

**Mid-term Exam I - Make-up****Multiple Choice**

*Identify the letter of the choice that best completes the statement or answers the question.*

- \_\_\_\_\_ 1. Which of the following is a qualitative statement?
- The compound is contaminated.
  - The reactants are 99.95% pure.
  - The sample has a mass of 85 grams.
  - The reaction produced 112 g of a pure white solid.
  - The gas volume is twenty-two liters.
- \_\_\_\_\_ 2. Which of the following is both a quantitative and a qualitative statement?
- The reaction produced 112 g of a pure white solid.
  - The compound has a mass of 14.62 g.
  - The compound formed pale yellow crystals.
  - The drug is 92.5% pure.
  - The compound melted.
- \_\_\_\_\_ 3. A comfortable room temperature is 72 °F. Correctly estimating this temperature in Celsius yields:
- 8.0 °C.
  - 14 °C.
  - 22 °C.
  - 54 °C.
  - 98 °C.
- \_\_\_\_\_ 4. Aspirin melts at 275°F. Correctly estimating this temperature in Celsius yields:
- 275°C
  - 175°C
  - 63°C
  - 487°C
  - 135°C
- \_\_\_\_\_ 5. Which of the following is not a physical property?
- pressure
  - heat capacity
  - hardness
  - reactivity
  - temperature
- \_\_\_\_\_ 6. A sample of aluminum has a mass of 63.49 g. What is its volume? (Density of aluminum = 2.70 g/mL)
- 63.5 mL
  - 171 mL
  - 0.370 mL
  - 0.425 mL
  - 23.5 mL

- \_\_\_\_\_ 7. A sample has a mass of 612 g and a volume of 78 cm<sup>3</sup>. What is the identity of the sample?
- mercury (density = 13.6 g/cm<sup>3</sup>)
  - iron (density = 7.86 g/cm<sup>3</sup>)
  - copper (density = 8.92 g/cm<sup>3</sup>)
  - silver (density = 10.5 g/cm<sup>3</sup>)
  - aluminum (density = 2.7 g/cm<sup>3</sup>)
- \_\_\_\_\_ 8. Water is an unusual substance in that the density of the solid state (ice) is normally *lower* than the density of the liquid state. Suppose a friend brings you a glass of ice water. If you leave the glass untouched, what will happen over time?
- The ice will melt and the resulting water level will be lower than before.
  - The ice will melt and the resulting water level will be unchanged.
  - The ice will melt and the resulting water level will be higher than before.
  - The ice will only melt if the mixture is stirred.
  - None of the above.
- \_\_\_\_\_ 9. Which of the following is not a physical property of water?
- Water is a liquid at room temperature.
  - Water is transparent to visible light.
  - Water boils at 100°C.
  - Water freezes at 32°F.
  - Water can be broken down into hydrogen gas and oxygen gas.
- \_\_\_\_\_ 10. Which of the following is not a chemical property of water?
- Water interacts with some metals to produce hydrogen gas.
  - Water combines with carbon dioxide in plants to produce starches and sugars.
  - Water boils at 100 degrees Celsius.
  - Water combines with sulfur dioxide and oxygen to produce sulfuric acid.
  - Water and carbon dioxide are produced by the combustion of fossil fuels.
- \_\_\_\_\_ 11. Which of the following describes a chemical change?
- Ethanol is a clear, colorless liquid.
  - Ethanol can be produced by the fermentation of grapes.
  - Ethanol evaporates quickly at room temperature.
  - Ethanol has a high heat capacity.
  - Ethanol boils when heated.
- \_\_\_\_\_ 12. Which of the following substances is homogeneous?
- wood
  - a jelly bean
  - vegetable soup
  - salt dissolved in water
  - a mirror
- \_\_\_\_\_ 13. Which of the following is heterogeneous?
- black coffee
  - copper pipe
  - a clear sugar solution
  - grape juice
  - a tossed salad

