

NAME \_\_\_\_\_  
CHEM1450/Practice Exam 3/Dr. Dooley/Fall 2018

*(3 Points Each) Place the letter corresponding to the correct answer in the blank to the left of the question number.*

\_\_\_\_\_1. **What happens to electrons to form a covalent bond?**

- a. Electrons are formed.
- b. Electrons are lost.
- c. Electrons are shared.
- d. Electrons are gained.
- e. Electrons are transferred.

\_\_\_\_\_2. **Using periodic trends, place the following bonds in order of increasing ionic character.**

**S-F                      Se-F                      O-F**

- a. Se-F < S-F < O-F
- b. S-F < Se-F < O-F
- c. O-F < Se-F < S-F
- d. Se-F < O-F < S-F
- e. O-F < S-F < Se-F

\_\_\_\_\_3. **Which molecule or compound below contains a pure covalent bond?**

- a.  $\text{Li}_2\text{CO}_3$
- b.  $\text{SCl}_6$
- c.  $\text{Cl}_2$
- d.  $\text{PF}_3$
- e.  $\text{NaCl}$

\_\_\_\_\_4. **Which of the following represent the Lewis symbol for Cl?**

- a.  $\text{:}\ddot{\text{Cl}}\text{:}$
- b.  $\text{:}\dot{\text{Cl}}\text{:}$
- c.  $\text{Cl}\cdot$
- d.  $\cdot\ddot{\text{Cl}}\text{:}$
- e.  $\cdot\dot{\text{Cl}}\text{:}$

- \_\_\_\_\_ 5. **How many valence electrons are there (total) in the molecule CH<sub>3</sub>Br?**
- 14
  - 12
  - 5
  - 30
  - 38
- \_\_\_\_\_ 6. **How many of the following elements can form compounds with an expanded octet?**
- H, C, S, Ar, Ne, B, Se**
- 0
  - 1
  - 2
  - 3
  - 4
- \_\_\_\_\_ 7. **In general, for a particular pair of atoms, which type of bond will be the shortest?**
- triple
  - single
  - double
  - there is no trend in bond length
- \_\_\_\_\_ 8. According to the following balanced reaction, how many moles of water are formed when 4.52 moles of HClO<sub>4</sub> reacts completely?
- $$\text{Cr(OH)}_3 + 3 \text{HClO}_4 \rightarrow \text{Cr(ClO}_4)_3 + 3 \text{H}_2\text{O}$$
- 13.6 moles H<sub>2</sub>O
  - 9.04 moles H<sub>2</sub>O
  - 4.52 moles H<sub>2</sub>O
  - 2.26 moles H<sub>2</sub>O
  - 1.51 moles H<sub>2</sub>O
- \_\_\_\_\_ 9. What volume of 5.0 M HCl stock solution should be diluted to make 450 mL of .654M HCl solution?
- $1.47 \times 10^3$  mL
  - 58.86 mL
  - $3.44 \times 10^3$  mL
  - 6.03 mL
  - .00727 mL

\_\_\_\_\_10. How many moles of  $\text{Na}^+$  are contained in a 0.852 L sample of 2.15M  $\text{Na}_2\text{CO}_3$ ?  
a. 1.83 mol  $\text{Na}^+$   
b. 0.396 mol  $\text{Na}^+$   
c. 0.793 mol  $\text{Na}^+$   
d. 3.66 mol  $\text{Na}^+$   
e. 7.32 mol  $\text{Na}^+$

\_\_\_\_\_11. What is the molarity of a solution made by dissolving 15.0 g  $\text{NaCl}$  in 500.0 mL water?  
a. 0.625 M  $\text{NaCl}$   
b. 0.0300 M  $\text{NaCl}$   
c. 5.13 M  $\text{NaCl}$   
d. 30.0 M  $\text{NaCl}$   
e. 0.513 M  $\text{NaCl}$

1. (12 Points Total) Fill in the table below with the electron geometries and bond angles associated with each of the following numbers of electron groups.

Number of Electron Groups around Central Atom	Electron Geometry (Name) (2 Points Each)	Bond Angle (or Angles) associated with this Geometry (2 Points Each)
<b>3</b>	Trigonal Planar	$120^\circ$
<b>4</b>		
<b>5</b>		
<b>6</b>		

2. (12 Points) Draw three resonance structures for  $\text{OCN}^-$ . Assign formal charges to all of the atoms in the resonance structures below.

a. (2 Points) Based on what you know about formal charges and stability, circle the resonance structure above that is the MOST likely structure.

3. (6 Points) List the molecular shape associated with the following Lewis structures:

Lewis structure: (Draw the structure for $\text{XeCl}_2$ . I usually do this box for you.)	VSEPR Sketch
Electron Geometry:	
Molecular Shape:	

4. (6 Points) Draw the Lewis Structure for the following molecule:

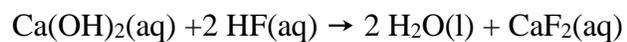


5. (5 Points) For the molecule below, draw the VSEPR Shape and include arrows to indicate bond polarities. Is the molecule polar?

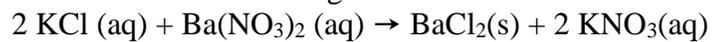


Is the molecule Polar (Circle One)? YES NO

1. (10 Points) The titration of 60.0 mL of an unknown concentration Ca(OH)<sub>2</sub> solution requires 425 mL of 0.18 M HF solution. What is the concentration of the Ca(OH)<sub>2</sub> solution (in M)? Below is the balanced reaction:



1. (8 Points) A 15 mL sample of 1.70 M potassium chloride solution is mixed with 5.25 g barium nitrate solution and the following reaction occurs:



- a. What is the limiting reactant and the theoretical yield of  $\text{BaCl}_2$  for this reaction?

Theoretical Yield:

Limiting Reactant: