INTRO UNIT STUDY GUIDE

Name Key

What do I need to know/be able to do/understand in order to be successful on the test?

SCIENTIFIC NOTATION

- Be able to express numbers in scientific notation
- Be able to convert from scientific notation into "common" number form

1. 93,000,000 mi. = 9.3×10^7 distance to the sun
2. 130,000,000 km = 1.3×10^8 distance to the sun
3. 58,666,000,000,000 mi = 5.8666×10^{13} distance to the nearest star
4. 300,000,000 m/sec = 3×10^8 speed of light
5. 600,000,000,000,000,000,000,000 = $6. \times 10^{23}$ molecules in 2g hydrogen
6. 0.000000027 m = 2.7×10^{-8} diameter of an atom
7. 0.0000010 km = 1.0×10^{-6} length of one mm
8. 350,000,000 = 3.5×10^8 number of people in USA
9. 0.000000010001 = 1.0001×10^{-8} a single dollars part of national debt
10. 365 = 3.65×10^2 days in a year
11. 3.6×10^6 = 3,600,000
12. 7.7×10^{12} = 7700000000000
13. 9.3×10^7 = 93,000,000
14. 6.0×10^{23} = 600000000000000000000000
15. 3.2×10^{-5} = 0.000032
16. 6.8×10^{-1} = 0.68

DIMENSIONAL ANALYSIS

- Use UNITS to solve problems! Remember, what in on top cancels out with what is on bottom.
- Understand what a conversion factor is and what it looks like
- Know how to properly set up a problem by using dimensional analysis

1. A camper named Bob ran into aliens on a trail. Bob made friends with the aliens so he could steal their treasure of 1 zygot.

   1 zygot = 3 trigots
   3 trigots = 2 bigots
   4 bigots = 1 gram gold

   How many grams of gold did Bob take from the aliens?

$$1 \cancel{z} \times \left(\frac{3 \cancel{t}}{1 \cancel{z}}\right) \times \left(\frac{2 \cancel{b}}{3 \cancel{t}}\right) \times \left(\frac{1 g}{4 \cancel{b}}\right) = 0.5 \text{ g gold}$$

2. A student goes through seven class periods in school. Each period lasts 55 minutes. How many hours does he spend in class per week?

$$1 \text{ week} \times \left(\frac{7 d}{1 \text{ wk}}\right) \times \left(\frac{7 \text{ per}}{1 d}\right) \times \left(\frac{55 \text{ min}}{1 \text{ per}}\right) \times \left(\frac{1 \text{ hr}}{60 \text{ min}}\right) = 44.9 = \boxed{45 \text{ h}}$$

3. Jolene went to the candy store and wanted to use the dimensional analysis she had learned in class that day. She only had a certain amount of money to spend. In terms of price, she figured out the following conversion factors:

   4 lollipops = 5 gumballs
   9 gumballs = 8 lemonheads
   16 lemonheads = 15 redhots

   If Jolene knows she could buy 12 lollipops, how many redhots could she buy for the same amount of money?

$12\ LP \times \left(\frac{5\ GB}{4\ LP}\right) \times \left(\frac{8\ LH}{9\ GB}\right) \times \left(\frac{15\ RH}{16\ LH}\right) = 12.5\ RH$

METRIC CONVERSIONS

- Be able to convert between common metric prefixes (kilo, milli, centi, nano, etc)

1. Which quantity of heat is equal to 200. joules?

   A) 20.0 kJ B) 2.00 kJ C) 0.200 kJ D) 0.0200 kJ

$200\ J \times \left(\frac{1\ kJ}{1000\ J}\right)$

2. Which quantity is equivalent to 50 kiloJoules?

   A) 5000 J B) 0.05 J C) 5×10^3 J D) 5×10^4 J

$50\ kJ \times \left(\frac{1000\ J}{1\ kJ}\right)$

3. One kiloJoule is the same as

   A) 0.001 Joule B) 0.01 Joule C) 100 Joules D) 1,000 Joules

4. How many kiloJoules are equivalent to 10 Joules?

   A) 0.001 kJ B) 0.01 kJ C) 1000 kJ D) 10,000 kJ

$10\ J \times \left(\frac{1\ kJ}{1000\ J}\right)$

SIGNIFICANT FIGURES

- Be able to state how many significant figures are in a number
- Know how to multiply and divide and that the number with the **least** amount of sig figs limits the number of sig figs your answer has

1. Which mass measurement contains four significant figures?

A) 0.086 g B) 0.431 g
C) 1003 g D) 3870 g

2. The measurement 0.41006 gram, rounded to three significant figures, is expressed as

A) 0.41 g B) 0.410 g
C) 0.4100 g D) 0.4101 g

3. Which measurement contains a total of three significant figures?

A) 0.12 B) 012 C) 120 D) 120.

4. What is the product of (2.324 cm × 1.11 cm) expressed to the correct number of significant figures?

A) 2.58 cm^2 B) 2.5780 cm^2
C) 2.5796 cm^2 D) 2.57964 cm^2

5. What is the quotient of 8.01 grams divided by 3.127 grams, expressed to the correct number of significant figures?

A) 2.6 B) 2.56
C) 2.562 D) 2.5616

6. Which measurement contains three significant figures?

A) 0.08 cm B) 0.080 cm
C) 800 cm D) 8.08 cm

7. Which measurement contains a total of three significant figures?

A) 0.012 g B) 0.125 g
C) 1,205 g D) 12,050g

8. Given:

3 4
(52.6 cm) × (1.214 cm)

What is the product expressed to the correct number of significant figures?

A) 64 cm^2 B) 63.9 cm^2
C) 63.86 cm^2 D) 63.8564 cm^2

9. Which volume measurement is expressed in four significant figures?

A) 5.50 ml B) 550. ml
C) 5,500 ml D) 5,500. ml

10. Which mass measurement contains a total of three significant figures?

A) 22.0 g B) 22.00 g
C) 220 g D) 2200 g

11. Which measurement has the greatest number of significant figures?

A) 6.060 mg 4 B) 60.6 mg 3
C) 606 mg 3 D) 60600 mg 3

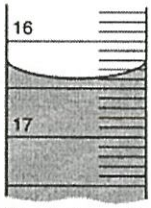
12. Which measurement contains three significant figures?

A) 0.05 g B) 0.050 g
C) 0.056 g D) 0.0563 g

MEASUREMENT SKILLS

- Be able to read a meniscus
- Be able to read a thermometer

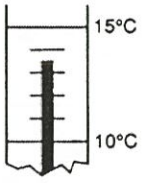
1. The diagram below shows a portion of a buret.



What is the meniscus reading in milliliters?

A) 16.00 B) 16.40 C) 17.00 D) 17.60

2. The diagram below represents a portion of a thermometer that is measuring the temperature of a solution.



According to the thermometer, the temperature of the solution is

A) 13.50°C B) 13.5°C
C) 16.50°C D) 16.5°C

Elements, Compounds, and Mixtures

Directions: Fill in the missing words (homogeneous, heterogeneous, substance, mixture, element, compound)

MATTER

Composed of just **one** type of particle (PURE) → **Substance**

Composed of more than one type of particle → **Mixture**

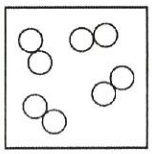
Substance

Made of just **one** type of **atom** → **Element**

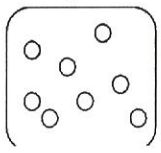
Made of **two or more atoms** joined together by a **chemical bond** → **Compound**

Element

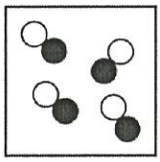
Two of the same type of atom → DIATOMIC



One atom → MONOATOMIC



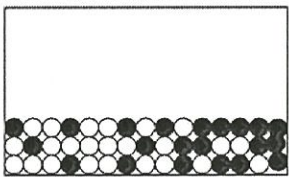
Compound



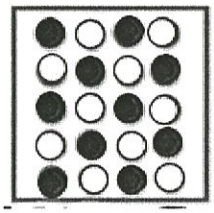
Compounds **can** be broken down (decomposed) by **chemical means**!

Mixture

Particles are **not** evenly distributed/arranged → **heterogeneous**



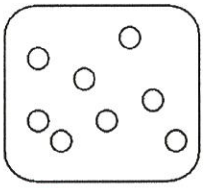
Particles **are** evenly distributed/arranged → **homogeneous**



Since mixtures are made up of 2 or more different **substances** that each have their own unique physical properties, mixtures can be separated by **physical means.**

aq = aqueous (homogeneous mixture of solid dissolved in water – SOLUTION)

PRACTICE: *Label the following particle diagrams as an element, compound, or mixture. Then* ***circle*** *those that can be separated physically.*



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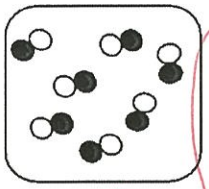
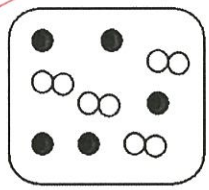
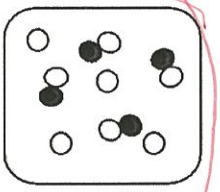


C



M



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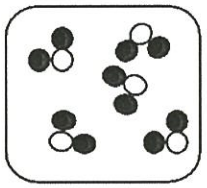