- \_\_\_\_\_ 14. Iodine, gasoline, and sugar are:
- an element, a homogeneous mixture, and a pure substance.
  - a pure substance, a heterogeneous mixture, and a pure substance.
  - a homogeneous mixture, a pure substance, and a homogeneous mixture.
  - an element, a pure substance, and a pure substance.
  - none of the above.
- \_\_\_\_\_ 15. In a chemical reaction, 23.2 g of mercury oxide is broken down to yield 20 g of mercury and 3.2 g of oxygen gas. This is an example of:
- The Law of Conservation of Mass.
  - The Law of Multiple Proportion.
  - The Law of Conservation of Energy.
  - Dalton's Atomic Theory.
  - The Law of Constant Composition.
- \_\_\_\_\_ 16. Which of the following is not the symbol of an element?
- Cu
  - Ni
  - CO
  - Ag
  - C
- \_\_\_\_\_ 17. Which of the following is not a metal?
- nickel (Ni, atomic number 28)
  - sulfur (S, atomic number 16)
  - lithium (Li, atomic number 3)
  - uranium (U, atomic number 92)
  - calcium (Ca, atomic number 20)
- \_\_\_\_\_ 18. Which of the following is a metal?
- carbon (C, atomic number 6)
  - iridium (Ir, atomic number 77)
  - radon (Rn, atomic number 86)
  - hydrogen (H, atomic number 1)
  - boron (B, atomic number 5)
- \_\_\_\_\_ 19. How many of each types of atoms does the compound  $\text{Ca}_3(\text{PO}_4)_2$  contain?
- 3 calcium, 1 phosphorus and 4 oxygen
  - 3 calcium, 2 phosphorus and 8 oxygen
  - 3 calcium, 1 phosphorus and 6 oxygen
  - 3 calcium, 1 phosphorus and 8 oxygen
  - 3 calcium, 2 phosphorus and 6 oxygen
- \_\_\_\_\_ 20. Which of the following statements concerning the atom is false?
- Chemical reactions involve only the electrons.
  - The atom contains protons, neutrons and electrons.
  - Protons are found in orbits about the nucleus.
  - The nucleus contains both protons and neutrons.
  - Most of the mass of the atom is found in the nucleus.

- \_\_\_\_\_ 21. Which metric prefix means 1000?  
a. pico  
b. micro  
c. milli  
d. kilo  
e. nano
- \_\_\_\_\_ 22. Which metric prefix means  $1 \times 10^{-6}$ ?  
a. kilo  
b. nano  
c. pico  
d. micro  
e. milli
- \_\_\_\_\_ 23. There are \_\_\_\_\_ milligrams in a gram.  
a.  $1 \times 10^{-3}$   
b.  $1 \times 10^6$   
c.  $1 \times 10^9$   
d.  $1 \times 10^{-6}$   
e.  $1 \times 10^3$
- \_\_\_\_\_ 24. How many microliters are in 89.63 L?  
a.  $8.963 \times 10^{10} \mu\text{L}$   
b.  $8.963 \times 10^7 \mu\text{L}$   
c.  $8.963 \times 10^4 \mu\text{L}$   
d.  $8.963 \times 10^{-4} \mu\text{L}$   
e.  $8.963 \times 10^{-7} \mu\text{L}$
- \_\_\_\_\_ 25. Which of the following is incorrect?  
a.  $^{37}\text{Cl}$  has 20 protons, 20 electrons and 20 neutrons.  
b.  $^{74}\text{Se}$  has 34 protons, 34 electrons and 40 neutrons.  
c.  $^{40}\text{Ar}$  has 18 protons, 18 electrons and 22 neutrons.  
d.  $^{63}\text{Cu}$  has 29 protons, 29 electrons and 34 neutrons.  
e.  $^{55}\text{Mn}$  has 25 protons, 25 electrons and 30 neutrons.
- \_\_\_\_\_ 26. An element containing 26 protons, 26 electrons and 30 neutrons will have the symbol:  
a.  $^{82}\text{Te}$ .  
b.  $^{52}\text{Zn}$ .  
c.  $^{56}\text{Fe}$ .  
d.  $^{56}\text{Zn}$ .  
e.  $^{52}\text{Te}$ .
- \_\_\_\_\_ 27. Which of the following statements is not true ?  
a.  $^{95}_{42}\text{Mo}$  contains 53 neutrons.  
b.  $^{51}_{23}\text{V}$  has an atomic number of 23.  
c.  $^{12}_6\text{C}$  has the same number of protons, neutrons and electrons.  
d.  $^{66}_{30}\text{Zn}$  has the same number of electrons and protons.  
e.  $^{56}_{26}\text{Fe}$  has the same number of neutrons and protons.

