Chemistry: Fall Final Review

Name: _____

Hour: _____   Date: _____

Unit 1: _Introduction to Chemistry (12 Qs)_

1. Define the Law of Conservation of Mass:

2. Describe the difference between acute and chronic chemical exposure. Give two examples of each.

3. What are the differences between a hypothesis, a theory, and a law?

4. What is an MSDS? Give examples of information that might be found on an MSDS.

5. List the steps of the scientific method.

6. Convert a length of 4.56 cm into m.

7. Review lab safety procedures. List a few of the major safety rules (i.e. goggles must be worn at all times).

8. Describe the difference between pure and applied science. Give two examples of each.

9. Perform the following calculation: $\dfrac{(3.57 \times 10^{10})\,(1.56 \times 10^{-10})}{1.68 \times 10^{27}}$

10. Convert 1.57 km into mm.

11. Convert 5.83 cm^3 into m^3.

<u>**Unit 2: *Energy and Matter (12 Qs)***</u>

12. Describe the difference between a mixture and a pure substance. Give examples of each.

13. Describe the difference between a homogeneous and heterogeneous mixture. Describe the difference between an element and a compound. Give examples of each.3

14. Describe the difference between a chemical and physical property. Give examples of each.

15. Describe the difference between a chemical change and a physical change. Give examples of each.

16. Describe the difference between an intensive and extensive property. Give examples of each.

17. Lead (II) phosphate [$Pb_3(PO_4)_2$] is 7.63 % phosphorus and 76.6 % lead. How many grams of oxygen are in a 25.6 g sample of $Pb_3(PO_4)_2$?

18. A sample of metal has a mass of 12.35 g. When placed in a beaker filled with water, the water level rose from 25.6 mL to 31.2 mL. What is the density of this piece of metal?

19. A rectangular solid has a density of 4.35 g/cm^3 and a mass of 250.6 g. If the length is 5.2 cm and the width is 1.7 cm, what is the height of the solid?

<u>**Unit 3: *Atomic Structure (12 Qs)***</u>

20. Complete the following table:

Atomic Number	Number of Protons	Number of Electrons	Number of Neutrons	Mass Number	Complete Atomic Designation
					$^{195}_{78}Pt^{2+}$
	13	10		27	
43		45	56		
					$^{74}_{33}As^{3-}$

21. Consider two isotopes of uranium: U-235 and U-238. How do the numbers of protons, neutrons and electrons compare for each? The number of which subatomic particle MUST be the same? The number of which MUST be different? The number of which COULD be different?

22. The "element" Chemistrium (Ch) has two natural isotopes. The first isotope has an atomic mass of 53.6 amu and a % abundance of 75.3%. The second isotope has an atomic mass of 50.8 amu. Calculate the average atomic mass of Ch. .

23. The average atomic mass of Normalium (Nm) is 81.08 a.m.u. Normalium has three naturally-occurring isotopes. Nm-80 has a mass of 80.08 a.m.u. and is 41.6% abundant. Nm-82 has a mass of 81.96 a.m.u. and is 45.6% abundant. What is the mass of Nm-81?

24. Complete the table concerning the development of atomic theory:

Scientist	Experiment/Observation	Discovery or Major Contribution	Drawing of their Model
		Atomic Theory	
JJ Thomson			
	Gold-Foil Experiment		
	Electrons have only specific energy levels and distances from the nucleus that are allowed.		
		Quantum Mechanical Model	

25. Write the **complete** electron configurations for the following:

a) boron _____

b) nitrogen _____

c) cadmium _____

d) manganese _____

e) cesium_____

26. Write the **shorthand** electron configurations for the following. How many valence e⁻ does each have?

    a) aluminum   _____   valence e⁻_____

    b) chlorine   _____   valence e⁻_____

    c) iron   _____   valence e⁻_____

    d) gold   _____   valence e⁻_____

    e) lead   _____   valence e⁻_____

Unit 4: *The Periodic Table and Periodicity (12 Qs)*

27. Who is considered the father of the periodic table? How did he organize it? How is that different than the way it is organized today?

28. Compare and contrast the properties of metals, nonmetals, and metalloids.

29. Define periods and groups.

30. Why do elements in the same column have similar properties?

31. Explain why noble gases are not very reactive.

32. Complete the table below.

	Definition	Down a group (↓)	Across period (→)
Atomic Radius			
Ionization Energy			
Electronegativity			

33. Name two factors that affect the strength of Coulombic attraction.

34. Explain the shielding effect and how it relates to atomic radius and ionization energy.

35. Explain how successive ionization energies (ie 1st, 2nd, 3rd, etc) change for the following elements:

   a. Potassium (K)   b. Gallium (Ga)   c. Magnesium (Mg)

36. Look at your periodic table. For each of the following elements, answer the following: How many total and valence electrons are there? Will this element steal or give away electrons and how many? What charge would this element have after following the octet rule? What is this element's name as an ion?

	Sodium (Na)	Calcium (Ca)	Gallium (Ga)	Nitrogen (N)	Selenium (Se)	Fluorine (F)
Total e-						
Valence e-						
Steal/Give Away How many?						
Charge						
Name						

Unit 5: *Chemical Nomenclature (12 Qs)*

37. For each box in the table below, write the balanced chemical formula for those two ions.

	ClO_3^{1-}	SO_4^{2-}	P^{3-}
NH_4^{1+}			
Ca^{2+}			
Al^{3+}			

38. Provide the name or formula for each of the following:

   $NiCl_2$_____   iron (II) sulfate _____

   beryllium phosphide _____ Ga_2S_3_____

   nickel (II) bromide _____   disulfur tetroxide _____

   $Ca(ClO_3)_2$ _____   magnesium oxide_____

   PbO_2 _____ OF_2 _____

Unit 6: *The Mathematics of Chemical Formulas (15 Qs)*

39. What is a mole?

40. What is avogadro's number?

41. What is the molar mass?

42. Where can you find the molar mass?

43. How many particles are there in 37.5g of silver?

44. How many grams are there in 8.32×10^{25} atoms of cobalt?

45. Find the molar mass of $Mg_3(PO_3)_2$.

46. Calculate the percent composition of calcium in calcium iodide (CaI_2).

47. At STP, 56.2 L of C_2H_2 is how many molecules of C_2H_2?

48. At STP, 0.37 moles of Cl_2 is how many liters of Cl_2?

49. Convert 33.3g Fe_2O_3 to moles.

50. Convert 5.74×10^{26} molecules of CH_4 to moles.