

## CHAPTER 1 REVIEW

**Matter and Change****MIXED REVIEW****SHORT ANSWER** Answer the following questions in the space provided.1. Classify each of the following as a *homogeneous* or *heterogeneous* substance.

- |               |                 |               |                    |
|---------------|-----------------|---------------|--------------------|
| <u>homo</u>   | a. sugar        | <u>homo</u>   | d. plastic wrap    |
| <u>homo</u>   | b. iron filings | <u>hetero</u> | e. cement sidewalk |
| <u>hetero</u> | c. granola bar  |               |                    |

2. For each type of investigation, select the most appropriate branch of chemistry from the following choices: *organic chemistry*, *analytical chemistry*, *biochemistry*, *theoretical chemistry*. More than one branch may be appropriate.

- |            |                                                                                     |
|------------|-------------------------------------------------------------------------------------|
| <u>A</u>   | a. A forensic scientist uses chemistry to find information at the scene of a crime. |
| <u>T/B</u> | b. A scientist uses a computer model to see how an enzyme will function.            |
| <u>B</u>   | c. A professor explores the reactions that take place in a human liver.             |
| <u>O</u>   | d. An oil company scientist tries to design a better gasoline.                      |
| <u>A</u>   | e. An anthropologist tries to find out the nature of a substance in a mummy's wrap. |
| <u>B/A</u> | f. A pharmaceutical company examines the protein on the coating+ of a virus.        |

3. For each of the following types of chemical investigations, determine whether the investigation is *basic research*, *applied research*, or *technological development*. More than one choice may apply.

- |            |                                                                                                         |
|------------|---------------------------------------------------------------------------------------------------------|
| <u>B</u>   | a. A university plans to map all the genes on human chromosomes.                                        |
| <u>A</u>   | b. A research team intends to find out why a lake remains polluted to try to find a way to clean it up. |
| <u>A/T</u> | c. A science teacher looks for a solvent that will allow graffiti to be removed easily.                 |
| <u>B/A</u> | d. A cancer research institute explores the chemistry of the cell.                                      |
| <u>B</u>   | e. A professor explores the toxic compounds in marine animals.                                          |

**MIXED REVIEW** *continued*

4. Use the periodic table to identify the name, group number, and period number of the following elements:

- 6.17, P3      a. Cl  
2      3      b. Mg  
6      6      c. W  
8      4      d. Fe  
14      5      e. Sn

5. What is the difference between extensive and intensive properties?

ex - changes w/ matter (mass)  
in - does not change (density)

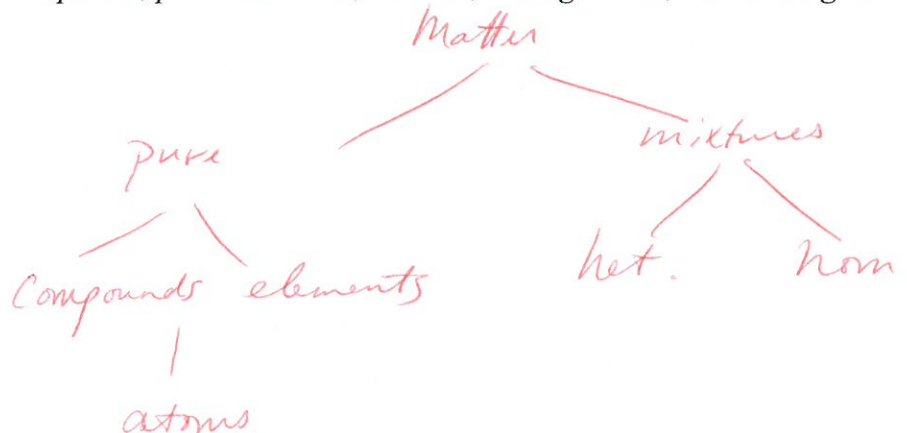
6. Consider the burning of gasoline and the evaporation of gasoline. Which process represents a chemical change and which represents a physical change? Explain your answer.

Burning - Chem. - can't go back to original  
Evap - Phys. - can go back  
New substance vs. same

7. Describe the difference between a heterogeneous mixture and a homogeneous mixture, and give an example of each.

het - blood - different properties  
hom - s.steel - same properties

8. Construct a concept map that includes the following terms: *atom, element, compound, pure substance, mixture, homogeneous, and heterogeneous.*



## CHAPTER 2 REVIEW

**Measurements and Calculations****MIXED REVIEW****SHORT ANSWER** Answer the following questions in the space provided.

1. Match the description on the right to the most appropriate quantity on the left.

- |                              |                                                |
|------------------------------|------------------------------------------------|
| <u>d</u> 2 m <sup>3</sup>    | (a) mass of a small paper clip                 |
| <u>a</u> 0.5 g               | (b) length of a small paper clip               |
| <u>f</u> 0.5 kg              | <del>(c) length of a stretch limousine</del>   |
| <u>e</u> 600 cm <sup>2</sup> | (d) volume of a refrigerator compartment       |
| <u>b</u> 20 mm               | (e) surface area of the cover of this workbook |
|                              | (f) mass of a jar of peanut butter             |

2. a A measured quantity is said to have good accuracy if

- (a) it agrees closely with the accepted value.  
 (b) repeated measurements agree closely.  
 (c) it has a small number of significant figures.  
 (d) all digits in the value are significant.

3. A certain sample with a mass of 4.00 g is found to have a volume of 7.0 mL. To calculate the density of the sample, a student entered  $4.00 \div 7.0$  on a calculator. The calculator display shows the answer as 0.571429.

