

Chemistry 105 Exam 1. Fall 2000

Name _____

By submitting this exam, I certify that I have neither given nor received unauthorized aid on this assignment.

For full credit, show all work. Please report all numbers to the correct number of significant figures.

Useful information: 1 in = 2.54 cm, $t_F = (t_C \times 9/5) + 32$, $t_C = (t_F - 32) \times 5/9$, 1 hr = 3600 s, 1 mile = 1.609 km

(1) An irregularly shaped object was placed in a graduated cylinder. The water level without the object was 32.8 mL and with the object was 47.1 mL. The mass of the object is 9.7653 g. What is the density?

(2) A student needs to add 5.02 g of xylene to a reaction. If the density of xylene is 0.790 g/mL, what was the volume of xylene does the student need to add?

(3) Perform the following conversions:

(a) 1.65×10^{-7} s to ns

(b) 35.6 in to m

(c) 23 K to °F

(4) Given the number of protons and neutrons in the nucleus of several nuclides, list the mass number, number of electrons, and the element for each as shown in the example.
example: 6 protons, 7 neutrons: mass number 13, 6 electrons, carbon

(a) 4 protons, 5 neutrons:

(b) 65 protons, 72 neutrons

(c) 35 protons, 34 neutrons

(d) 15 protons, 18 neutrons

(5) List 4 SI base units and the quantity they measure.

(6) Perform the following calculations and report the answer to the proper number of significant figures.

(a) $(768.32 + 31.4654)/14.2768 =$

(b) $1243.4564 - 1243.443274 =$

(c) $0.00853 \times 16.31 =$

(d) $41.276 \div 5.2 =$

(7) Identify the following as elements, compounds, homogeneous solutions, or heterogeneous mixtures.

(a) yard clippings

(b) Kool Aid

(c) Bronze

(d) Uranium

(8) What famous experiment was performed under Ernest Rutherford's direction? How did it work and why was it important?

(9) List 4 points from Dalton's Atomic Theory

(10) What is the Law of Multiple Proportions? Give an example.

(11) Light Travels at 3.00×10^{10} cm/s. Convert this to miles/hr.

(12) Sugar is dissolved in water. The water is then boiled off and condensed to form the separate water and sugar again. The sugar is then burned. List all of the chemical or physical processes from the above sequence. Label them as chemical or physical processes.

(13) When Mg is heated, it burns to form magnesium oxide (MgO). If 3.56 g of magnesium is burned, it produces 5.93 g of magnesium oxide. What is the mass of the oxygen that reacted with the magnesium?

(14) Two samples of a compound are tested. Sample A has a mass of 6.24 g and is found to contain 2.45 g of Na and 3.79 g of Cl. Sample B has a mass of 10.58 g and consist of 4.16 g of Na and 6.42 g of Cl. What law is demonstrated here and why (show mathematically)?

(15) A certain element consists of three isotopes. The first isotope has a fractional abundance of 0.7899 and a mass of 23.9850 amu. The second has a fractional abundance of 0.1000 and a mass of 24.9858 amu. The third has a fractional abundance of 0.1101 and a mass of 25.9826 amu. What is the weighted average mass of this element? Which element is it?