

CHEM 101
Quiz 3:
October 20, 21
Instructor: Lida Farsi

Quiz 3 must be turned in at the beginning of class on Wednesday, October 27.

Clearly print your name in the name section of the Scantron answer sheet.
Clearly enter the last five numbers of your student ID number in the Student ZipGrade ID portion of the Scantron answer sheet.

There is only one most correct response to each of the multiple-choice questions. Each question is worth 2 points. I expect you to turn in your ZipGrade Scantron sheet and your quiz (solutions to the problems). Please hand those to me separately as I am returning you the solutions (your quiz) but will keep the ZipGrade Scantron. Please write your names also on the solution pages you give me so I can give them back to you without any difficulty.

Although I am not grading the solutions (and only will Grade your ZipGrade Scantron), I need your solutions to make sure you have solved the problems yourself and to know the common mistakes in solving the problems and to try to address them.

I will return your solutions to you, but I will keep the ZipGrade Scantron sheets. For that matter, please work through the entire quiz and circle your responses to the question on your quiz before transferring your responses to the Scantron sheet. Be sure to make any erasure on the Scantron sheet complete.

- 1) What is the correct chemical formula for lithium phosphate, calcium nitrite, aluminum oxide, and iron (III) oxide:
 - a) Li_3PO_3 , $\text{Ca}(\text{NO}_3)_2$, Al_2O_3 , Fe_2O_3
 - b) Li_3PO_4 , $\text{Ca}(\text{NO}_2)_2$, Al_2O_3 , Fe_2O_3
 - c) Li_2HPO_4 , $\text{Ca}(\text{NO}_3)_2$, Al_2O_3 , Fe_3O_2
 - d) Li_2SO_4 , $\text{Ca}(\text{NO}_2)_2$, Al_2O_3 , FeO

- 2) Which statement is NOT correct?
 - a) Matter is ultimately composed of atoms, and those atoms are often combined in compounds.
 - b) The formula mass of a compound is the sum of charges of all the atoms in the chemical formula for the compound.
 - c) Besides being the characteristic mass of a molecule or formula unit, formula mass is important in many calculations involving the composition of compounds and quantities in chemical reactions.
 - d) Most of the matter you encounter is in the form of compounds.

- 3) What is the formula mass of CCl_2F_2 , hydrobromic acid, phosphorus pentafluoride, and manganese (III) oxide:
- 120.91, 96.91, 182.97, 102.94
 - 120.91, 80.91, 125.97, 157.88
 - 120.91, 96.91, 182.97, 102.94
 - 120.91, 80.91, 125.97, 196.82
- 4) Imagine we have 10 moles of the following compounds. Which sample is the heaviest and which one is an ionic compound?
 BrF_5 , HNO_3 , MgSO_4 , NI_3
- heaviest = BrF_5 , Ionic = BrF_5
 - heaviest = NI_3 , Ionic = NI_3
 - heaviest = BrF_5 , Ionic = MgSO_4
 - heaviest = NI_3 , Ionic = MgSO_4
- 5) Which compound name is correct?
- CaO : Calcium (II) oxide
 - KNO_3 : Potassium nitrite
 - $\text{Fe}(\text{OH})_2$: Iron oxide
 - NH_4NO_3 : Ammonium nitrate
- 6) We have 10 g of each of the following compounds. Which of them consists of the least grams of oxygen?
- Copper (I) chlorate
 - Potassium permanganate
 - Lithium hydrogen sulfite
 - All have the same grams of oxygen
- 7) Sort option 1, option 2, option 3, and option 4 from smallest to the greatest value:
- Option 1: Mass of Cl in 15 g of chlorous acid
 Option 2: Mass of N in 35 g of nitric acid
 Option 3: Mass of C in 20 g of acetic acid
 Option 4: Mass of S in 20 g of sulfurous acid
- Option 1 < Option 2 < Option 3 < Option 4
 - Option 4 < Option 3 < Option 2 < Option 1
 - Option 1 < Option 3 < Option 4 < Option 2
 - Option 1 < Option 2 < Option 4 < Option 3

