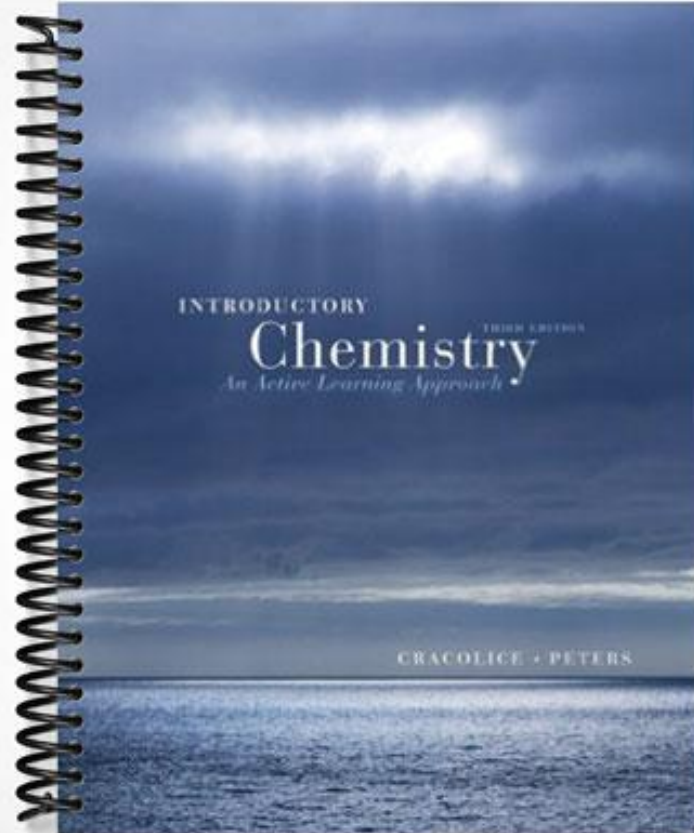


TEST BANK



Name: _____

Date: _____

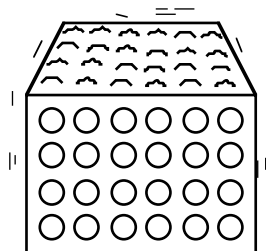
ID: _____

Section: _____

CHAPTER EXAM
CHAPTER 2
MATTER AND ENERGY

Instructions: You must show your work when space is provided, and it must logically lead to your answer to receive any credit for a question. When you complete your work for each question, place an X in the box corresponding to the *best* answer choice for that question. You are allowed to use a single-line-display nonprogrammable calculator to perform mathematical operations. You may use only the reference material provided by your instructor. No other references are permitted.

1. Which state of matter is illustrated below?



- A. Gas B. Liquid C. Solid
D. Both gas and solid E. Both liquid and solid

2. Which of the following changes is/are classified as chemical?





- i. dissolving vinegar in water ii. evaporation of rubbing alcohol
iii. crushing rock iv. fermenting apple juice
v. softening a glass tube by heating it

- A. i only B. iv only C. i and iv D. i and ii E. i, iv, and v

3. Which of the following correctly describes a homogeneous sample?

- A. Uniform appearance and composition throughout
B. Visibly different parts or phases
C. A mixture of diamond and graphite, which are both forms of carbon
D. Reacts with all elements
E. Reacts with all *natural* elements

	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

4. Which of the following can be a pure substance?
- i. gold
 - ii. air
 - iii. homogenized milk
 - iv. sugar completely dissolved in water
 - v. ice
- A. ii and iv B. ii and iii C. i and iii D. i and v E. ii, iii, and iv
5. Which of the following statements is *false*?
- A. Both elements and compounds are pure substances
 - B. The properties of a compound vary
 - C. An element cannot be decomposed chemically into other pure substances
 - D. A compound can be separated into other substances by chemical means
 - E. All of the above are true; none is false
6. Which of the following are elements?
- i. KOH
 - ii. Ne
 - iii. CO
 - iv. carbon tetrachloride
 - v. calcium
- A. i, ii, and iii B. iv and v C. ii and iii D. ii and v E. ii, iii, and v
7. Which of the following correctly represents electrostatic forces?
- A. 
 - B. 
 - C. 
 - D. 
 - E. All of the above are correct
8. Which of the following changes is/are endothermic for the underlined object?
- i. baking a potato
 - ii. a person being burned by a pan
 - iii. a wood log burning
 - iv. a lit light bulb shining
 - v. a person digesting food
- A. iii only B. iii and iv C. iii and iv D. i and iv E. i and ii

