

Chapters 1 & 2 Study Guide/Review Worksheet

I. Be able to define chemistry and list some topics we will be studying.

Study of the composition, structure, changes and energy matter undergoes.

II. Be able to classify matter as a substance, element, compound, solution, heterogeneous or homogeneous mixture. Know the difference/relationships between these terms.

1. A clear liquid in an open container is allowed to evaporate. After three days, a solid residue is left. Was the original liquid an element, compound, or mixture? How do you know?

mixture, it was easily separated by physical means. each substance had its own unique set of properties.

2. Classify each of the following as elements, compounds, or mixtures:

a. silver element (pure substance)

b. grape juice mixture (homogeneous)

c. pop mixture (homogeneous)

d. oxygen element (pure substance)

e. baking soda compound (pure substance)

3. Classify each of the following as a homogeneous or heterogeneous substance.

homogeneous (compound) a. sugar

homogeneous (compound) e. plastic wrap

homogeneous (element) b. iron filings

heterogeneous (mixture) f. cement sidewalk

heterogeneous c. granola bar

homogeneous (mixture) g. oxygen dissolved in water

homogeneous (compound) d. salt

homogeneous (mixture) h. apple juice

III. Be able to define physical & chemical properties and physical & chemical changes. Give examples of each.

4. Classify the following as either a physical or a chemical change:

a. gold is melted physical

e. grape juice is fermented chemical

b. pizza is sliced physical

f. water freezes physical

c. pizza is digested chemical

g. something new carbon + oxygen \rightarrow CO₂ chemical

d. coal is heated physical

h. a can of pop is opened physical

5. 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 is chemical because something new gets made.

evaporation is physical, it is a phase change and those are physical changes

6. List three properties of sugar that distinguish it from salt.

taste, melting point, particle size, odor

matter is never created or destroyed, it can just change forms.

IV. Be able to state the law of conservation of matter and apply it to a given situation.

V. Know the five steps of the scientific method and the purpose of doing experiments.

7. All of the following are steps in the scientific method *except*

- a. observing and recording data.
- b. forming a hypothesis.
- c. discarding data inconsistent with the hypothesis.
- d. drawing conclusions based on data analysis.

8. A proposed explanation that is based on observations and that can be tested is known as a(n)

- a. principle.
- b. experiment.
- c. law.
- d. hypothesis.

VI. Be able to design an experiment including identifying the control, constants, independent variable and dependent variable.

9. Why is it important to have a control in an experiment?

to make sure you are testing only one thing at a time and the results are due to the thing you are testing.

10. Ten plants are grown in equal amounts of sunlight with equal amounts of water and varying amounts of fertilizer. Fertilizer is a(n)

- a. control.
- b. experiment.
- c. system.
- d. variable.

11. A boy wearing a black shirt notices that he is much warmer than his friend who is wearing a white shirt on a hot, sunny summer day. He wonders if different colors of clothing absorb different amounts of heat. He carries out an experiment by wrapping different colored fabric around 8 different thermometers. He places them in the sun and records their temperature hourly for 10 hours.

a. What is the independent variable in this experiment?

time, (color of the fabric)

b. What is the dependent variable?

temperature (it depends on the color of the fabric)

c. List two constants you would want in this experiment.

Same type of fabric, same amount of sun, same positioning of the thermometers.

d. Is there a control in this experiment? If yes – what is the control? If no – what should the control be?

No control. Plain thermometer without being wrapped in fabric in the sun.

VII. Know the difference between a quantitative and qualitative piece of data.

12. Which of these observations is qualitative rather than quantitative?

- a. A chemical reaction is complete in 2.3 s.
- b. The solid has a mass of 23.4 g.
- c. The density of aluminum is 2.70 g/cm^3 .
- d. Salt deposits form from an evaporated liquid.

VIII. Be able to describe the characteristics of the three states of matter.

13. 50mL of a substance completely fills its 100mL container. It must be a

- a. solid
- b. liquid
- c. gas
- d. cytoplasm

IX. Explain the usefulness of the International System of Units.

everything is the same for everyone

gas
no definite shape
no definite volume
particles vary far apart
can flow.
completely fills container.

solid
definite shape
definite volume
particles tightly packed

liquid
no definite shape
definite volume
particles "loosely" packed
can flow.

X. Be able to list and define common SI base units of measurement. Be able to list the names and values of common SI prefixes and be able to convert between SI units.

