Name: Chemistry I

Mid-Semester Review: Units 1 – 4

Part I: Classify each of the following substances as; an element, a compound, a solution, or a heterogeneous mixture.

|  |  |  |  |
| --- | --- | --- | --- |
| 1.  Sand   | 2.  Salt  | 3.  Pure Water | 4.  Soil  |
| 5.  Soda   | 6.  Pure Air | 7.  Carbon Dioxide | 8.  Gold    |
| 9.  Bronze   | 10. Oxygen | 11.  Salad Dressing | 12. Salt Water |
|  Part IIA: Identify each of the following changes and chemical or physical. |
| 13. Freezing of H2O   | 14. Burning wood |
| 15. Rusting of a nail    | 16. Melting Metal |
| 17. Dissolving salt in water   | 18. Distilling water |

Part IIB: Identify the following as intensive or extensive properties

|  |  |  |  |
| --- | --- | --- | --- |
| **19)** conductivity |  | **22)** density |  |
| **20)** Volume |  | **23)** Mass |  |
| **21)** melting point  |  | 24)Length |  |

Part III: Determine the atomic structure of the following atoms and provide the shorthand notation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element** | **Nuclear Shorthand Notation** | **#p+** | **#n0** | **#e-** |
| **Sodium** |  |  |  |  |
| **Chlorine** |  |  |  |  |
| **Copper** |  |  |  |  |

Part V: Electron Configurations

For the following elements, please determine the longhand notation and the number of valence electrons. Please be sure to use the diagonal rule!



|  |  |  |
| --- | --- | --- |
| **Element** | **Longhand Configuration** | **Number of Valence Electrons** |
| Phosphorous(P) |  |  |
| Magnesium(Mg) |  |  |

For the following elements, please write out the orbital diagram.

|  |  |
| --- | --- |
| **Element** | **Orbital Diagram** |
| Silicon(Si) | \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ 1s 2s 2p 3s 3p |
| Manganese(Mn) | \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ 1s 2s 2p 3s 3p 4s 3d |

For the following elements write out the Noble Gas Shorthand Configurations

|  |  |
| --- | --- |
| **Element** | **Noble Gas Shorthand Configuration** |
| Calcium(Ca) |  |
| Magnesium(Mg) |  |

VI Nuclear Decay

1. Please write the alpha decay nuclear equation for the following nuclides:
	1. 
	2. 
	3. 
	4. 
2. Please write the beta decay nuclear equation for the following:
	1. 
	2. 
	3. 
	4. 

Part VII: Open Reponse

1. Define the following terms: Element, compound, homogeneous mixture and heterogeneous mixture. Classify the following using the previous terms and explain your reasoning: chocolate chip cookie, lead, Sugar (C6H12O6), and salt water solution.
2. Compare Nuclear Fusion and Fission.
3. What are the 3 main states of Matter and discuss their properties with respect to Particle interactions, Particle Motion, Volume and Shape.
4. Describe the 3 particles that make up an Atom in terms of charge, mass, and location in side of the atom.

**Chemistry I CP Mid-Semester Exam Math Review**

1. Report all to the proper # of Sig Figs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1) 15.9994+ 40.08 | 2)  12.0111+15.9994 1.00794  | 3)  200.0- 99 | 4)  207.2- 84.75 | 5)   | 6)  62.59x 3.3 |

1. Carbon tetrachloride is a solvent used for degreasing electronic parts. If 25.0mL of carbon tetrachloride has a mass of 39.75g, what is the density of the liquid? (1.59g/mL)
2. An automobile battery contains 1275mL of sulfuric acid. If the density of battery acid is 1.84g/mL, how many grams of acid are in the battery? (2350g)
3. Trinitrotoluene, TNT, is a white crystalline substance that explodes at 240°C. Calculate the percent composition of TNT, C7H5(NO2)3. (37.01% C, 2.22% H, 18.50% N, & 42.26%O)
4. A quadrillion is approximately the number of red blood cells in 50,000 people. Which is greater: a quadrillion, 1x1015, red blood cells or the number of nickel atoms in a 5g nickel coin? (5g nickel coin, 5x1022 atoms Ni)
5. Small amounts of phosphoric acid, H3PO4, are used in common soft drinks. Calculate the mass of acid present in 0.731 moles of acid. (71.6g H3PO4)
6. Small amounts of phosphoric acid, H3PO4, are used in common soft drinks. Calculate the mass of acid present in 0.731 moles of acid. (71.6g H3PO4)
7. What is the molar mass of Al2(SO4)3?( 278.14g/mol)
8. How many atoms of Mg3N2 are in 4.56g of Mg3N2?(2.72x1022 atoms Mg3N2)