9. A book is pushed off a table, and it falls to the floor. Which of the following statements about the book is *false*?
- A. Its potential energy is at a maximum just as it leaves the table
 - B. Its kinetic energy is at a maximum just before it hits the floor
 - C. Its kinetic energy is equal to its potential energy at a point halfway between the table and the floor
 - D. Its potential energy is reduced
 - E. All of the above are true
10. When freshly cut sodium metal is exposed to air, the mass of the substance increases. Which of the following is the best explanation for this apparent violation of the Law of Conservation of Mass?
- A. The air “pushes down” on the metal, causing the balance to display a falsely high mass
 - B. The sodium atoms move closer to one another, causing the sample to gain mass
 - C. The sodium reacts with a component of the air, and the total mass of the reactants is equal to the total mass of the products
 - D. Thermal energy of the air is converted into the additional mass
 - E. The Law of Conservation of Mass does not apply to metals

Additional Questions
Chapter 2
Matter and Energy

Goal 1: Identify and explain the difference among observations of matter at the macroscopic, microscopic, and particulate levels.

11. Which of the following correctly matches each sample with its classification as macroscopic, microscopic, or particulate?

<u>Macroscopic</u>	<u>Microscopic</u>	<u>Particulate</u>
A. protein molecule	cat hair	crystal on polished metal
B. protein molecule	crystal on polished metal	cat hair
C. crystal on polished metal	cat hair	protein molecule
D. cat hair	crystal on polished metal	protein molecule
E. cat hair	protein molecule	crystal on polished metal

12. Which of the following is *not* a particulate sample of matter?
- | | |
|--------------------------|---------------------|
| A. An oxygen molecule | B. A human egg cell |
| C. An electron | D. A nickel atom |
| E. A hemoglobin molecule | |

Goal 2: Define the term *model* as it is used in chemistry to represent pieces of matter too small to be seen.

13. Which is the best definition of the term *model*, as it is used in chemistry?
- A product from a kit from which molecules can be constructed
 - A computer image of a molecule
 - A representation of something else
 - A person who is photographed for scientific journals
 - A graph that shows the relationship between two variables
14. Why do chemists use models of atoms and molecules?
- Use of models is more convenient and less expensive than using photographs from microscopes.
 - Matter at the particulate level is too small to be seen
 - Chemists follow the tradition established by Watson and Crick
 - High-powered electron microscopes create computerized models of atoms and molecules
 - To illustrate textbooks and scientific reports with more color than black-and-white photographs of the atoms and molecules

Goal 3: Identify and explain the differences among gases, liquids, and solids in terms of (a) visible properties, (b) distance between particles, and (c) particle movement.

15. Which of the following does *not* describe the gaseous state?
- A. Same shape as a closed container
 - B. Same volume as a closed container
 - C. Random, independent particle movement
 - D. Easily compressed
 - E. All describe the gaseous state
16. Which of the following does *not* describe the liquid state?
- A. Particles vibrate in fixed position
 - B. Same shape as the bottom of the container
 - C. Constant volume
 - D. Pourable
 - E. All describe the liquid state
17. Which of the following does *not* describe the solid state?
- A. Rigid, fixed, constant shape
 - B. Constant volume
 - C. Easily compressed
 - D. Particles vibrate in fixed position
 - E. All describe the solid state

Goal 4: Distinguish between physical and chemical properties at both the particulate level and the macroscopic level.

18. Which of the following properties is/are classified as physical?
- i. the odor of glass cleaning solution
 - ii. the color of chlorine gas
 - iii. the electrical conductivity of copper wire
 - iv. the ability of milk to sour
 - v. a compound does not react with bromine
- A. i only B. ii only C. i and ii D. i, ii, and iii E. iv and v
19. Which of the following properties is/are classified as chemical?
- i. the taste of honey
 - ii. the ability of hair to stretch
 - iii. the corrosive character of hydrochloric acid
 - iv. the combustibility of ethanol
 - v. the softness of talc
- A. i and ii B. i, ii, and v C. iii only D. iv only E. iii and iv

20. Which of the following is a chemical property?

- A. Combustibility B. Boiling point C. Density D. Odor E. Taste

Goal 5: Distinguish between physical and chemical changes at both the particulate level and the macroscopic level.

21. Which of the following changes is/are classified as physical?

- i. carving a block of ice into a sculpture
- ii. burning wood
- iii. souring of cream
- iv. rusting of steel
- v. dissolving salt in water

- A. i only B. v only C. i and v D. ii, iii, and iv E. ii, iii, iv, and v

22. Which of the following is a physical change?

- A. Combustion B. Fermentation C. Decomposition
D. Rusting E. Dissolving

Goal 6: Distinguish between a pure substance and a mixture at both the macroscopic level and the particulate level.

