Chemistry 11 Practice test
Examination #1
Chapter 1-3 in text and section 1 in course guide

Questions 1-39 multiple choice (2 pts. each) on scantron (50 questions on each side)
Question 40 is Lewis Structures and VESPR plus polarity (14 pts.) on test paper
Question 41 is reading measurements given a scale/drawing. (8 pts.) on test paper

Chapter 1:

1. What is the scientific method? Know the meaning of each term in the scientific method.

2. Significant figures:
Identify the best answer to the following calculation:
   a) \( \frac{541.23 + 3.2}{9876.5} \)
   b) \( 3.63 \times 10^{-4} + (4.776 \times 10^{-3}) \)
   c) Express 8401.0 in exponential notation

3. Precision and accuracy: know the difference between the two terms

4. Temperature conversions:
   a. Convert 80. °F to °C and K
   b. Convert -80. °F to °C and K

5. Unit Conversion problems:
   a) The recommended pediatric dosage of Velosef is 20. mg/kg/day.
      (A) What is the daily dose (in mg) for a child weighing 36 pounds?
      (B) If the stock vial of Velosef is labeled 208 mg/mL, how many mL
      would be given in a daily dose?
   b) A critical care physician prescribes an IV of heparin to be administered at
      the rate of 1100 units per hour. The IV contains 26,000 units of heparin
      per liter. Determine the rate of the IV in cc/h
   c) Convert 32 ft/sec to meters/min.

6. Density measurements:
   a) You take a rock that weighs 15.20 g and place it in a graduated cylinder
      containing 10.00 mL of a liquid. The level of liquid rises to 15.00 mL.
      What is the density of the rock?
   b) If the density of the liquid is 1.00 g/mL, what is the mass of the liquid?
   c) If the density determined by a student is 7.00 g/mL and the actual density
      is 7.14 g/mL, what is the % error in the student’s determination?
7. Specific Heat:
   a) The specific heat of liquid mercury is 0.138 J/g K. How much heat (in cal) is required to raise the temperature of 15.0 mL of mercury from 27.0 ºC to 30.3 ºC? The density of liquid mercury is 13.546 g/mL.
   b) Given the table of specific heat values below, what is the identity of a 26.2 g metal sample that increases by 8.5 ºC when 100.0 J of energy is absorbed?

<table>
<thead>
<tr>
<th>Element</th>
<th>Specific Heat (J/g ºC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Au</td>
<td>0.128</td>
</tr>
<tr>
<td>Ag</td>
<td>0.235</td>
</tr>
<tr>
<td>Cu</td>
<td>0.385</td>
</tr>
<tr>
<td>Fe</td>
<td>0.449</td>
</tr>
<tr>
<td>Al</td>
<td>0.903</td>
</tr>
</tbody>
</table>

CHAPTER 2

8. States of matter and terms used for the inter conversion of one state to another.

9. Pure substance vs. mixtures

10. Are these chemical changes or physical changes?

   a) Density measurement
   b) dissolving a sugar cube
   c) ice melting to water
   d) evaporation of salt water
   e) Burning a sugar cube
   f) rusting of iron
   g) burning of kerosene
   h) bomb explosion

11. How many protons, neutron, and electrons are present in atoms or ions:

   a) The total number of protons, neutrons, and electrons in $^{50}$Co$^{+3}$ are:
   b) The total number of protons, neutrons, and electrons in $^{76}$Se$^{3-}$ are:

12. Know the Mass in amu and charge of protons, electrons, and neutrons

13. What is an isotope? Give examples of isotopes.

14. Organization of the periodic table. Study all the properties of each category of elements on page 15 of course guide thoroughly. Examples of questions are given below:

   Use the generically labeled periodic table below to select the best answer choice for each of the listed descriptions:
a) These group of elements are radioactive.
b) Elements in this group are used heavily in the electronics industry
c) Most likely to undergo reduction.
d) These group of elements form cations

15. Writing electronic configuration: Determine the accurate electronic configuration for Dubnium, Db (Z = 105).

16. CORE vs. VALENCE electrons

17. Trends in atomic radius, electronegativity, ionization potential

a) Which one of these sets has the elements arranged in correct order of increasing atomic radius?

A. Ca < Sr < Rb
B. Sr < Rb < Ca
C. Ca < Sr = Rb
D. Ca < Rb < Sr
E. Ca < Sr < Rb

b) Which has a larger radius in each of the following:

A. Ca^{2+} or Ca
B. I^{-} or I
C. K or K^{+}
c) Determine the correct listing of the listed atoms in terms of increasing electronegativity: Au, Cs, Cl, Cd, F, and I.

A. \( F < Cl < Cd < Cs < I < Au \)
B. \( F < Cl < I < Cd < Au < Cs \)
C. \( Cl < Cd < Cs < Au < I < F \)
D. \( Cs < Au < Cd < I < Cl < F \)
E. \( Au < I < F < Cl < Cd < Cs \)

18. Which of the following is IMPROPERLY matched?

a) C and Mg; an element
b) Sodium chloride; a compound
c) \( Na_2 \) and \( O_2 \); diatomic elements
d) saline; a homogeneous mixture
e) salad dressing; a heterogeneous mixture

19. Which statement concerning solid NaCl (i.e., table salt) is expected to be TRUE?

a) \( NaCl \) is a chemical compound.
b) \( NaCl \) is a homogeneous mixture.
c) \( NaCl \) is a heterogeneous mixture.
d) \( NaCl \) has properties identical to its component elements, sodium metal and chorine gas.
e) Both A and B

Chapter 3

20. Naming compounds and writing formulas of compounds (ionic, covalent, transitional metals-nonmetals). Refer to workshop 3 and textbook/course guide for examples
For questions 21 – 25, reference the structure of ascorbic acid also called Vitamin C below:

21. Based on your knowledge of VSEPR, which of the following geometries is NOT present in Vitamin C?

A. trigonal planar
B. tetrahedral
C. bent
D. trigonal pyramidal
E. All of the above are present in Vitamin C.

22. Select “A” for True OR “B” for False regarding the following statement: The carbon-oxygen dipoles around carbon labeled B are equal in magnitude.

23. Select “A” for True OR “B” for False regarding the following statement: Vitamin C is predominantly polar.

24. What is the relative bond angle associated with the carbon labeled “B”?

A. 90º
B. 109.5º
C. 120º
D. 180º
E. 360º

25. What is the number of lone pairs around the oxygen labeled “A”?

A. 0
B. 1
C. 2
D. 3
E. 4
26. Consider each of the following ions/molecules shown below and write your final structures in the boxes provided:

A. Beginning with the best *Lewis dot structure*, use VSEPR theory to draw each of the listed species, including resonance where appropriate. Don’t forget to include lone pairs!

B. Describe the geometry about EACH central atom. Include both electronic and molecular geometries.

C. Give the approximate bond angle(s) around each central atom.

D. Determine whether the overall species is polar or nonpolar.

i. SeO$_3$

ii. POCl$_3$

iii. CH$_3$COOH

iv. C$_2$O$_4^{2-}$
27. Give the measurements indicated by the arrow: