

Chapters 1 & 2

Study Guide

Name: _____

Date: _____ Per: _____

DIRECTIONS: Fill in the blank(s).

1. Matter is anything that has mass & occupies space.
2. The variable manipulated in an experiment by the researcher is called the independent variable.
3. The variable measured by a researcher in an experiment is called the dependent variable.
4. The standard for comparison in an experiment is called the control group.
5. Complete the table:

SI System of Measures						
SI Measurement	Unit	Symbol		SI Prefix	Symbol	Meaning
Length	<u>meter</u>	<u>m</u>		kilo-	<u>k</u>	<u>1000</u>
Mass	kilogram	<u>kg</u>		hecto-	<u>h</u>	<u>100</u>
Electrical Current	<u>ampere</u>	<u>A</u>		deka-	<u>da</u>	<u>10</u>
Amount	<u>mole</u>	<u>mol</u>		deci-	<u>d</u>	<u>1/10th</u>
Time	second	<u>s</u>		centi-	<u>c</u>	<u>1.100th</u>
Luminous Intensity	<u>candela</u>	<u>cd</u>		milli-	<u>m</u>	<u>1/1000th</u>
Temperature	<u>kelvin</u>	<u>K</u>				

6. The boiling point of water at sea level is 373 K or 100 °C.
7. The freezing point of water at sea level is 273 K or 0 °C.
8. The point at which matter stops moving is called absolute zero. It is equal to 0 K or -273 °C.
9. Convert the following:
 - a. 300. K to °C 27 °C
 - b. 35.0 °C to K 308 K
 - c. 82 °C to K 355 K
10. Contrast accuracy and precision: Accuracy = true compared to a known measure / Precision = ability to reproduce the same measurement repeatedly
11. List the five steps of the scientific method.
 - i. observation
 - ii. question
 - iii. hypothesis
 - iv. experiment
 - v. conclusions
12. Convert the following:
 - a. 156.3 mL to 0.1563 L
 - b. 0.0031 kg to 3.1 g
 - c. 0.3461 km to 3461 dm
 - d. 34 223 m to 34.233 km
 - e. 9.15 m to 9150 mm
 - f. 0.331 mL to 0.00331 dL
13. How many significant digits are present in each of the following?
 - a. 0.0031mL 2
 - b. 3.400 N 4
 - c. 2300 dm 2
 - d. 0.722 m 3
 - e. 707.12 km 5
 - f. 230. L 3

Chapters 1 & 2

Study Guide

Name: _____

Date: _____ Per: _____

14. Write the following in scientific notation:

- a. 0.00031 3.1×10^{-4} c. 2300 2.3×10^3
 b. 3400000 3.4×10^6 d. 0.0047600 4.7600×10^{-3}

15. Write the following in standard (expanded) notation:

- a. 3.12×10^6 3120000 c. 7.6×10^{-5} 0.000076
 b. 5.201×10^7 52010000 d. 3.100×10^7 Can't really be done

16. A physical property is one which does not change the identity of a sample of matter as it is observed and includes such examples as: melting point, boiling point, density, color, odor. A property observed as a substance undergoes permanent changes into another substance is called a chemical change property and includes such examples as: rusting, burning, rotting, cooking. This second type of property is observed during a chemical change.

17. Fill in the table below.

State of Matter	Description	Definite Shape	Definite Volume	Indefinite Shape	Indefinite Volume
Solid	Slow moving particles held in rigid structure.	X	X		
Gas	Particles moving separately with space between them.			X	X
Liquid	Particles sliding past one another closely.		X	X	
Plasma	Superheated gas in which particles become charged.			X	X

18. Label each change as being either physical (P) or chemical (C).

- a. Breaking glass P d. Burning gasoline C g. Boiling water P
 b. Condensing water P e. Melting metal P h. Heating plastic P
 c. Lighting a match C f. Freezing water P i. Cooking a steak C

19. Define "element": smallest part of matter with unique chemical and physical properties

- a. Give three examples of elemental formulas: Mg, Au, Li
 b. Give two examples of polyatomic elemental formulas: H₂, O₂

20. Define "compound": a unit of matter with fixed proportions of certain elements

- a. Give two examples of compound formulas: NaCl, CO₂

21. Label each of the following as either an atomic formula (formula of an element) (A) or a compound formula (C).

- a. MgO C d. NO C g. H₂O C
 b. He A e. Co A h. Sn₃N₄ C
 c. CO C f. No A i. Sn A

Chapters 1 & 2

Study Guide

Name: _____

Date: _____ Per: _____

22. Identify each sample of matter as a compound(C), element(E), heterogeneous mixture(H), or homogeneous mixture(M).
- | | | |
|------------------------------------|--|----------------------------------|
| a. Milk _____ H _____ | e. A 14K gold ring _____ M _____ | i. Concrete _____ H _____ |
| b. Table salt _____ C _____ | f. Italian dressing _____ H _____ | j. Cola _____ M _____ |
| c. Sea water _____ M _____ | g. Pure water _____ C _____ | k. Air _____ M _____ |
| d. Gold _____ E _____ | h. Coffee _____ M _____ | l. Sugar _____ C _____ |

23. **DIRECTIONS:** Circle the correct response.