23. Which of the following is/are (a) mixture?

- i. nitrous oxide
- ii. nitrogen
- iii. carbon monoxide
- iv. carbon
- v. oxygen

- A. i and iii B. ii, iv, and v C. i only D. iii only E. All are pure substances

24. Which of the following does *not* describe a mixture?

- A. Two or more pure substances
- B. Distinct set of physical and chemical properties
- C. Components can be separated by physical changes
- D. Boiling temperature of a solution will increase with time
- E. All of the above describe a mixture

Goal 7: Distinguish between homogeneous and heterogeneous matter.

25. Which of the following substances is/are homogeneous?
- i. mineral oil
 - ii. a plant leaf
 - iii. sausage
 - iv. sugar
 - v. freshly squeezed lemonade
- A. i only B. ii only C. iv only D. i and iv E. i, ii, and iv
26. Which of the following substances is/are heterogeneous?
- i. gasoline
 - ii. a gold bar
 - iii. a freshly opened can of cola
 - iv. potato chips
 - v. a bacon strip
- A. i and ii B. iii, iv, and v C. i, iv, and v D. i, ii, and iv E. ii, iii, and v

Goal 8: Describe how distillation and filtration rely on physical changes and properties to separate components of mixtures.

27. Most methods for separating mixtures into their components depend on which of the following?
- A. Differing physical properties among the components
 - B. Differing chemical properties among the components
 - C. Differing electromagnetic properties among the components
 - D. Differing normalized properties among the components
 - E. Differing spectroscopic properties among the components.
28. Which of the following properties is *distillation* based upon?
- A. Pore size of the filtration device
 - B. Relative densities
 - C. Inhomogeneity of the viscosities
 - D. Boiling points
 - E. Melting points


Goal 9: Distinguish between elements and compounds.


29. What type of substance cannot be decomposed or separated into other stable pure substances?
- A. A gas B. A solution C. An element
 D. A compound E. Homogeneous matter
30. What type of pure substance can be decomposed *chemically* into other pure substances?
- A. A compound B. An element C. A mixture D. A solution
 E. Heterogeneous matter

Goal 10: Distinguish between elemental symbols and the formulas of chemical compounds.

31. Which of the following are compounds?
- i. carbon dioxide
 ii. silicon
 iii. sodium carbonate
 iv. I₂
 v. Cr
- A. i, ii, and iii B. iv and v C. i and iii D. i, iii, and iv E. ii and v
32. Which of the following is *false*?
- A. IF is the formula of a compound
 B. An elemental symbol is a capital letter, sometimes followed by a small letter
 C. If there is only one atom of an element in a formula unit, it is indicated with a subscript “1”
 D. H₂ is the formula of an element
 E. The properties of compounds are *always* different from the properties of the elements from which they are formed

Goal 11: Distinguish between atoms and molecules.

33. Consider the particulate-level illustration: 
 Which is the best classification of this particle?
- A. Atom B. Crystalline solid
 C. Molecule D. Mixture
 E. Heterogeneous

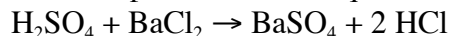
34. Consider the particulate-level illustration: 
Which is the best classification of this particle?
- A. Molecule
B. Element
C. Solid
D. Crystalline solid
E. Atom
35. The formula of most elements is the same as the symbol of the element. This indicates that the element is stable as a single (i), the smallest unit particle of the element. Other elements exist as stable, distinct, and independent (ii), which are made up of two or more atoms.
- A. (i) molecule; (ii) particles
B. (i) molecule; (ii) crystalline solids
C. (i) crystalline solid; (ii) molecules
D. (i) atom; (ii) mixtures
E. (i) atom; (ii) molecules

Goal 12: Match electrostatic forces of attraction and repulsion with combinations of positive and negative charge.

36. Which of the following is *false*?
- A. Two objects, both having positive charge, repel each other
B. Two objects having unlike charges attract each other
C. Electrostatic forces are responsible for the energy absorbed or released in chemical changes
D. The region in space where magnetic or electrostatic forces are effective is called a force field
E. All of the above are true
37. In which of the following pairs of substances will there be a net attractive electrostatic force?
- A. Two positively charged table tennis balls
B. A negatively charged piece of dust and a positively charged piece of dust
C. A positively charged sodium ion and a positively charged potassium ion
D. A negatively charged chloride ion and a negatively charged bromide ion
E. Two negatively charged pith balls

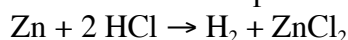
Goal 13: Distinguish between reactants and products in a chemical equation.