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

- | | |
|------------------------------|--|
| <u>D</u> 2 m ³ | (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 | (c) length of a stretch limousine |
| <u>E</u> 600 cm ² | (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 |

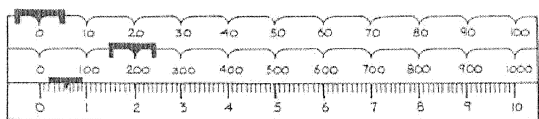
15. Convert the following measurements:

- a. 6.03 L = 6030 mL c. 5320 g = 5.32 Kg
 b. 0.025 m = 25 mm d. 12.1 mm = 1.21 cm

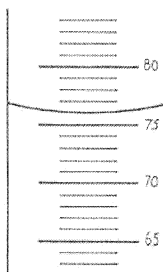
do we do this yet?

XI. Be able to read measuring devices correctly and to the appropriate number of significant digits.

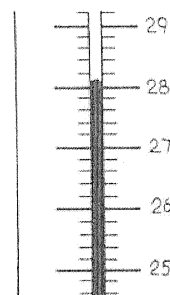
16. Read the following measuring devices to the appropriate number of significant figures.



a. 200.53
~~20.53~~



b. 76.0



c. ~~28.1~~ 28.1

XII. Be able to solve problems involving density calculations including labeling with the proper units.

17. A rock has a mass of 127 g and displaces 32.1 mL of water. What is the density of the rock?

$m = 127g$ $V = 32.1 mL$
 $D = \frac{m}{V}$ $D = \frac{127g}{32.1 mL} = \boxed{3.96 \text{ g/mL}}$

18. A board measures 1.8 cm by 8.8 cm by 30.5 cm. It has a mass of 140 g. What is its density?

$V = l \times w \times h$ $m = 140g$
 $V = 1.8 \text{ cm} \times 8.8 \text{ cm} \times 30.5 \text{ cm} = 483.12 \text{ cm}^3$ $D = \frac{m}{V}$ $D = \frac{140g}{483.12 \text{ cm}^3} = \boxed{0.29 \text{ g/cm}^3}$

19. The density of ice is 0.917 g/cm³. How much volume does 52.3 g of ice occupy?

$D = 0.917 \text{ g/cm}^3$ $m = 52.3g$
 $D = \frac{m}{V}$ $V = \frac{m}{D}$ $V = \frac{52.3g}{0.917 \text{ g/cm}^3} = \boxed{57.0 \text{ cm}^3}$

XIII. Be able to calculate the percent error of an experimentally determined measurement.

20. The accepted value for the density of sodium chloride is 2.165 g/cm³. A student measured the density as 2.075 g/cm³. Calculate the percent error.

$\% \text{ error} = \frac{A - m}{A} \times 100$ $\frac{2.165 \text{ g/cm}^3 - 2.075 \text{ g/cm}^3}{2.165 \text{ g/cm}^3} = \boxed{4.1579\%}$

IXV. Be able to distinguish between the accuracy and precision of a measurement.

21. 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)
Student A	24.8	24.8	24.4
Student B	24.2	24.3	24.3
Student C	24.6	24.8	25.0

a. Considering the average of all three trials, which student's measurements show the greatest accuracy?

Student A

b. Which student's measurements show the greatest precision?

Student B

XV. Be able to write measurements and perform calculations using scientific notation.

22. Convert each of the following into scientific notation.

a.) 3427 3.427×10^3 b.) 0.00456 4.56×10^{-3} c.) 126.936 1.26936×10^2

23. Convert each into normal/conventional form.

a.) 1.56×10^4 15600 b.) 0.56×10^{-2} 0.0056 c.) 3.69×10^{-3} 0.00369

XVI. Be able to identify the number of significant figures in a measurement and be able to apply the rules for significant figures in calculations to round off numbers correctly.

24. Determine how many significant figures are in each of the following numbers.

a. 3 32.1 g b. 3 0.00107 kg c. 5 2306700 L d. 2 0.060 m

25. Perform the following calculations and round off the answer to the correct number of significant figures.

a. $0.3287 \text{ g} \times 45.2 \text{ g} = 14.85724 = 14.9 \text{ g}^2$

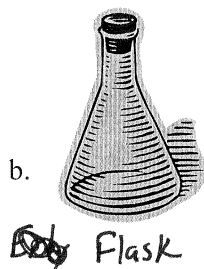
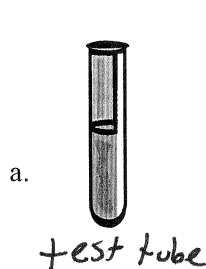
b. $125.5 \text{ Kg} + 52.68 \text{ Kg} + 2.1 \text{ Kg} = 180.28 = 180.3 \text{ Kg}$

c. $52.8 \text{ Pa} + 3.0025 \text{ Pa}$

253.4 Pa $= 0.22025 = 0.220$

XVII. Be able to recognize common laboratory equipment.

26. Identify the following objects:



XVIII. Be familiar with safety rules discussed in class and listed on your safety contract.

27. List two safety rules that should always be followed.