Chem 121 Rybolt Exam 3 Fall 2007 Name_____

Numerical constants may be listed below. Other needed information is given in the problem or written on the board or found in the periodic tables you will use during exam. For numerical problems, be sure to **show your work**, include units and circle your final answer. If several choices are given, **circle the correct answer**. Your written answers should be brief - just a few key words or sentences and not a long discussion. You can use your own calculator on the exam, but no notes, books, external information, or other electronic devices are to be used. 1 mol = 6.02×10^{23} c = 3.00×10^{8} m/s h = 6.63×10^{-34} Js

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1) Write the abbreviated electron configuration of the atom K

2) Write the abbreviated electron configuration of the atom Rb

3) K and Rb are placed in the same group in the periodic table which indicates that they have similar chemical properties but what is the reason they do have the same properties?

4) Consider the electron configuration for iron - draw arrows up or down to indicate how the Fe electrons are placed into these 3d orbitals shown below

_____ _____ _____ _____ _____

5) A 6p orbital has what value of primary quantum number n =

and what value of secondary quantum number l =

6) And what are the possible values of m_l if l=2

7) An experiment is done in which a substance is found to conduct electricity when it is a liquid but not when it is a solid. Which of the following is a possibility based on these results

KBr Br_2 K

8) What is the abbreviated electron configuration of Mo (one of the exceptions you learned)

9) And what is the electron configuration (<u>not</u> abbreviated) of the ion Fe^{2+}

10) And why is iron attracted to a magnet (paramagnetic) ?

11) A photon of light has a frequency of $2.00 \times 10^{14}\ s^{-1}$ therefore the wavelength (m) is

12) If a photon of light has a frequency of $2.00 \times 10^{14}\ s^{-1}$ then what is the energy (J) of this one photon of light?

13) Which of the following types of electromagnetic radiation has the longest wavelength?
microwave x-rays infrared light radio waves visible light

14) Circle the one of the following with the smallest size?
Fe Fe^{2+} Fe^{3+}

15) How many sigma bonds and how many pi bonds in the ethene molecule C_2H_4 ? - Draw Lewis structure first and then count.

16) The atom with the <u>smallest</u> size is

K Ca Ga As Br

17) The atom with the <u>lowest</u> ionization energy is

K Ca Ga As Br

18) Sharing two electrons is the basis of a(n) _____ bond.

metallic covalent ionic

19) Water molecules are found throughout living cells. Draw a Lewis structure for water and then identify the type of hybridization on the oxygen atom

sp sp^2 sp^3 sp^3d sp^3d^2

20) What is the name for the electron pair geometry around oxygen in water?

21) And what is the name for the molecular geometry when only the atoms are considered?

22) And what is the more electronegative side of the polar water molecule
oxygen side hydrogens side

23) Aluminum has only one isotope aluminum-27. In the ion $^{27}Al^{3+}$ what are the number of
protons neutrons electrons

24) Write the electron configuration (<u>not</u> abbreviated) for Al^{3+}

25) Draw the Lewis structure for alcohol molecule called ethanol C_2H_5OH

26) Draw the Lewis structure for O_2

27) How many different 4f orbitals are there?

28) Indicate which one of the following is an ionic compound by circling
Na SiO_2 H_2O NaCl

29) Draw the Lewis structure for SF_6 and then answer the following
hybridzation on central S atom is and molecular geometry is

30) Draw a picture of a wave and label the distance on your drawing that is used to define one wavelength