- yes a. Is the setup for calculating density correct?  
2 b. How many significant figures should the answer contain?

4. It was shown in the text that in a value such as 4000 g, the precision of the number is uncertain. The zeros may or may not be significant.

- 1 a. Suppose that the mass was determined to be 4000 g. How many significant figures are present in this measurement?  
 $4.00 \times 10^3$  g b. Suppose you are told that the mass lies somewhere between 3950 and 4050 g. Use scientific notation <sup>4000</sup> to report the value, showing an appropriate number <sub>SF</sub> of significant figures.

5. If you divide a sample's mass by its density, what are the resulting units?

$$\text{volume} = \frac{g}{g/mL} = mL$$

$$D = \frac{m}{V}$$



**MIXED REVIEW** *continued*

6. Three students were asked to determine the volume of a liquid by a method of their choosing. Each performed three trials. The table below shows the results. The actual volume of the liquid is 24.8 mL.

	Trial 1 (mL)	Trial 2 (mL)	Trial 3 (mL)	Average mL
Student A	24.8	24.8	24.4	24.6
Student B	24.2	24.3	24.3	24.26
Student C	24.6	24.8	25.0	24.8


- C     a. Considering the average of all three trials, which student's measurements show the greatest accuracy? *Add Trials, ÷ 3*
- B     b. Which student's measurements show the greatest precision? *Repeatability (only off by 0.1 on one trial)*

**PROBLEMS** Write the answer on the line to the left. Show all your work in the space provided.

7.      $2.0 \times 10^2$  g     A single atom of platinum has a mass of  $3.25 \times 10^{-22}$  g. What is the mass of  $6.0 \times 10^{23}$  platinum atoms?

$$3.25 \times 10^{-22} \text{ g} \times 6.0 \times 10^{23} \text{ atoms}$$

8. A sample thought to be pure lead occupies a volume of 15.0 mL and has a mass of 160.0 g.

- 10.7 g/mL     a. Determine its density.
- $D = \frac{m}{V}$    $\frac{160.0 \text{ g}}{15.0 \text{ mL}}$  *4sf* *3sf*     3sf
- No     b. Is the sample pure lead?     Pg. 42
- 5.73%     c. Determine the percentage error, based on the accepted value for the density of lead.

$$11.35 \text{ g/mL} = D_{\text{lead}}$$

$$\% \text{ error} = \frac{V_{\text{exp}} - V_{\text{acc.}}}{V_{\text{acc.}}} \times 100 = \frac{10.7 - 11.35}{11.35} \times 100$$

## CHAPTER 3 REVIEW

**Atoms: The Building Blocks of Matter****MIXED REVIEW****SHORT ANSWER** Answer the following questions in the space provided.

1. The element boron, B, has an atomic mass of 10.81u according to the periodic table. However, no single atom of boron has a mass of exactly 10.81u. How can you explain this difference?

10.81u is the average mass of all atoms of B. Isotopes mass an relative amount are calculated for the relative mass.

2. How did the outcome of Rutherford's gold-foil experiment indicate the existence of a nucleus?

Alpha particles (positive) passed through the gold. Only a few bounced back showing that the center was positive & very tiny. The atom is mostly empty space.

3. Ibuprofen,  $C_{13}H_{18}O_2$ , that is manufactured in Michigan contains 75.69% by mass carbon, 8.80% hydrogen, and 15.51% oxygen. If you buy some ibuprofen for a headache while you are on vacation in Germany, how do you know that it has the same percentage composition as the ibuprofen you buy at home?

The law of definite proportions says that  $C_{13}H_{18}O_2$  is the same no matter where or from what source it comes.

4. Complete the following chart, using the atomic mass values from the periodic table:

Compound	Mass of Fe (g)	Mass of O (g)	Ratio of O:Fe
FeO	55.85	16.00	0.2865 $16 / 55.85$
Fe <sub>2</sub> O <sub>3</sub>	111.70 $2 \times 55.85$	48.00 $3 \times 16$	0.4297 $48 / 111.70$
Fe <sub>3</sub> O <sub>4</sub>	167.55 $3 \times 55.85$	64.00 $4 \times 16$	0.3820 $64 / 167.55$

**MIXED REVIEW** *continued*

5. Complete the following table:

Element	Symbol	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons
Sodium	Na	11	22	11	11	11
Fluorine	F	9	19	9	10	9
Bromine	Br	35	80	35	45	35
Calcium	Ca	20	40	20	20	20
Hydrogen	H	1	1	1	0	1
Radon	Rn	86	222	86	136	86

**PROBLEMS** Write the answer on the line to the left. Show all your work in the space provided.

6.  $1.51 \times 10^{24}$  atoms  
3sf
- a. How many atoms are there in 2.50 mol of hydrogen?  
 $2.50 \text{ mol H} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol H}} =$
- $1.51 \times 10^{24}$  atoms  
3sf
- b. How many atoms are there in 2.50 mol of uranium?  
 $2.50 \text{ mol U} = 2.50 \text{ mol H}$   
atom = atom  
Same answer
- 4.65 mol  
3sf
- c. How many moles are present in 107 g of sodium?  
 $107 \text{ g Na} \times \frac{1 \text{ mol Na}}{22.99 \text{ g Na}} =$

7. A certain element exists as three natural isotopes, as shown in the table below.

Isotope	Mass (amu)	Percent natural abundance	Mass number
1	19.99244	90.51	20
2	20.99395	0.27	21
3	21.99138	9.22	22

20.179 amu Calculate the average atomic mass of this element.

$$.9051(19.99244) + .0027(20.99395) + .0922(21.99138) = 20.17944635 \text{ amu}$$