

Chem 1110
Midterm 2
100 points
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Name _____

Instructions:

This is a closed book, closed notebook test. You may not discuss this exam with anyone, either during or after the exam, until it has been graded and returned to you in class. You may not use any outside materials - including Periodic Tables - on this exam. You may use a calculator to help you compute the correct answer but may not retrieve or view any reference materials that may be stored in your calculator.

Each question is worth 4 points. All questions are of equal value.

1. The property that describes the ease with which an atom gives up an electron to form a cation is
 - A. Atomic number
 - B. Electron affinity
 - C. Electronegativity
 - D. Ionization energy
 - E. None of the above

2. The property that describes the energy released when a single atom adds an electron is
 - A. Atomic number
 - B. Electron affinity
 - C. Electronegativity
 - D. Ionization energy
 - E. None of the above

3. What is the most likely charge on an ion formed by an element with a valence electron configuration of ns^2np^5 ?
 - A. 5-
 - B. 1-
 - C. 1+
 - D. 2+
 - E. 5+

4. Which of the following elements is most likely to form an ion with a -2 charge?
 - A. Mg
 - B. Si
 - C. S
 - D. K
 - E. Ti

5. If an element X could react with sulfur to form an ionic compound with the formula XS_2 , the charge on the ion formed by X would be
- A. -4
 - B. -2
 - C. +1
 - D. +2
 - E. +4
6. What is the formula of a compound formed by the ions M^+ and X^{3-} ?
- A. MX_3
 - B. M_3X
 - C. M_3X_3
 - D. M_2X_6
 - E. None of the above
7. The molecular formula of ammonium phosphate indicates that one molecule of the substance is composed of
- A. Three atoms of nitrogen, twelve atoms of hydrogen, one atom of phosphorus, four atoms of oxygen, and six extra electron
 - B. Three atoms of nitrogen, twelve atoms of hydrogen, four atoms of phosphorus, and four atoms of oxygen
 - C. One atom of nitrogen, twelve atoms of hydrogen, one atom of phosphorus, and four atoms of oxygen
 - D. Three atoms of nitrogen, seven atoms of hydrogen, one atom of phosphorus, and four atoms of oxygen
 - E. Three atoms of nitrogen, twelve atoms of hydrogen, one atom of phosphorus, and four atoms of oxygen
8. What is the name of $BaCO_3$?
- A. Barium carbonate
 - B. Barium (II) carbonate
 - C. Barium (II) acetate
 - D. Barium carbon trioxide
 - E. None of the above

9. Which groups contains only elements which normally exist in diatomic form?
- A. Nitrogen, sulfur, bromine
 - B. Helium, neon, argon
 - C. Nitrogen, oxygen, fluorine
 - D. Hydrogen, lithium, iodine
 - E. Oxygen, phosphorus, germanium
10. Which element is the most likely to form three covalent bonds?
- A. P
 - B. Si
 - C. Al
 - D. S
 - E. Se
11. A chemical bond formed when two atoms share four electrons is a _____ bond that is best described as _____.
- A. Double, covalent
 - B. Double, ionic
 - C. Single, covalent
 - D. Single, ionic
 - E. None of the above
12. The bond angle in the molecule H_2S is _____ because the _____.
- A. Exactly 109.5° , the S atom has four sets of bonding and nonbonding electrons
 - B. Greater than 109.5° , lone pairs on the S atom allow the bond angle to expand
 - C. Less than 109.5° , lone pairs on the S atom force the bond angle to contract
 - D. Exactly 120° , the double bond negates the effect of the lone pair
 - E. Exactly 180° , the sulfur atom has two covalent bonds

13. A molecule in which the central atom forms one double bond and two single bonds has _____ geometry.
- A. Bent
 - B. Linear
 - C. Trigonal planar
 - D. Pyramidal
 - E. Tetrahedral
14. If the elements W, X, Y, and Z have electronegativity values of 1.0, 2.0, 2.5, and 3.5 respectively, which bond is the least polar?
- A. WX
 - B. XY
 - C. WZ
 - D. XZ
 - E. YZ
15. The electronegativity values of Si and Cl are 1.8 and 3.0 respectively. In the compound silicon tetrachloride the Si-Cl bond is _____ and the molecule is _____.
- A. Nonpolar, nonpolar
 - B. Polar, polar
 - C. Nonpolar, polar
 - D. Polar, nonpolar
 - E. None of the above
16. The electronegativity values of hydrogen and selenium are 2.1 and 2.4 respectively. In the compound dihydrogen selenide the H-Se bond is _____ and the molecule is _____.
- A. Nonpolar, nonpolar
 - B. Polar, polar
 - C. Nonpolar, polar
 - D. Polar, nonpolar
 - E. None of the above

17. Which sample contains the smallest number of atoms?
- A. 1.0 mole water
 - B. 1.5 moles sodium chloride
 - C. 2.0 moles carbon tetrachloride
 - D. 2.5 moles gold
 - E. 3.0 moles chlorine
18. The molecular weight of aluminum sulfate is _____ grams/mole.
- A. 214
 - B. 278
 - C. 315
 - D. 342
 - E. 450
19. 42.0 grams of chlorine gas contains _____ molecules of chlorine which is equivalent to _____ chlorine atoms.
- A. 1.2, 0.59
 - B. 3.6×10^{23} , 7.1×10^{23}
 - C. 3.6×10^{23} , 1.8×10^{23}
 - D. 1.8×10^{23} , 3.6×10^{23}
 - E. 0.59, 1.2
20. How many grams of calcium nitrate are in 0.65 moles?
- A. 66.4
 - B. 97.6
 - C. 133
 - D. 165
 - E. None of the above

21. The reaction $\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$ is used to produce ammonia. When 450. g of hydrogen reacts with nitrogen (how much? More than enough) 1575 g of ammonia are produced. What is the percent yield of this reaction?
- A. 62.2 %
 - B. 41.5%
 - C. 30.8%
 - D. 20.7%
 - E. More information is needed to solve this problem
22. The combination of ions most likely to produce a precipitate is
- A. Li^+ and PO_4^{3-}
 - B. Pb^{2+} and NO_3^-
 - C. NH_4^+ and SO_4^{2-}
 - D. Fe^{3+} and OH^-
 - E. Mg^{2+} and $\text{C}_2\text{H}_3\text{O}_2^-$
23. The combination of ions least likely to produce a precipitate is
- A. Ba^{2+} and SO_4^{2-}
 - B. Pb^{2+} and Cl^-
 - C. Hg_2^{2+} and PO_4^{3-}
 - D. Ag^+ and I^-
 - E. Hg^{2+} and $\text{C}_2\text{H}_3\text{O}_2^-$
24. The net ionic equation for the double displacement reaction between ammonium sulfide and gold (III) nitrate is
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25. In the double displacement reaction between silver (I) nitrate and potassium sulfate the spectator ions in the reaction are
- A. Silver ion and nitrate ion
 - B. Hydrogen ion and hydroxide ion
 - C. Silver ion and sulfate ion
 - D. Potassium ion and sulfate ion
 - E. Potassium ion and nitrate ion

Chem 1110 MT2 answers

1. D
2. B
3. B
4. C
5. E
6. B
7. E
8. A
9. C
10. A
11. A
12. C
13. C
14. B
15. D
16. C
17. D
18. D
19. B
20. E
21. A
22. D
23. E
24. $2 \text{Au}^{3+}_{(\text{aq})} + 3 \text{S}^{2-}_{(\text{aq})} \rightarrow \text{Au}_2\text{S}_3 (\text{s})$
25. E