2013-2014

Chemistry 1 Honors Midterm Review

All chapters refer to your Chemistry textbook: Holt Modern Chemistry.

Matter and Change (Chapter 1)

1. Define: Chemistry, physical properties, chemical properties, physical changes, chemical changes, matter, pure substance, element, compound, heterogeneous mixture, homogeneous mixture.
2. Give examples of: extensive and intensive properties, quantitative and qualitative data.
3. Define the four states of matter and describe their properties.
4. Are the following elements, compounds, homogeneous mixtures, or heterogeneous mixtures?
   a. vegetable soup b. tap water c. bleach d. magnesium
5. Are the following physical properties, chemical properties, physical changes, or chemical changes?
   a. the burning of paper
   b. the crumpling of paper
   c. the flammability of paper
   d. the color of paper

Measurements and Calculations (Chapter 2)

6. What is the scientific method? Give the steps of the scientific method along with a description of each.
7. Give the SI units of measurement?
8. Know the prefixes used to make measurement units smaller and larger ex: kilo, centi, deci etc.
9. Convert 145 g to a. mg b. cg c. kg d. μg
10. Define mass.
11. Describe and define density and the units it is measured in.
12. Calculate the density of an object with a mass of 10.5 g and a volume of 9.2 g.
13. Diamond has a mass of 3.26 g/cm^3. What is the mass of a diamond with volume 0.351 cm^3?
14. If a student measures the length of a lab bench 5 times and always gets results very close to 2.50 meters, yet the actual length of the lab bench is 3.20 meters, are his measurements precise, accurate, both, or none of these?
15. How many significant figures in: a. 345 000 b. 2.41099
16. Round to three significant figures: a. 0.00036105 b. 5.236×10^9 c. 5999000
17. Calculate the following and round to the correct number of digits: a. 32.1 + 45.009 b. 6.27 x 10.
18. Convert the following to scientific notation: a. 345 000 b. 0.0034 028
19. Multiply 3.21×10^{22} by 4.21×10^{-15}
20. Know the definitions for directly and inversely proportional and how each relationship looks when graphed.

Atoms: The Building Blocks of Matter. (Chapter 3)

21. Describe the Laws of conservation of mass, definite proportions, and multiple proportions.
22. What were the major contributions to atomic theory of the following scientists? Also know the famous experiments.
    Dalton Rutherford Bohr Heisenberg
    Thomson Planck DeBroglie
23. Give the definition of an atom
24. Give the mass, charge, and location of protons, electrons and neutrons.
25. Define atomic number, mass number, and atomic mass.
26. How many protons, electrons and neutrons in the following?
    a) carbon-13 b) ${}^{36}_{17}Cl^-$ c) ${}^{25}_{12}Mg^{2+}$ d) neon-20
27. Define ion and isotope.
28. Define average atomic mass. What is the average atomic mass unit based on?
29. What is Avogadro's number?
30. What's the mass of 5.0 moles of nitrogen atoms?
31. How many moles in 56.1 g of carbon?
32. What's the mass of 5.21×10^{24} atoms of zinc?
33. How many atoms in 54.6 g of copper?

Nuclear Chemistry (Chapter 21)

34. Which elements are radioactive and what causes them to be radioactive?
35. Give the symbol, definitions, and properties of alpha, beta, and gamma radiation.

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36. Write nuclear equations for a) the alpha decay of uranium-238 b) the beta decay of carbon-14
37. Define half-life.
38. How many grams of a 5.2 g sample of a radioactive isotope will remain after 39 seconds if its half-life is 13 seconds?
39. What is the half-life of a radioactive isotope if it decays from 12.0 grams to 0.75 grams after 10 years?
40. Define fusion and fission. Which takes place in nuclear power plants and which provides the sun's energy?
41. What is a chain reaction and what causes it?
42. Know some of the applications of nuclear reactions such as the use of radioactive tracers, how a power plant uses nuclear reactions etc.

Arrangement of Electrons in Atoms. (**Chapter 4)**

43. What is meant by the *dual nature of light*?
44. Give the properties of electromagnetic waves and the relationship between them.
45. What is the difference between a continuous spectrum and a bright line spectrum.
46. What would you see in a line spectrum for hydrogen?
47. Briefly explain Bohr's model of the hydrogen atom. Know the difference between ground state and excited state and how an electron moves from one to the other.
48. Explain the following rules for electron configurations:
    a) Pauli's exclusion principle b) The Aufbau rule (know the fill order) c) Hund's rule
49. What are the maximum number of electrons that can occupy each of the first 5 principle energy levels?
50. How many orbitals can exist on each energy level?
51. What are the maximum number of electrons that can occupy the following sublevels: s, p, d, and f?
52. Give orbital diagrams, electron configurations, and abbreviated noble gas configurations for the following:
    a) Li b) Mn c) Ne d) Cu e) Pb f) Cr g) Fe^{2+} h) Fe^{3+} h) Cl^-
53. What are quantum numbers and how many are needed to describe an electron?

The Periodic Law. (Chapter 1 and 5)

54. Describe Mendeleev's periodic table.
55. How is the modern periodic table arranged?
56. Give the properties of metals, non-metals and semi-metals and know where they are found in the periodic table.
57. What is a family/ group?
58. What is a period?
59. Where are the most reactive metals found?
60. Where are the most reactive non-metals found?
61: Name a metal in group 14
62. What is the element in period 3 group 2?
63: Name a semi-metal.