- 8) Which sample contains the most number of atoms?
- a) One gram of cobalt
 - b) One gram of carbon
 - c) One gram of lead
 - d) All have the same number of atoms
- 9) Fluoride is often added to water as sodium fluoride. What is the mass percent composition of F in sodium fluoride. How many grams of sodium fluoride must be added to 1500 L of water to fluoridate it at a level of 1.0 mgF/L?
- a) 45 % , 3.3 mg
 - b) 90 % , 3.3 g
 - c) 45 % , 3.3 g
 - d) 90 % , 3.3 mg
- 10) Which statement is NOT correct:
- a) The molecular formula of sulfur hexafluoride is SF₆
 - b) HCl is an ionic compound with H having the charge of +1 and Cl having the charge of -1
 - c) Dihydrogen monoxide is the other name of water
 - d) Gold (IV) oxide has the chemical formula of AuO₂
- 11) Which statement is NOT correct:
- a) The value of an element's molar mass in grams per mole is numerically equal to the element's atomic mass in atomic mass units
 - b) The mass of one mol of atoms of an element is its molar mass
 - c) Just as the weight of 1 doz nails is constant for different types of nails, so the mass of 1 mol of atoms is constant for different atoms
 - d) Avogadro's number, the number of atoms in a mole, is defined as the number of atoms in exactly 12 g of carbon-12
- 12) We are told that 3.24 g sample of titanium reacts with oxygen and forms 5.40 g of the metal oxide. We are told all the oxygen and titanium in this reaction would be consumed to produce metal oxide. We are also given the periodic table of elements. What information CANNOT directly be inferred from this information:
- a) The empirical formula of metal oxide is TiO₂
 - b) 2.16 g of oxygen reacts with 3.24 g of titanium
 - c) 0.135 mol of oxygen reacts with 0.0677 mol of titanium
 - d) The molecular formula of metal oxide is Ti₂O₄

13) Which of the following consists of only metals?

- a) hydrogen, lithium, sodium, potassium
- b) beryllium, magnesium, calcium, silicon
- c) germanium, tellurium, boron, vanadium
- d) aluminum, copper, zinc, mercury

14) Sort the following elements based on their atomic mass (remember atomic mass numerically equals molar mass):

Carbon, nitrogen, calcium, phosphorous, chlorine, argon, palladium, iridium, sodium, potassium

- a) Carbon < nitrogen < calcium < phosphorous < chlorine < argon < palladium < iridium < sodium < potassium
- b) Carbon < nitrogen < chlorine < phosphorous < argon < calcium < sodium < potassium < palladium < iridium
- c) Carbon < nitrogen < sodium < phosphorous < chlorine < argon < potassium < calcium < palladium < iridium
- d) Carbon < nitrogen < sodium < phosphorous < chlorine < potassium < argon < calcium < palladium < iridium

15) Which of the following answers contain all metals with invariant charges?

- a) cesium, calcium, silver, zinc, lead
- b) copper, zinc, sodium, strontium, barium
- c) tin, mercury, zinc, silver, lead
- d) silver, aluminum, magnesium, cesium, lithium

16) Which statement is correct?

- a) All transition metals form more than one type of ion and as a result form second type of ionic compounds
- b) Cr, Fe, Zn, Zr are examples of transition metals that form more than one type of ion
- c) Ionic compounds for sure consist of a metal and non-metal. If we do not see a metal in a compound, we can be sure it is not an ionic compound
- d) We categorize chemical formulas into three types: empirical, molecular, and structural

17) Which statement is NOT correct?

- a) Even though atoms combine in whole-number ratios, their mass ratios are not necessarily whole numbers
- b) The ratio of hydrogen to oxygen in a mixture is variant
- c) The ratio of hydrogen to oxygen in water is fixed
- d) Molecular elements normally exist in nature with single atoms as their basic units

18) Which of the following is an ionic compound?

- a) NO
- b) NH_4ClO_4
- c) Au
- d) CCl_4

19) Which of these elements exist as diatomic molecules?

- a) Ba
- b) Bi
- c) Br
- d) Be

20) Which formula represents the greatest total number of atoms?

- a) $\text{Al}(\text{C}_2\text{H}_3\text{O}_2)_3$
- b) $\text{Al}_2(\text{Cr}_2\text{O}_7)_3$
- c) $\text{Pb}(\text{HSO}_4)_4$
- d) $(\text{NH}_4)_3\text{PO}_4$

21) Which of the following is NOT an acid?

- a) $\text{HC}_2\text{H}_3\text{O}_2$
- b) HCl
- c) HClO_2
- d) Al_2O_3

22) Which of the following samples has the smallest mass?

- a) 2.32 mol carbon tetrafluoride
- b) 0.66 mol magnesium fluoride
- c) 1.99 mmol carbon disulfide
- d) 2.21 kmol sulfur trioxide

23) A mothball is composed of naphthalene ($C_{10}H_8$) and has a mass of 2.32 g. How many naphthalene molecules does it contain?

- a) 1.09×10^{22}
- b) 8.72×10^{22}
- c) 8.72×10^{23}
- d) 1.09×10^{23}

24) Which sample has the most number of molecules?

- a) 10 g H_2O
- b) 100 g N_2
- c) 100 g CCl_4
- d) 30 g $C_6H_{12}O_6$

25) What is the mass percent composition of H in $C_2H_8N_2$?

- a) 3.36%
- b) 13.44 %
- c) 4.2 %
- d) 46.6 %