

CHM1025 – UF Teaching Center Exam 3 Review Spring 2020

1. Arrange the following in order of increasing bond angles: ClO_2^- , NO_2^- , SiO_2

- A. $\text{ClO}_2^- < \text{NO}_2^- < \text{SiO}_2$
- B. $\text{ClO}_2^- < \text{SiO}_2 < \text{NO}_2^-$
- C. $\text{SiO}_2 < \text{NO}_2^- < \text{ClO}_2^-$
- D. $\text{SiO}_2 < \text{ClO}_2^- < \text{NO}_2^-$
- E. $\text{NO}_2^- < \text{ClO}_2^- < \text{SiO}_2$

2. Which of the following species exhibit resonance? SeO_2 , NO_2 , PbCl_2

- A. Only SeO_2
- B. Only NO_2
- C. Only PbCl_2
- D. SeO_2 and NO_2
- E. SeO_2 and PbCl_2

3. The concentration of LiOH is 0.50 M. If 25mL of LiOH is needed to titrate 40ml of HNO_3 , what is the concentration of HNO_3 ?

- A. 0.03125 M
- B. 0.8 M
- C. 0.3125 M
- D. 0.08 M
- E. 1.00 M

4. A certain element X has the electron configuration $[\text{A}]\text{ns}^2\text{np}^5$ and the element M has the electron configuration $[\text{B}]\text{ns}^2\text{np}^1$. Let A and B = the number of core electrons for X and M respectively and n = the energy level. If an ionic compound was made between M and X, what would the chemical formula most likely look like?

- A. MX_3
- B. M_2X_3
- C. MX_2
- D. MX
- E. M_3X

5. Which of the following substances exhibits hydrogen bonding intermolecular forces in its liquid state?

- A. CH_3NH_2
- B. CH_3OCH_3
- C. CH_3F
- D. H_2S
- E. $(\text{CH}_3)_3\text{N}$

6. Determine the bond energy of a H-Cl bond given the following information. $\text{CH}_4(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow \text{H}_3\text{C-Cl}(\text{g}) + \text{HCl}(\text{g})$ $\Delta H_{\text{rxn}} = -113 \text{ kJ}$

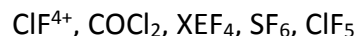
Bond	Bond Energy (kJ/mol)
Cl-Cl	243
C-Cl	339
H-C	414

- A. -1109 kJ/mol
- B. 883 kJ/mol
- C. -623 kJ/mol
- D. 55 kJ/mol
- E. 431 kJ/mol

7. Select the pair of substances in which the one with the lowest normal boiling point is listed first.

- A. C_7H_{16} , C_5H_{12}
- B. Xe, Kr
- C. H_2O , H_2S
- D. $\text{CH}_3\text{CH}_2\text{OH}$, CH_3OCH_3
- E. CF_4 , CCl_4

8. What is the correct molecular geometry of each of the following, respectively:



- A. See-Saw, Bent, Square Planar, Trigonal Planar, Trigonal pyramidal
- B. Tetrahedral, Trigonal Planar, Octahedral, Trigonal Bipyramidal, Trigonal Pyramidal
- C. See-Saw, Trigonal Planar, Square Planar, Octahedral, Square Pyramidal
- D. See-Saw, Trigonal Planar, Octahedral, Trigonal Bipyramidal, Square Pyramidal

E. Tetrahedral, Trigonal Pyramidal, Square Planar, Bent, Square Pyramidal

9. When 200 mL of 0.100 M NH_3 solution is added to 300mL of an unknown NH_3 solution, the final concentration of NH_3 in the mixture is 0.700 M. What was the concentration of the NH_3 in the unknown solution?

- A. 0.600 M
- B. 1.1 M
- C. 0.800 M
- D. 0.700 M
- E. 0.200 M

10. Which of the following bonds is the most polar?

- A. C - O
- B. H - C
- C. N - Cl
- D. Cl - Br
- E. O - F

11. Which of the following is not isoelectronic with the others?

- A. Mg^{2+}
- B. Na^+
- C. O^{2-}
- D. Ar
- E. Ne

12. How many lone pairs does the central atom have for the following Lewis structures?



- A. 0, 0, 0
- B. 1, 2, 3
- C. 2, 0, 1
- D. 0, 1, 2
- E. 2, 1, 0

13. In the Bohr model, which of the following electron transitions in a hydrogen atom results in the emission of the highest-energy photon?

- A. $n = 6$ to $n = 5$
- B. $n = 5$ to $n = 4$
- C. $n = 4$ to $n = 3$
- D. $n = 3$ to $n = 2$
- E. $n = 2$ to $n = 1$

14. The wavelength of the green light in the hydrogen line spectrum is 434.1 nm. What is the photon energy of the green light emitted?

- A. 4.33×10^{-19} J
- B. 4.58×10^{-22} J
- C. 4.58×10^{-19} J
- D. 4.33×10^{-22} J
- E. 5.12×10^{-19} J

15. Which of the following are nonpolar molecules, even though they have polar bonds?

- A. CH_2Cl_2
- B. SCl_2
- C. PBr_3
- D. SiCl_4
- E. ClO_2^-

16. What mass of KI is dissolved in 700.0 g of a solution that is 15.0% KI by mass?

- A. 1.05 g
- B. 105 g
- C. 205 g
- D. 100 g
- E. 15 g

17. Which solution, 1.0 m NaCl or 1.0 m glucose, $\text{C}_6\text{H}_{12}\text{O}_6$, should have the highest boiling point and why?

- A. NaCl b/c it has a higher van't hoff factor
- B. NaCl b/c it has a lower van't hoff factor
- C. Glucose b/c it has a higher van't hoff factor

- D. Glucose b/c it has a lower van't hoff factor
- E. They have the same van't hoff factor and therefore the same boiling point

18. Which of the following is not a strong acid?

- A. HClO_4
- B. H_2SO_4
- C. **HF**
- D. HBr
- E. HNO_3

19. How many acidic hydrogens do carbonic acid and phenol have, respectively? Lewis structures are given below.

- A. 2, 6
- B. 1, 6
- C. 1, 1
- D. **2, 1**
- E. 2, 2