- \_\_\_\_\_ 28. Which of the following statements concerning isotopes is true?
- All isotopes of a given element are radioactive.
  - Various isotopes of the same element exhibit very different chemical reactivity.
  - Various isotopes of the same element have the same number of protons.
  - Every element has 3 isotopes.
  - Various isotopes of the same element have the same mass.
- \_\_\_\_\_ 29. An element that has 36 protons and 48 neutrons has an approximate atomic weight of:
- 60 amu.
  - 84 amu.
  - 12 amu.
  - 36 amu.
  - 48 amu.
- \_\_\_\_\_ 30. Suppose the isotopic ratio of the two boron isotopes  $^{10}\text{B}$  (10.013 amu) and  $^{11}\text{B}$  (11.009 amu) in a sample has been altered from the ratio found in nature and now contains 58.73%  $^{10}\text{B}$  in the sample. Determine the atomic weight of this sample of boron.
- 10.511 amu
  - 10.013 amu
  - 11.009 amu
  - 10.424 amu
  - 10.498 amu
- \_\_\_\_\_ 31. An element has three naturally occurring isotopes with the following masses and abundances (in parenthesis): 27.977 amu (0.9222); 28.974 amu (0.0469); 29.974 amu (0.0310). Calculate the atomic weight of the element.
- 28.09 amu
  - 66.94 amu
  - 86.93 amu
  - 28.98 amu
  - 83.93 amu
- \_\_\_\_\_ 32. Calculate the number of moles represented by 21.7 g Fe.
- 1210 moles
  - 0.835 moles
  - 1.20 moles
  - 2.57 moles
  - 0.389 moles
- \_\_\_\_\_ 33. How many atoms are in a 10.0 g sample of molybdenum (Mo)?
- $6.28 \times 10^{22}$
  - $1.10 \times 10^{23}$
  - $1.43 \times 10^{23}$
  - $2.53 \times 10^{26}$
  - $5.78 \times 10^{26}$
- \_\_\_\_\_ 34. How many hydrogen atoms are in a 27.0 g sample of water ( $\text{H}_2\text{O}$ )?
- 1.50
  - 2.99
  - $4.98 \times 10^{-24}$
  - $1.81 \times 10^{24}$
  - $2.93 \times 10^{26}$

- \_\_\_\_\_ 35. Which sample contains the same number of atoms as 175.0 g of cadmium (Cd)?
- 225 g Pb
  - 175 g Hg
  - 307 g Au
  - 142 g Ir
  - 305 g Sn
- \_\_\_\_\_ 36. Which element can be classified as a halogen?
- He
  - H
  - O
  - Cl
  - La
- \_\_\_\_\_ 37. Which element can be classified as a noble gas?
- O
  - Cl
  - H
  - No
  - Ne
- \_\_\_\_\_ 38. Which element can be classified as a transition metal?
- C
  - Xe
  - Cs
  - O
  - Ni
- \_\_\_\_\_ 39. The chemical compound  $(\text{CH}_3\text{O})_2\text{CH}_2$  can also be represented as:
- $\text{C}_3\text{H}_5\text{O}$ .
  - $\text{C}_3\text{H}_8\text{O}$ .
  - $\text{C}_3\text{H}_8\text{O}_2$ .
  - $\text{C}_2\text{H}_8\text{O}_2$ .
  - $\text{C}_2\text{H}_5\text{O}_2$ .
- \_\_\_\_\_ 40. Which formula name combination is incorrect?
- $\text{SeCl}_4$  and selenium tetrafluoride
  - $\text{N}_2\text{O}_3$  and dinitrogen trioxide
  - $\text{P}_4\text{O}_{10}$  and tetraphosphorus decaoxide
  - $\text{AsF}_5$  and arsenic pentafluoride
  - $\text{SF}_6$  and sulfur heptafluoride
- \_\_\_\_\_ 41. Find the correct combination of protons and electrons below for the magnesium ion.
- 12 protons and 12 electrons
  - 12 protons and 14 electrons
  - 24 protons and 24 electrons
  - 24 protons and 22 electrons
  - None of the above

