

Chapter 1 and 2 Homework Answer Key

1.3 pg. 17 #8 to 11

#8) Answers will vary. Sample Answer:

Observation: My Stomach is Growling!

Hypothesis: Maybe I am hungry!

Experiment: Eat something and see what happens!

#9) A law is a concise statement that summarizes the results of a broad variety of observations and experiments. A theory is a tested (by experiments) hypothesis. A hypothesis is a proposed explanation or reason for what is observed.

#10) The hypothesis guides the design of the experiment.

#11) a law; The statement summarizes facts; it does not give an explanation

2.1 pg. 31 #1 to 4

#1) No; a substance is a particular kind of matter that has a uniform and definite composition. Pure substances contain only one kind of matter. Matter is anything that has mass and occupies space.

#2) Solids have definite shape and volume and are nearly incompressible. Liquids have definite volume but no definite shape, are nearly incompressible, and can flow. Gases have neither definite shape nor definite volume and are easily compressed.

#3) b., c., and d.

#4) a. Mercury b. Melting point and Density c. All are colorless

2.2 pg. 34 #5, 6; pg. 35 #7 to 12

#5) Magnet attracts iron, but not salt. Salt dissolves in water, but not iron.

#6) a. Heterogeneous b. Homogeneous c. Heterogeneous
d. Homogeneous e. Homogeneous

#7) Heterogeneous mixtures have non-uniform composition consisting of two or more phases. Homogeneous mixtures have a uniform composition throughout the sample.

#8) Add water to dissolve the salt. Pour the resulting mixture onto a piece of closely-woven cloth. The sand will remain on the cloth, and the salt solution will pass through. Use evaporation to remove the water from the solution, leaving solid salt behind.

#9) a. Substance b. Mixture c. mixture d. Substance

#10) A pure substance contains only one kind of matter. A mixture contains two or more kinds of matter that may or may not be uniform in composition.

#11) The components of a mixture can be separated by physical means such as filtration or distillation.

#12) A phase is any part of a system with uniform composition. A homogeneous mixture consists of one phase; a heterogeneous mixture consists of two or more phases.

2.3 pg. 39 #13; pg. 40 #14 to 18

#13) It cannot be an element because it separated into at least one solid and one liquid. It must have been a mixture. The liquid components evaporated, leaving behind the solid components. Compounds cannot be separated by physical means such as evaporation. Evaporation is one way to physically separate the components of a mixture.

#14) Compounds can be separated by chemical means into elements. Elements cannot be separated into simpler substances by chemical techniques.

#15) a. Cu b. O c. P d. Ag e. Na f. He

#16) a. Tin b. Calcium c. Sulfur
d. Cadmium e. Phosphorus f. Chlorine

#17) a. Mixture b. Mixture c. Compound
d. Mixture e. Mixture f. Element

#18) carbon, hydrogen, oxygen, and nitrogen; Hydrogen is present in the greatest proportion by number of atoms.

2.4 pg. 43 #19 to 23

#19) a. In a chemical change, the chemical composition of the reactants changes as one or more different products is formed. In a physical change, the chemical composition of the substance remains the same even if its physical appearance changes. Indicators are (1) a change in color or odor, or production of a gas; (2) energy released or absorbed; (3) irreversibility. Out of these indicators, (3) is the most reliable observation that a chemical change had taken place.

b. In any physical change or chemical reaction, mass is neither created nor destroyed; it is conserved. The mass of the products equals the mass of the reactants in a chemical reaction.

20) a. Chemical b. Physical c. Physical
d. Chemical e. Chemical f. Chemical

21) 18 g

- 22) a. Color, odor, reaction upon heating, boiling point
b. Color, melting point, reactions with other substances, hardness, brittleness, strength
c. boiling point, freezing point, density
d. density, melting point, magnesium

23) 43.2 g

Chapter 2 Review pg. 47-48 #24 to 43

24) solid, metallic luster, gray color, high melting point, malleable

25) a. Solid b. Liquid c. Gas d. Solid e. Liquid f. Liquid

26) a. Solid b. Gas c. Liquid d. Liquid e. Solid f. Gas

27) vapor; The term "vapor" is used to refer to the gaseous state of a substance which normally exists as a liquid or a solid at room temperature.

