August 26th

Tuesday (lab)

→ Bring lab manual + notebook + laptop
→ No special attire necessary
→ Quiz 8-8:15
  ↳ * chm 203 + 204 syllabus
  * orientation presentation
  * expt 1 presentation

* Finish all problems from ch. 1 + worksheets

write intro BEFORE coming to lab!

Wednesday 8/28 → start ch. 2 (3-day visit)

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sulfuric acid has a density of $1.83\ g/cm^3$
Annually 3.6×10^{11} lbs are produced worldwide.
What is the volume in liters?

(what they're asking for)

$$\text{vol} = 3.6\times10^{11}\ \text{lbs}\left|\frac{454\ g}{1\ lb}\right|\frac{1\ cm^3}{1.83\ g}\left|\frac{1\ mL}{1\ cm^3}\right|\frac{1\times10^{-3}\ L}{1\ mL} = \boxed{8.93\times10^{10}\ L}$$

$$\text{wt (lbs)} \longrightarrow g \xrightarrow{\text{density}} cm^3\ (\equiv mL) \longrightarrow L = \boxed{89\ GL}$$

"same as"

How many liters are in $1\ m^3$?

$$\text{vol} = 1\ m^3\left|\frac{(1\ cm)^3}{(1\times10^{-2}\ m)^3}\right|\frac{1\ mL}{1\ cm^3}\left|\frac{1\times10^{-3}\ L}{1\ mL}\right. = \boxed{1000\ L}$$

$1\ cm^3 \equiv 1\ mL$

↳ $1\ m^3 \equiv 1000\ L$

$m^3 \longrightarrow cm^3 \longrightarrow mL \longrightarrow L$

$$V_{H_2SO_4} = 8.9\times10^{10}\ L\left|\frac{1\ m^3}{1000\ L}\right. = 8.9\times10^{7}\ m^3$$

$E = \frac{1}{2}mv^2$ (kg, m/s)

$1\ J = 1\ kg\ m^2/s^2$

$1\ \text{calorie} = 4.184\ \text{Joules (J)}$

$1\ \text{Calorie}_{\text{(nutritional)}} = 4.184\ kJ$

Problem #1.8

450 g baseball

$E = 406 J$

$m = \frac{450 g \mid 1 kg}{1 \times 10^3 g} = 0.450 kg$

$E = \frac{1}{2} m v^2$

$406 J = \frac{1}{2}(0.450 kg)(v^2)$

$406 \frac{kg\,m^2}{s^2} = \frac{1}{2}(0.450 kg)(v^2)$

$\boxed{v^2 = 1804 m^2/s^2} \longrightarrow \boxed{v = 42 \ m/s}$

GIVEN ← Convert m/s to mi/hr:

1 mi = 5280 ft
12 in = 1 ft
2.54 cm = 1 in

$\frac{42 \ m}{1 s} \mid \frac{1 cm}{1 \times 10^{-2} m} \mid \frac{1 in}{2.54 cm} \mid \frac{1 ft}{12 in} \mid \frac{1 mi}{5280 ft} \mid \frac{3600 s}{1 hr} = 94 \ mi/hr$

Problem #80

"corresponds to"

$E = 2498 kJ$ ⟷ 45.0 g methane

The combustion of 45.0 g methane releases 2498 kJ. How much energy in kcal would the combustion of 0.450 oz methane produce?

= 1 Cal (nutritional)

$1 Cal = 4.184 J \longrightarrow 1 kCal = 4.184 kJ$

$E = \frac{0.450 oz \mid 1 lb \mid 454 g \mid 2498 kJ \mid 1 kCal}{1602 \mid 1 lb \mid 45.0 g \mid 4.184 kJ} = \boxed{169 \ kCal}$

Problem #82

A bigmac has 540 calories. How many kJ are in BMac?

(hours) ← How long will a 100 watt light bulb burn? 1 Watt = 1 J/s

$E = 540 \ Calories \mid \frac{1 kCal}{1 Cal} \mid \frac{4.184 kJ}{1 kCal} = \boxed{2260 \ kJ}$

$Time = 2260 kJ \mid \frac{1 \times 10^3 J}{1 kJ} \mid \frac{1 Watt \cdot s}{1 J} \mid \frac{}{100 Watt} \mid \frac{1 hr}{3600 s} = \boxed{6.3 \ hrs}$