CHMY 121
EXAM #1 (CH 1-2)
January 29, 2010

Name: ____________________________________________
ID #: ____________________
Also print your name on the back of the exam

PART I MULTIPLE CHOICE. Choose the correct answer, write the letter corresponding to that answer in the space provided and fill in the scantron. (32 pts).

C  1. Identify the correct expression for the measured quantity, 2500 ft, if 3 significant figures are justified.
   a) 2500.0 ft  b) 25.0 ft  c) $2.50 \times 10^3$ ft  d) $2.50 \times 10^2$ ft

B  2. Which of these liquids, when used as a cold compress, will need to be changed most frequently (not a good cold compress)? A liquid with a specific heat of
   a) 0.6 cal/g°C  b) 0.06 cal/g°C  c) 1.0 cal/g°C  d) 0.09 cal/g°C

A  3. A red solid, all of which melts at the same temperature to produce a liquid that does not decompose upon further heating is a(n) ____________________
   a) element  b) homogeneous mixture  c) compound  d) heterogeneous mixture

B  4. Billings tap water is an example of a(n)
   a) element  b) mixture  c) compound  d) pure substance

D  5. Determine the number of oxygen atoms present in hydroxyapatite, Ca$_{10}$(PO$_4$)$_6$(OH)$_2$.
   a) 12  b) 4  c) 24  d) 26  e) 2

C  6. A colorless gas that cannot be separated into simpler substances using physical means but can react with magnesium to produce both a magnesium-nitrogen compound and a magnesium-oxygen compound is a(n)
   a) element  b) homogeneous mixture  c) compound  d) heterogeneous mixture

D  7. Identify the physical change
   a) an aluminum can is crushed  b) water is vaporized into steam  c) a snowflake melts  d) all of the above  e) none of the above

D  8. Sand, salt and water is an example of a(n)
   a) element  b) homogeneous mixture  c) compound  d) heterogeneous mixture
9. An explanation of some phenomenon, which has been tested and validated over a period of time is a(n)
   a) fact  b) law  c) experiment  d) theory  e) hypothesis

10. Select the element that is classified as a metal
   a) Si  b) Ce  c) Cl  d) Rn  e) none are metals

11. Identify the chemical change
   a) water boiling  b) ice melting  c) hydrogen burning  d) oxygen boiling

12. Express 0.00030 in scientific notation.
   a) $3.0 \times 10^{-4}$

13. Identify the physical change
   a) an aluminum can is crushed  b) water is vaporized into steam  c) a snowflake melts  d) all of the above  e) none of the above

14. Which of the following is an example of a pure substance?
   a) milk  b) salt and pepper  c) sand  d) sugar water  e) nitrogen

15. Pick the correct answer when the following measured quantities are added:
    $29.36 + 72.2 + 6.1 = \underline{107.6}$
   a) 110  b) 107.7  c) 108  d) 107.6  e) 108.0

16. Convert 45.7°F to Kelvin
    $^\circ C = \frac{5}{9}(^\circ F - 32)$
   a) 266 K  b) 280.6 K  c) 114 K  d) 318.7 K

PART II SHORT ANSWER

17. (16 pts) Give the name (with the correct spelling) or the correct symbol for the following elements.
   lead  Cu
   mercury  Hg
   sodium  Na
   copper  Cu
   chromium  Cr
   gold  Au
   tin  Sn
   iron  Fe
12. Indicate whether the following statements are true or false. Rewrite the false statements to make them true. (DO NOT just make the statement a negative of what is written.) (6pts)

a) The crushing of ice to make ice chips is a physical procedure that involves a chemical change.  
   False +1

b) In outer space, an astronaut may be massless but never weightless.  
   False +1

PART III For the following problems, SHOW ALL YOUR WORK AND CIRCLE YOUR FINAL ANSWER. Be sure your work is legible. NO credit will be given if no work is shown even if answer is correct!!