28) water, gasoline, acetone (fingernail polish remover), aromatic vaporizers (such as aerosol deodorants)

29) chlorine, mercury, bromine, and water; Chlorine condenses, and mercury, bromine and water all freeze when the temperature drops within the stated range.

30) a. Heterogeneous b. Heterogeneous c. Homogeneous
d. Homogeneous e. Homogeneous

31) one; A solution is a system with uniform composition and properties. Solutions are homogeneous mixtures, consisting of a single phase.

32) a. Element b. Mixture c. Mixture d. Element e. Mixture f. Mixture

33) a. Nitrogen, hydrogen chlorine b. Potassium, manganese, oxygen
c. Carbon, hydrogen, oxygen d. Calcium, iodine

34) color change; energy absorbed or released; gas produced; odor change

35) a. Physical b. Chemical c. Chemical d. Physical

36) The iron combines with oxygen in the air, and oxygen has mass

37) As the wax burns, the chemical composition of the wax changes, producing the products water and carbon dioxide, which are released into the surrounding air.

38) Add sufficient water to dissolve all of the sugar. Separate the charcoal and sand from the sugar water by filtration. Large pieces of charcoal could be separated on the basis of color. Small pieces of charcoal could be burned.

39) a. Mixtures b. Mixtures

40) a. Color b. Six c. Sodium chloride d. Sulfur

41) a. Homogeneous Mixture b. Homogeneous Mixture c. Heterogeneous Mixture
d. Homogeneous Mixture e. Heterogeneous Mixture f. Compound
g. Homogeneous Mixture h. Heterogeneous Mixture

42) a. Physical b. Physical c. Physical d. Physical e. Chemical

43) a. Color and odor change b. Gas is produced c. formation of a precipitate
d. color and texture change e. Energy change, odor, irreversible

44) a. (1) product b. (3) compound

45) In gases, particles are far apart. In liquids, particles are in contact. In solids, particles are tightly packed

46) The appearance of a substance will change during a change of state, which is a physical change.

47) a. Yes, because the graph is a straight line, the proportion of iron to oxygen is a constant.
b. No, plotting these values on the graph would not give a point on the line indicating that the mass ratio of iron to oxygen is different from the other four samples.

48) a. Oxygen and calcium b. Silicon, aluminum, and iron
c. Different. The second most abundant element in the Earth's crust, silicon, is not present in the human body, and the second most abundant element in the human body, carbon, is not among the most abundant elements of Earth's crust. If the elements are different then the compounds must also be different.

3-3 to 3-5 Homework Answer Key

3.3 pg. 67 #17 to 22

- #17) a. Amount of substance, mol b. Density, kg/m^3 c. time, s
d. Pressure, Pa e. Length, m f. Mass, kg

#18) Mass is a measure of the amount of matter in an object. Weight is a measure of the force of gravity on an object. Weight is a measure of the force of gravity on an object.

- #19) a. (m), 10^{-3} b. (n), 10^{-9} c. (d), 10^{-1} d. (c), 10^{-2}

#20) Your weight would decrease; your mass would remain constant.

#21) $8.8 \times 10^2 \text{ cm}^3$

#22) a. and d. > f. > e. > c. > b.

3.4 pg. 71 #23, 24; pg. 72 #25, 26, 28

#23) 2.50 g/cm^3 , no

#24) 6.5 cm^3

#25) Mass is divided by volume.

#26) a. $1.7 \times 10^{-2} \text{ g/L}$

#28) 0.802 g/cm^3 ; It would sink.

3.5 pg. 75 #30 to 35

#30) -196°C

#31) melting point: 1234 K; boiling point: 2485 K

#32) $^\circ\text{C} = \text{K} - 273$

#33) 463 K

#34) 443 K

#35) -186°C