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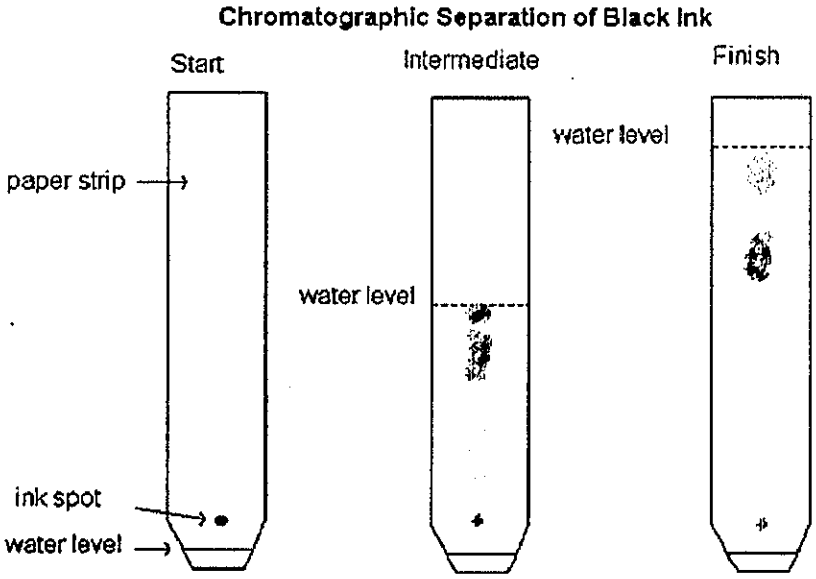
Mixtures and Physical Separations
How can we use physical properties to separate mixtures?

- Mixtures are made up of 2 or more substances that can be physically separated because each substance has its own **physical properties.**

- There are many physical properties. Examples are:
  - Color
  - Hardness
  - Phase/state of matter
  - Solubility/dissolving
  - Odor
  - Mass/volume – DENSITY
  - Boiling point
  - Melting point
  - Conductivity
  - Magnetism

- There are different techniques used to separate mixtures.
  - Using a magnet
  - Distillation/Evaporation
    - Separating a mixture of liquids based on differences in **boiling point**
  - Filtration
    - Separating a solid that cannot be dissolved (such as sand) from a liquid (such as water) based on **size** and **solubility**
  - Chromatography
    - Separating a mixture based on the different rates substances travel through a liquid (based on **solubility**)



Physical & Chemical Changes

If a new substance is produced → Chemical change

Example:

- Burning
- **reacting** with an acid, water, or air
- **forming a compound**

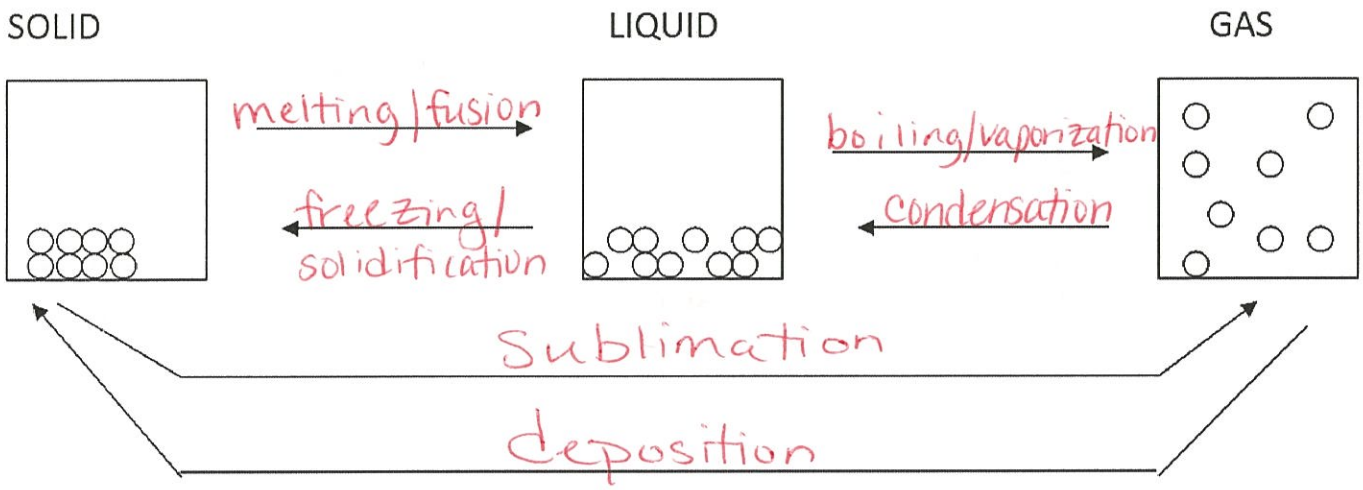
If no new substance is produced → physical change

Example:

- phase changes
- dissolving in water to form an aqueous solution

PHASE CHANGES

Fill in the diagram below with the names of the phase changes.



****YOU CAN CHECK YOUR ANSWERS IN CLASS OR ON MY WEBSITE (missvirga.weebly.com)****