#### Chapter 01 – MATTER AND ENERGY: An Atomic Perspective



Define chromatography?

### C. CHROMATOGRAPHY:

- A process involving stationary and mobile phases for separating a mixture of substances based on their different affinities for the two types of phases.
  - a. The more strongly the particles in the mobile phase interact with the

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- V) Ball-and-stick models provide 3D view of molecules.
  - Balls = atoms Α.
    - Β. Sticks = chemical bonds





- VI) Space-filling models
  - More accurately show us how the atoms are Α. arranged in a molecule and its overall 3D shape.
  - Β. Sometimes hard to see atoms and angles between the bonds

CONCEPT TEST:



esale.co.uk Acetic acid

Space filling model of methanol (methyl alcohol, wood alcohol) What is its molecular formula?

# **1.7 – COAST: A FRAMEWORK FOR** SOLVING PROBLEMS

What does the acronym COAST stand for?

## **1.7 – COAST: A FRAMEWORK FOR SOLVING PROBLEMS**

VIII) COAST stands for: **C**ollect and **O**rganize **A**nalyze Solve and Think about the answer i

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Commonly used prefixes for SI units:

PREFIX VALUE				
Name	Symbol	Numerical in the market of Numerical	Exponentia	
zetta	Z	1,000,000,000,000,000,000,000	10 <sup>21</sup>	
exa	Е	1,000,000,000,000,000,000	1018	
peta	Р	1,000,000,000,000,000	1015	
tera	Т	1,000,000,000,000	1012	
giga	G	1,000,000,000	10 <sup>9</sup>	
mega	М	1,000,000	106	
kilo	k	1,000	10 <sup>3</sup>	
hecto	h	100	10 <sup>2</sup>	
deka	da	10	10 <sup>1</sup>	
deci	d	0.1	10 <sup>-1</sup>	
centi	c .	0.01	10 <sup>-2</sup>	
milli	m	0.001	10 <sup>-3</sup>	
micro	μ	0.000001	10 <sup>-6</sup>	
nano	n	0.000 0 000 1	10 <sup>-9</sup>	
pico	р		10 <sup>-12</sup>	
femto	f	0.0000000000000000000000000000000000000	10 <sup>-15</sup>	
atto	a	0,0000000000000000000000000000000000000	10 <sup>-18</sup>	
zepto	1 AL	0.0000000000000000000000000000000000000	10 <sup>-21</sup>	

SI Based units:

TABLE 1.2 SI Base Units

Quantity or Dimension	Unit Name	Unit Abbreviation
Mass	kilogram	kg
Length	meter	m
Temperature	kelvin	K
Time	second	s
Electric current	ampere	А
Quantity of a substance	mole	mol

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Appalachian Trail Conservancy, the trail is 2175 miles long.

> a: What is the hiker's avg. speed in miles/day?

b: Which do you think is the weak link in calculating the hiker's avg. speed: the actual distance hiked or the time that it took?

Sample Exercise 1.1: Suppose we add a penny with a mass of 2.5271 g to 49 other pennies with a combined mass of 124.01 g. What is the combined mass of the 50 pennies?

a:  $\frac{2175 \text{ miles}}{212,267 \text{ minutes}} x \frac{60 \text{ min}}{1 \text{ hr}} x \frac{24 \text{ hr}}{1 \text{ day}} = 14.6959 \frac{\text{miles}}{\text{day}}$ = 14.70 miles/day

b: The distance (4 sig. figs. )

VIII) Sample Exercise 1.1 – Using Significant Figures in Calculations

- Α. **Collect and Organize** 
  - 1. Calc. combined mass of 49 pennies that were weighed to the nearest 0.01 g and a single penny that was weighed to the nearest 0.0001 g.
  - 2. Follow the weak-link rule:
- we can know i combination of measing can be as well as we whow the least well-known measured value. B Annyl 1. Summing 2 values 2. Weak-link: the combination of weak-link: the combination of measing can be as well as well as we value.

Solve

C.

124.01 g + 2.5271 g 126.53**71** g = 126.54 g

- D. Think About It
  - 1. We can know the value of the sum to only the nearest 0.01 g, so we round 126.5371 to 126.54.
  - 2. We round b/c  $1^{st}$  digit to be dropped is the "7"

**Practice Exercise:** 

A: max. density:

volume of golf ball:  $V = (4/3)\pi(\frac{4.267}{2})^3 = 40.6786$ 

**Practice Exercise:** 

According to the rules of golf, a golf ball cannot weigh more than 45.97 grams and it must be at least 4.267 cm in diameter. The volume of a sphere is  $(4/3)\pi r^3$ , r = radius