the mass of the second sample of water?
- e. 203 g
25. When two solutions are mixed, the container "feels hot." Thus,
- c. the reaction is exothermic.