- \_\_\_\_\_ 42. Which combination below corresponds to a cation with a +1 charge?
- 7 protons and 8 electrons
  - 11 protons and 10 electrons
  - 18 protons and 18 electrons
  - 17 protons and 18 electrons
  - 20 protons and 18 electrons
- \_\_\_\_\_ 43. Which of the following is not an ionic compound?
- H<sub>2</sub>S
  - CaCl<sub>2</sub>
  - NiCl<sub>2</sub>
  - CuO
  - NaBr
- \_\_\_\_\_ 44. Give the formula for the ionic compound that forms between magnesium and nitrogen.
- MgN
  - MgN<sub>2</sub>
  - Mg<sub>2</sub>N
  - Mg<sub>3</sub>N<sub>2</sub>
  - Mg<sub>3</sub>N
- \_\_\_\_\_ 45. Which compound is incorrectly named?
- NaF sodium fluoride
  - MgBr<sub>2</sub> magnesium bromide
  - CaO calcium oxide
  - CuO copper(II) oxide
  - TiCl<sub>4</sub> titanium tetrachloride
- \_\_\_\_\_ 46. Which compound is incorrectly named?
- Fe(OH)<sub>3</sub> iron(III) hydroxide
  - NH<sub>4</sub>NO<sub>3</sub> ammonium nitrate
  - K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> potassium dichromate
  - Ba(OH)<sub>2</sub> barium hydroxide
  - Na<sub>2</sub>SO<sub>4</sub> sodium sulfite
- \_\_\_\_\_ 47. Determine the percent platinum in cisplatin, PtCl<sub>2</sub>(NH<sub>3</sub>)<sub>2</sub>.
- 0.650%
  - 78.9%
  - 58.5%
  - 65.0%
  - 23.6%
- \_\_\_\_\_ 48. A hydrocarbon contains 40.0% carbon, 6.66% hydrogen and the remainder oxygen. It has a molecular weight of 180. Determine the molecular formula of the compound.
- C<sub>2</sub>H<sub>6</sub>O<sub>4</sub>
  - C<sub>3</sub>H<sub>6</sub>O<sub>3</sub>
  - C<sub>4</sub>H<sub>8</sub>O<sub>2</sub>
  - C<sub>5</sub>H<sub>12</sub>O<sub>5</sub>
  - C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>

Name: \_\_\_\_\_

ID: A

- \_\_\_\_\_ 49. A hydrate of magnesium sulfate,  $\text{MgSO}_4 \cdot n\text{H}_2\text{O}$  loses 37.4% of its mass upon heating. The mass loss can be considered to be only water. What is the value of  $n$  if *all* of the water was lost?
- a. 2
  - b. 3
  - c. 4
  - d. 5
  - e. 6
- \_\_\_\_\_ 50. When 2.34 g of pure iron is allowed to react with an excess of oxygen, 3.35 g of the final compound is produced. Determine the formula of the compound.
- a.  $\text{Fe}_2\text{O}_3$
  - b.  $\text{FeO}$
  - c.  $\text{FeO}_2$
  - d.  $\text{FeO}_3$
  - e.  $\text{FeO}_4$