23. (12 pts) What is the volume in liters of a gold nugget that possesses a mass of 23.0 oz? Density of gold is 18.88 g/cm³. (16 oz = 1 lb)

\[
23.0 \text{ oz} \left( \frac{1 \text{ lb}}{16 \text{ oz}} \right) \left( \frac{454 \text{ g}}{1 \text{ lb}} \right) \left( \frac{1 \text{ cm}^3}{18.88 \text{ g}} \right) \left( \frac{1 \text{ mL}}{1 \text{ cm}^3} \right) \left( \frac{1 \text{ L}}{1000 \text{ mL}} \right) = 0.0346 \text{ L}
\]

24. (10 pts) Which speed is faster, 14.6 in/sec or 9.68 m/min?

\[
\frac{14.6 \text{ in}}{\text{sec}} \left( \frac{60 \text{ sec}}{1 \text{ min}} \right) \left( \frac{2.54 \text{ cm}}{1 \text{ in}} \right) \left( \frac{1 \text{ m}}{100 \text{ cm}} \right) = 22.3 \text{ m/min faster than } 9.68 \text{ m/min}
\]

or

\[
\frac{9.68 \text{ m}}{1 \text{ min}} \left( \frac{1 \text{ min}}{60 \text{ sec}} \right) \left( \frac{1 \text{ in}}{2.54 \text{ cm}} \right) = 60.35 \text{ in/sec slower than } 14.6 \text{ in/sec}
\]
23. (12 pts) A patient needs to be given 5.0 mg drug per kg body mass. The nurse gave the
patient 4 tablets. If the patient weighs 249 lbs and a tablet contains 250 mg, did
the nurse give enough or too many tablets?

\[
\begin{align*}
5.0 \text{ mg drug} &= 1 \text{ kg body mass} \\
1 \text{ tablet} &= 250 \text{ mg drug} \\
+2 &+2 \text{ tablets needed} \\
249 \text{ lb} (\frac{454 \text{ g}}{1 \text{ lb}}) (\frac{1 \text{ kg body mass}}{1000 \text{ g}}) (\frac{5.0 \text{ mg drug}}{1 \text{ kg body mass}}) (\frac{1 \text{ tablet}}{250 \text{ mg drug}}) &= +2 \text{ tablets needed} \\
\text{nurse gave too many tablets when gave 4 tablets}
\end{align*}
\]

25. (12 pts) The specific heat of aluminum is 0.22 cal/g °C. If 0.237 kcal of heat are added to
a 33.3g piece of aluminum whose temperature started at 22.8°C, what temperature would the
piece of aluminum have after the heat was added?

\[
\begin{align*}
\text{heat} &= \text{SH} \times \text{mass} \times \Delta T + 1 \\
\Delta T &= \frac{\text{heat}}{\text{SH} \times \text{mass}} + 1 \\
\Delta T &= \frac{0.237 \text{ kcal}}{0.22 \frac{\text{cal}}{\text{g} °\text{C}}} \times 33.3\text{ g} + 1 \\
\Delta T &= \frac{237 \text{ cal}}{0.22 \frac{\text{cal}}{\text{g} °\text{C}} \times 33.3 \text{ g}} + 1 \\
\Delta T &= 32.3505 °\text{C} \\
\Delta T &= 32.3505 °\text{C} + 2 \text{ (to the nearest °C)} \\
T_f &= 55 °\text{C}
\end{align*}
\]

**EXTRA CREDIT:** (10PTS)

A nurse is asked to inventory the penicillin supply. He/She determines the supply to be
45.0 pints of penicillin. If the office uses 342 cc's per day, how long (in days) will the
penicillin last? (2 pt = 1 qt)

\[
\begin{align*}
342 \text{ cc} &= 1 \text{ day} \\
2 \text{ pt} &= 1 \text{ qt} \\
1 \text{ qt} &= 0.946 \text{ L} \\
1 \text{ cm}^3 &= 1 \text{ mL} \\
1000 \text{ mL} &= 1 \text{ L} \\
45.0 \text{ pts} (\frac{1 \text{ qt}}{2 \text{ pts}}) (\frac{0.946 \text{ L}}{1 \text{ qt}}) (\frac{1000 \text{ mL}}{1 \text{ L}}) (\frac{1 \text{ cc}}{1 \text{ mL}}) (\frac{1 \text{ day}}{342 \text{ cc}}) &= 62.2 \text{ days}
\end{align*}
\]