- (**Crystalline** / Amorphous) solids have a repeating crystalline structure and melt directly when heated.
 - (Crystalline / **Amorphous**) solids become flexible before melting.
 - (Condensation / **Evaporation**) is a change of phase that occurs when liquids change to a gas at a temperature below the boiling point of the liquid.
 - (**Sublimation** / Deposition) is a change of phase that occurs when solids change directly to a gas.
 - Boiling point is an example of a (**physical** / chemical) property.
 - Reactivity with water is an example of a (physical / **chemical**) property.
 - (Physical / **Chemical**) changes always involve a change in the chemical identity of a substance.
 - (**Homogeneous** / Heterogeneous) mixtures are uniformly mixed particles that cannot be separated through filtration.
 - (**Homogeneous** / Heterogeneous) mixtures are also referred to as solutions.
 - Salt dissolved in water is an example of a (**homogeneous** / heterogeneous) mixture.
 - In a solution the (**solvent** / solute) is the dissolving agent and the (solvent / **solute**) is the substance dissolved.
 - The combination of oil and vinegar is a (homogeneous / **heterogeneous**) mixture.
24. Identify the appropriate method of separating the mixture (crystallization(C), distillation(D), filtration(F), chromatography(G)).
- | | |
|--|--|
| a. Salt from water _____ C _____ | c. Sand from water _____ F _____ |
| b. Alcohol from water _____ D _____ | d. Red dye from black ink _____ G _____ |
25. Vertical columns of the periodic table are called _____ **groups** _____ or _____ **families** _____. Elements are placed in the same vertical column because they have similar _____ **chemical & physical properties** _____. The rows of the periodic table are referred to as _____ **periods** _____.

26. **DIRECTIONS:** Complete the following table:

	Location on the Periodic Table	Properties	Examples
Metals	Left of the stair step line	largest group, high conductivity, malleable, lustrous, ductile, solid at room temperature	gold, silver, magnesium
Non-Metals	Right of the stair step line	most are gases at room temperature, low conductivity, brittle, not malleable or ductile	carbon, helium, phosphorus
Semi-Metals	Elements along the stair step line	share properties of both metals and non-metals (includes semi-conductors)	silicon, germanium

Chapters 1 & 2

Study Guide

Name: _____

Date: _____ Per: _____

DIRECTIONS: Complete the calculations in the space provided.

27. If a 37.50 g weight is placed in a graduated cylinder with 41.0 mL of water and the water level goes up to 44.3 mL, what is the density of the weight?

$$m = 37.50 \text{ g}$$

$$V_{\text{initial}} = 41.0 \text{ mL}$$

$$V_{\text{final}} = 44.3 \text{ mL}$$

$$\text{Volume of object} = 44.3 \text{ mL} - 41.0 \text{ mL} = 3.3 \text{ mL}$$

$$\text{Density of object} = \text{mass} / \text{volume} = 37.50 \text{ g} / 3.3 \text{ mL} = 11.363636 \text{ g/mL}$$

(2 sig figs because 3.3 mL only has 2 sig figs)

$$\boxed{11 \text{ g / mL}}$$

28. A 3.75 g object with a density of 2.380 g/mL is placed in a graduated cylinder containing 20.50 mL of water. What is the final volume of the graduated cylinder after the object has sunk?

$$m = 37.5 \text{ g}$$

$$D = 2.380 \text{ g/mL}$$

$$D = m/v$$

$$V = m/D$$

$$V = 37.5 \text{ g} \times 2.380 \text{ g/mL} = 10.6125 \text{ mL} \quad (3 \text{ sig figs because } 37.5 \text{ g has 3 sig figs})$$

Final volume in cylinder = 20.50 mL + 10.61 mL = 31.11 mL *(Round to tenths because 10.61 ml should have been rounded to tenths place.)*

$$\boxed{31.1 \text{ mL}}$$

29. A graduated cylinder contains 30.00 mL of water. An object with a volume of 12.00 cm³ is placed in the graduated cylinder and floats with only a portion of the object beneath the surface. If the water level in the graduated cylinder has increased to 34.50 mL, what is the density of the object?

A floating object displaces an equal mass of water. If the water level has increased by 4.50 mL (34.50 mL – 30.00 mL = 4.50 mL) and water has a density of 1 g/mL, then the object has a mass of 4.50 g (Round to hundredths since both measures are rounded to hundredths).

$$D = m/v = 4.50 \text{ g} / 12.00 \text{ cm}^3 = 0.375 \text{ g/cm}^3 \quad (Round to 3 sig figs since 4.50 g has only 3 sig figs)$$

$$\boxed{0.375 \text{ g / cm}^3}$$

30. A calculation indicates that a reaction should produce 1.87 g of product. After carrying out the experiment, only 1.650 g of product have been collected. Calculate the percent error.

$$\text{Percent error} = \frac{\text{experimental} - \text{accepted}}{\text{accepted}} \times 100$$

$$\text{Experimental} = 1.650 \text{ g}$$

$$\text{Accepted} = 1.87 \text{ g}$$

$$\text{Percent error} = \frac{1.650 \text{ g} - 1.87 \text{ g}}{1.87 \text{ g}} \times 100 \Rightarrow \frac{-0.22 \text{ g}}{1.87 \text{ g}} \times 100 = -11.7647 \%$$

$$\boxed{12\%}$$