**Mid-term Exam I - Make-up  
Answer Section****MULTIPLE CHOICE**

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|------------|--|
| 1. ANS: A  | OBJ: 01-3 How Science is Done                                |
| 2. ANS: A  | OBJ: 01-3 How Science is Done                                |
| 3. ANS: C  | OBJ: 01-4 Identifying Matter: Physical Properties            |
| 4. ANS: E  | OBJ: 01-4 Identifying Matter: Physical Properties            |
| 5. ANS: D  | OBJ: 01-4 Identifying Matter: Physical Properties            |
| 6. ANS: E  | OBJ: 01-4 Identifying Matter: Physical Properties            |
| 7. ANS: B  | OBJ: 01-4 Identifying Matter: Physical Properties            |
| 8. ANS: A  | OBJ: 01-4 Identifying Matter: Physical Properties            |
| 9. ANS: E  | OBJ: 01-4 Identifying Matter: Physical Properties            |
| 10. ANS: C | OBJ: 01-5 Chemical Change and Chemical Properties            |
| 11. ANS: B | OBJ: 01-5 Chemical Change and Chemical Properties            |
| 12. ANS: D | OBJ: 01-6 Classifying Matter: Substances and Mixtures        |
| 13. ANS: E | OBJ: 01-6 Classifying Matter: Substances and Mixtures        |
| 14. ANS: A | OBJ: 01-6 Classifying Matter: Substances and Mixtures        |
| 15. ANS: A | OBJ: 01-9 The Atomic Theory                                  |
| 16. ANS: C | OBJ: 01-10 The Chemical Elements                             |
| 17. ANS: B | OBJ: 01-10 The Chemical Elements                             |
| 18. ANS: B | OBJ: 01-10 The Chemical Elements                             |
| 19. ANS: B | OBJ: 01-11 Communicating Chemistry: Symbolism                |
| 20. ANS: C | OBJ: 02-2 The Nuclear Atom                                   |
| 21. ANS: D | OBJ: 02-3 The Sizes of Atoms and the Units to Represent Them |
| 22. ANS: D | OBJ: 02-3 The Sizes of Atoms and the Units to Represent Them |
| 23. ANS: E | OBJ: 02-3 The Sizes of Atoms and the Units to Represent Them |
| 24. ANS: B | OBJ: 02-3 The Sizes of Atoms and the Units to Represent Them |
| 25. ANS: A | OBJ: 02-4 Atomic Numbers and Mass Numbers                    |
| 26. ANS: C | OBJ: 02-4 Atomic Numbers and Mass Numbers                    |
| 27. ANS: E | OBJ: 02-4 Atomic Numbers and Mass Numbers                    |
| 28. ANS: C | OBJ: 02-5 Isotopes and Atomic Weights                        |
| 29. ANS: B | OBJ: 02-5 Isotopes and Atomic Weights                        |
| 30. ANS: D | OBJ: 02-5 Isotopes and Atomic Weights                        |
| 31. ANS: A | OBJ: 02-5 Isotopes and Atomic Weights                        |
| 32. ANS: E | OBJ: 02-6 Amounts of Substances-the Mole                     |
| 33. ANS: A | OBJ: 02-7 Molar Mass and Problem Solving                     |
| 34. ANS: D | OBJ: 02-7 Molar Mass and Problem Solving                     |
| 35. ANS: C | OBJ: 02-7 Molar Mass and Problem Solving                     |
| 36. ANS: D | OBJ: 02-8 The Periodic Table                                 |
| 37. ANS: E | OBJ: 02-8 The Periodic Table                                 |
| 38. ANS: E | OBJ: 02-8 The Periodic Table                                 |

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|------------|---|
| 39. ANS: C | OBJ: 03-1 Molecular Compounds                           |
| 40. ANS: E | OBJ: 03-2 Naming Binary Molecular Compounds             |
| 41. ANS: E | OBJ: 03-5 Ions and Ionic Compounds                      |
| 42. ANS: B | OBJ: 03-5 Ions and Ionic Compounds                      |
| 43. ANS: A | OBJ: 03-5 Ions and Ionic Compounds                      |
| 44. ANS: D | OBJ: 03-5 Ions and Ionic Compounds                      |
| 45. ANS: E | OBJ: 03-6 Naming Ions and Ionic Compounds               |
| 46. ANS: E | OBJ: 03-6 Naming Ions and Ionic Compounds               |
| 47. ANS: D | OBJ: 03-9 Percent Composition                           |
| 48. ANS: E | OBJ: 03-10 Determining Empirical and Molecular Formulas |
| 49. ANS: C | OBJ: 03-10 Determining Empirical and Molecular Formulas |
| 50. ANS: A | OBJ: 03-10 Determining Empirical and Molecular Formulas |