Chem 1054 Exam 1. Jordan, Fall 2006

Name_____*Key*_____

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

You must show all work for credit. Express each answer to the correct number of significant figures.

Useful information: 1 in = 2.54 cm, 1 kg = 2.200 lbs, 1m = 1.0936 yds, K = °C + 273,

$$°F = \frac{9}{5}(°C) + 32 \quad °C = \frac{5}{9}(°F - 32)$$, 1 gal = 3.7854 L
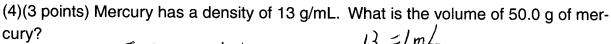
(1) (2 points) How many micrograms (µg) are in a gram?

    a.   0.001

    b.   100

    c.   1000

    d.   **1,000,000**

(2) (2 points) Which of the following is a base unit?

    a.   gram

    b.   liter

    c.   **second**

    d.   Joule

(3) (2 points) The rows in the periodic table are called

    a.   **periods**

    b.   densities

    c.   groups

    d.   classes

(4)(3 points) Mercury has a density of 13 g/mL. What is the volume of 50.0 g of mercury?

$$\frac{50.0\ g}{1} \times \frac{1\ mL}{13\ g} = \boxed{3.85\ mL} = \boxed{3.9\ mL}$$

$13_g = 1\ mL$

(5) (2 points) A student measured the diameter of a sphere and determined the average value. His measurements are 2.50 cm, 6.92 cm, 6.08 cm, and 7.50 cm. If the true diameter is 5.80 cm, what can be said about the student's results?

a.   They are accurate and precise.
b.   They are accurate but not precise.
c.   They are precise but not accurate.
d.   They are neither precise nor accurate.

(6) (4 points) Write the name of the elements next to their chemical symbol below.

(a) B   boron

(b) Cl   chlorine

(c) O   oxygen

(d) P   phosphorus

(7)(4 points) List the answers to the following problems to the correct number of significant figures

(a) $\dfrac{(3.4545 + 0.122)}{15.2331} = \dfrac{3.5765}{15.2331} = \boxed{0.2348}$

(7)(4 points) List the answers to the following problems to the correct number of significant figures

(a) $\dfrac{(2.2334 \times 16.22)}{16.554 + 0.02} =$ $\dfrac{36.223}{16.574} = \boxed{21.86}$

(b) $(54.2 + 244) \times (0.16 - 25.2) =$ $\left(2.982\right) \times \left(-25.04\right) = \boxed{-7.47 \times 10^{3}}$

(8)(2 points) Label each property below as a physical or chemical property.

(a) it burns in oxygen chemical

(b) it rusts chemical

(c) it is shiny physical

(d) it conducts electricity physical

(9) (2 points) List two extensive properties.

mass

length

(10)(7 points) List the seven base SI units and the property each one represents.

(11) What work did Lavoisier and Proust do that contributed to Dalton's atomic theory? (tell me what they did and how that fits into Dalton's atomic theory).

Lavoisier came up with the Law of conservation of mass which is explained by point 4 in problem #10.

Proust came up with the Law of Constant composition which is explained by point 3.

(12) (12 points) Perform the following conversions. Express the answer in correct scientific notation.

(a) 25.0 L into nL $2.50 \times 10^{-8} \, nL$

$$\frac{2.50 L}{1} \times \frac{1nL}{10^{-9}L} = 2.50 \times 10^{-8} L$$

(b) 15 gal into L

$$\frac{15 gal}{1} \times \frac{3.785 L}{1 gal} = 56.78 L = \boxed{57 L}$$

(c) 65 yards into km $1 km = 1000 m$

$$\frac{65 yd}{1} \times \frac{1m}{1.0936 yd} = 59.44 \, m = \boxed{59 m} =$$

$$\frac{59 m}{1} \times \frac{1 km}{1000 m} \boxed{0.059 km}$$

(d) 2.55 m/s into km/hr $1 h = 3600 s$

$$\frac{2.55 m}{s} \times \frac{1 km}{1000 m} = \frac{2.55 \times 10^{-3} km}{s} \quad \frac{2.55 \times 10^{-3} km}{s} \times \frac{3600 s}{1 h} = 9.18 \frac{km}{h}$$

$$1000g = 1kg$$

(e) 35.54 lbs to grams

$$\frac{35.54\,lbs}{1} \times \frac{1kg}{2.200\,lb} = 16.15\,kg$$

$$\frac{16.15\,kg}{1} \times \frac{1000g}{1kg} = \boxed{1.615 \times 10^4\,g}$$

(f) 5 pA to mA

$$\frac{5pA}{1} \times \frac{10^{-12}A}{1pA} = 5 \times 10^{-12}A \qquad \frac{5 \times 10^{-12}A}{1} \times \frac{1mA}{10^{-3}A} = \boxed{5 \times 10^{-9}\,mA}$$

(13)(3 points) Fill in the blanks in the following table for neutral atoms

Isotope	protons	neutrons	electrons
^{33}S	16	17	16
^{28}Si	14	14	14
^{25}Cl	17	8	17

(14) (2 points) Who is credited with discovering

(a) the electron

J.J. Thompson

(b) the nucleus

Ernest Rutherford

Extra Credit: (4 points) Billy wanted to bake some brownies while on vacation in France with some mix he brought from the US. The box said to bake the brownies at 350° for 20 minutes. After 10 minutes at 350 °, smoke began pouring out of the oven. Why (show numbers for full credit)?

The box is in °F, the oven in °C.

$$°F = \frac{9}{5}(350°C) + 32$$

$$°F = 662°$$

The oven was at 662 °F