

**CHM1025 – UF Teaching Center Exam 3 Review (Spring 2020)**

1. Arrange the following in order of increasing bond angles:  $\text{ClO}_2^-$ ,  $\text{NO}_2^-$ ,  $\text{SiO}_2$

- 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?  $\text{SeO}_2$ ,  $\text{NO}_2$ ,  $\text{PbCl}_2$

- A. Only  $\text{SeO}_2$
- B. Only  $\text{NO}_2$
- C. Only  $\text{PbCl}_2$
- D.  $\text{SeO}_2$  and  $\text{NO}_2$
- E.  $\text{SeO}_2$  and  $\text{PbCl}_2$

3. The concentration of  $\text{LiOH}$  is 0.50 M. If 25mL of  $\text{LiOH}$  is needed to titrate 40ml of  $\text{HNO}_3$ , what is the concentration of  $\text{HNO}_3$ ?

- 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.  $\text{MX}_3$
- B.  $\text{M}_2\text{X}_3$
- C.  $\text{MX}_2$
- D.  $\text{MX}$
- E.  $\text{M}_3\text{X}$

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

- A.  $\text{CH}_3\text{NH}_2$
- B.  $\text{CH}_3\text{OCH}_3$
- C.  $\text{CH}_3\text{F}$
- D.  $\text{H}_2\text{S}$
- E.  $(\text{CH}_3)_3\text{N}$

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

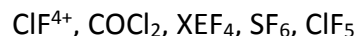
Bond	Bond Energy (kJ/mol)
Cl-Cl	243
C-Cl	339
H-C	414

- 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.  $\text{C}_7\text{H}_{16}$ ,  $\text{C}_5\text{H}_{12}$
- B. Xe, Kr
- C.  $\text{H}_2\text{O}$ ,  $\text{H}_2\text{S}$
- D.  $\text{CH}_3\text{CH}_2\text{OH}$ ,  $\text{CH}_3\text{OCH}_3$
- E.  $\text{CF}_4$ ,  $\text{CCl}_4$

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  $\text{NH}_3$  solution is added to 300mL of an unknown  $\text{NH}_3$  solution, the final concentration of  $\text{NH}_3$  in the mixture is 0.700 M. What was the concentration of the  $\text{NH}_3$  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.  $\text{Mg}^{2+}$
- B.  $\text{Na}^+$
- C.  $\text{O}^{2-}$
- 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.  $4.33 \times 10^{-19}$  J
- B.  $4.58 \times 10^{-22}$  J
- C.  $4.58 \times 10^{-19}$  J
- D.  $4.33 \times 10^{-22}$  J
- E.  $5.12 \times 10^{-19}$  J

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

- A.  $\text{CH}_2\text{Cl}_2$
- B.  $\text{SCl}_2$
- C.  $\text{PBr}_3$
- D.  $\text{SiCl}_4$
- E.  $\text{ClO}_2^-$

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.  $\text{HClO}_4$
- B.  $\text{H}_2\text{SO}_4$
- C.  $\text{HF}$
- D.  $\text{HBr}$
- E.  $\text{HNO}_3$

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

