Chem E-1a
Friday Review Problems
Chapters 1 and 2

1. Using your calculator, perform the following calculations. Round your answer to a maximum of three or four digits.

a) $\dfrac{1.006\times10^{-3}}{2.3\times10^{8}}$

$1.006\times10^{-3} = 0.001006$

1.006×10^{-3} ON CALCULATOR

" 1.006 EE −3 "

EXP

x10^x

$= 4.37391304 \times 10^{-12}$

$= 4.374 \times 10^{-12}$ OR 4.37×10^{-12}

b) $(2.06 \times 10^{2}) + (1.32 \times 10^{4}) - (1.26 \times 10^{3})$

$= 12146$

$= 12100$ OR 1.21×10^{4} ETC...

c) $(5.2 + 3.31 + 7) \times (1.24 \times 10^{6})$

15.51

$= 19232400$

$= 1.92 \times 10^{7}$

2. You may have heard the expression, "Give him an inch and he'll take a mile." In fact, the original expression was "Give him an inch and he'll take an *ell*." An *ell* is an old unit of length, which is defined as exactly 45 inches. What is the length of an ell in meters?
   Note: 1 inch = 2.54 cm

$$1\ \text{ELL} \times \frac{45\ \text{INCH}}{1\ \text{ELL}} \times \frac{2.54\ \text{cm}}{1\ \text{INCH}} \times \frac{1\ \text{m}}{100\ \text{cm}} = 1.143\ \text{m}$$

3. Given the following units of volume and length:
   1 barrel (of oil) = 0.1590 m^3
   1 mL = 1 cm^3
   1 ft = 12 inches
   1 inch = 2.54 cm
   1 kg = 2.205 pounds

$0.85\ \text{g} = 1\ \text{mL}$
USE $\frac{0.85\ \text{g}}{1\ \text{mL}}$ OR $\frac{1\ \text{mL}}{0.85\ \text{g}}$
AS CONVERSION FACTORS

   a) A particular sample of crude oil has a density of 0.85 g/mL. Determine the mass of 1.00 barrel of this crude oil, in kilograms.

$$1.00\ \text{BAR} \times \frac{0.1590\ \text{m}^3}{1\ \text{BAR}} \times \left(\frac{100\ \text{cm}}{1\ \text{m}}\right)^3 \times \frac{1\ \text{mL}}{1\ \text{cm}^3} \times \frac{0.85\ \text{g}}{1\ \text{mL}} \times \frac{1\ \text{kg}}{1000\ \text{g}} = 135.2\ \text{kg}$$

$$\left(\frac{100\ \text{cm}}{1\ \text{m}}\right)^3 = \left(\frac{100^3\ \text{cm}^3}{1^3\ \text{m}^3}\right)$$

   b) Calculate the volume, in cubic feet, of 1.00 barrel of oil.

$$1.00\ \text{BAR} \times \frac{0.1590\ \text{m}^3}{1\ \text{BAR}} \times \frac{100^3\ \text{cm}^3}{1^3\ \text{m}^3} \times \frac{1^3\ \text{in}^3}{2.54^3\ \text{cm}^3} \times \frac{1^3\ \text{ft}^3}{12^3\ \text{in}^3} = 5.615\ \text{ft}^3$$

   c) Determine the density of oil in units of pounds per cubic foot.

$$\frac{0.85\ \text{g}}{1\ \text{mL}} \times \frac{1\ \text{kg}}{1000\ \text{g}} \times \frac{2.205\ \text{POUNDS}}{1\ \text{kg}} \times \frac{1\ \text{mL}}{1\ \text{cm}^3} \times \frac{2.54^3\ \text{cm}^3}{1^3\ \text{in}^3} \times \frac{12^3\ \text{in}^3}{1^3\ \text{ft}^3} = 53.1\ \frac{\text{POUNDS}}{\text{ft}^3}$$

g → POUNDS

mL → ft^3

$= 53.1\ \text{POUNDS}/\text{ft}^3$

$= \frac{53.1\ \text{POUNDS}}{1\ \text{ft}^3}$

MAKE FLASHCARDS

CrO_4^{2-} CHROMATE

4. I) Write an acceptable chemical name for each of the following:

a) $CuCl_2$

Cu^{2+} Cl^- COPPER (II) CHLORIDE OR CUPRIC CHLORIDE

b) Hg_2I_2

Hg_2^{2+} I^- MERCURY (I) IODIDE OR MERCUROUS IODIDE

c) S_2F_4

DISULFUR TETRAFLUORIDE

d) KOH

K^{+1} OH^{-1} POTASSIUM HYDROXIDE

e) V_2O_5 (note: V = Vanadium)

+10 TOTAL → V^{+5} O^{2-} ← -10 TOTAL VANADIUM (V) OXIDE

f) CO_3^{2-}

CARBONATE ION

g) H_2

HYDROGEN

h) H_3PO_4

PHOSPHORIC ACID

i) NH_3

AMMONIA

DO NOT WRITE: $(NH_4^+)_2SO_4^{2-}$

II) Write the chemical formula for each of the following:

a) Ammonium Sulfate

NH_4^+ SO_4^{2-} → $(NH_4)_2SO_4$

b) Calcium Chlorate

Ca^{2+} ClO_3^- → $Ca(ClO_3)_2$

c) Aluminum Oxide

Al^{3+} O^{2-} → Al_2O_3

d) Sulfur Hexafluoride

SF_6

e) Lead (II) Phosphate

Pb^{2+} PO_4^{3-} → $Pb_3(PO_4)_2$

SO_3 = SULFUR TRIOXIDE

SO_3^{2-} = SULFITE ION

f) Ferric Hydroxide

Fe^{3+} OH^- → $Fe(OH)_3$

g) Manganese (VII) Oxide

Mn^{7+} O^{2-} → Mn_2O_7

h) Nitrate

NO_3^-

i) Fluorine

F_2

MAGNESIUM OXIDE

Mg^{2+} O^{2-} → MgO