Exam 2
CHEM 111 – General Chemistry I
Fall 2017

Instructions: Read the instructions for each question carefully and answer the questions to the best of your ability. You may use the Periodic Table below and a calculator to answer the following questions.

### Periodic Table of the Elements

<table>
<thead>
<tr>
<th>1</th>
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<tbody>
<tr>
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<td>C</td>
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<tr>
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<td>Nb</td>
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<td>Ag</td>
<td>Cd</td>
<td>In</td>
<td>Sn</td>
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<td>Rn</td>
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<tr>
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<td>Md</td>
<td>No</td>
<td>Lr</td>
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</tr>
</tbody>
</table>

Good luck!
This material was distributed by the Austin College Academic Skills Center in the General Chemistry Tutorial Series.

Contact the ASC for tutoring sessions and other information!
(903) 813-2454
1. Periodic Trends:
   
   a. Identify the relationship between elements in the same group.
   
   b. Identify the relationship between elements in the same period.

2. Classify the elements as metal, nonmetal, or metalloid:
   
   a. Mg
   
   b. S
   
   c. Rb
   
   d. Cr
   
   e. Te

3. Describe effective nuclear charge.

4. Cations are ________ than anions (in relation to size).

5. Write the name of the following molecules:
   
   a. NF₃
   
   b. CaCl₂
   
   c. NH₃
   
   d. Zn₃(PO₄)₂

6. Write chemical formulas for each of the following:
   
   a. Iron(III) chloride
b. Carbon tetrafluoride
c. Nitrate
d. Potassium Dichromate

7. Identify all the intermolecular forces associated with the following:
   a. Nitrite
   b. H₂O
   c. CF₄
   d. KCN

8. Write the electron configuration for the following ions (short and long forms):
   a. Ca²⁺

   ————
   ————
   ————
   ————

   b. Cl⁻

   ————
   ————
   ————
   ————

   c. Cr³⁺

   ————
   ————
   ————
   ————

9. Identify the element from this electron configuration: [Ar] 3d⁹

10. Rank from highest to lowest:
    a. Atomic Radius of: Cl, Ni, Fr, Al, Kr
    b. First Ionization Energy of: Cd, O, B, Rb, Cs
    c. Electronegativity of: Se, F, Ca, O, C
11. Draw the Lewis structure for PCl₅. State the molecular geometry, formal charge of each atom, and the hybridization state. Show the dipoles with a vector arrow and indicate the net dipole moment.

12. Draw all of the resonance structures and the resonance hybrid for nitrate. State the molecular geometry, formal charge of each atom, and the hybridization state. Show the dipoles with a vector arrow and indicate the net dipole moment.
13. Identify the percent composition of each of the elements present in $C_6H_{12}O_6$.

14. What is the empirical formula of a compound containing 40.92% C, 4.58% H, and 54.50% O?

15. If the compound from the above question has a known molecular weight of 176.12 g/mol, what is the molecular formula?