38. Identify the reactants and the products in the equation



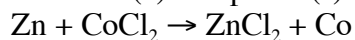
- | | |
|---|---|
| A. Reactants: H_2SO_4 and HCl | Products: BaCl_2 and BaSO_4 |
| B. Reactants: BaCl_2 and BaSO_4 | Products: H_2SO_4 and HCl |
| C. Reactants: BaSO_4 and HCl | Products: H_2SO_4 and BaCl_2 |
| D. Reactants: H_2SO_4 and BaCl_2 | Products: BaSO_4 and HCl |
| E. Reactants: H and Ba | Products: SO_4 and Cl |

39. Identify the formulas of both reactants and products in



- | | |
|--|--|
| A. Reactants: Zn and HCl | Products: H_2 and ZnCl_2 |
| B. Reactants: H_2 and ZnCl_2 | Products: Zn and HCl |
| C. Reactants: Zn and ZnCl_2 | Products: HCl and H_2 |
| D. Reactants: HCl and H_2 | Products: Zn and ZnCl_2 |
| E. Reactants: Zn and H_2 | Products: HCl and ZnCl_2 |

40. Identify the product(s) that is/are (a) compound(s) in the equation



- A. CoCl_2 B. ZnCl_2 C. CoCl_2 and ZnCl_2 D. ZnCl_2 and Co E. Zn and CoCl_2

Goal 14: Distinguish between exothermic and endothermic changes.

41. Which of the following changes is/are exothermic for the underlined object?

- i. ice melts
- ii. hot french fries cool
- iii. a beaker warms as chemicals react within it
- iv. a hot plate warms a beaker of water
- v. water evaporates off of skin

- A. iii and iv B. i and v C. ii only D. All are exothermic E. None is exothermic

42. Which of the following statements is *false*?
- A. A chemical change that releases energy to its surroundings is called an exothermic reaction
 - B. A chemical change that absorbs energy from its surroundings is called an endothermic reaction
 - C. “Sodium + Fluorine \rightarrow Sodium fluoride + Energy” is an example of an exothermic reaction
 - D. Electrical energy is needed to decompose water, so
$$2 \text{H}_2\text{O} \rightarrow 2 \text{H}_2 + \text{O}_2$$
is an exothermic reaction
 - E. All of the above are true

Goal 15: Distinguish between potential energy and kinetic energy.

43. Which of the following statements is *false*?
- A. As a positively charged object moves toward a negatively charged object, their potential energy increases
 - B. As a positively charged object moves toward another positively charged object, their potential energy increases
 - C. As a negatively charged object moves toward another negatively charged object, their potential energy increases
 - D. Increasing the distance between two electrically charged objects may raise or lower their potential energy
 - E. All of the above are true
44. Which of the following statements is *false*?
- A. The potential energy of an object depends on its position in a field where forces of attraction and/or repulsion are present
 - B. Any moving object has kinetic energy
 - C. Minimization of energy is one of the driving forces that cause chemical reactions to occur
 - D. Kinetic energy is always greater than potential energy for an object
 - E. Most of what we call “mechanical energy” is kinetic energy

Goal 16: State the meaning of, or draw conclusions based on, the Law of Conservation of Mass.

45. When paper is burned, the mass of the remaining ash is less than the mass of the original paper. Which of the following is the best explanation for this apparent violation of the Law of Conservation of Mass?
- A. Some of the mass is converted into the heat energy evolved from burning
 - B. When invisible substances are taken into account, the total mass of the reactants is equal to the total mass of the products
 - C. The ash is more dense than the paper
 - D. The different molecular structure of the ash causes it to appear to have less mass until it is compacted
 - E. The mass of the ash cannot be accurately determined
46. Which of the following is the best statement of the Law of Conservation of Mass?
- A. In any non-nuclear change, energy is conserved
 - B. In a chemical change, the mass of the reactants is always greater than or equal to the mass of the products
 - C. In a chemical change, the mass of the products is always greater than or equal to the mass of the reactants
 - D. For endothermic chemical reactions, the mass of the products is greater than the mass of the reactants, and for exothermic chemical reactions, the mass of the products is less than the mass of the reactants
 - E. In a chemical change, mass is neither created nor destroyed

Goal 17: State the meaning of, or draw conclusions based on, the Law of Conservation of Energy.

47. When coasting on a bicycle on a level street, the bicycle will eventually come to a stop. Which of the following is the best explanation for this apparent violation of the Law of Conservation of Energy?
- A. The kinetic energy is converted into an equal amount of energy in other forms
 - B. The rubber in the tires is converted into energy
 - C. If there was no air resistance, the bicycle would continue moving indefinitely
 - D. The street must actually be slightly angled uphill
 - E. This is not a chemical reaction, so it does not obey the Law of Conservation of Energy

48. When room temperature solutions of vinegar and drain cleaner are combined, the temperature of the resulting solution is greater than room temperature. Which of the following is the best explanation for this apparent violation of the Law of Conservation of Energy?
- A. Some of the mass of the room temperature solutions is converted into heat energy
 - B. The total energy of the original solutions is equal to the total energy of the resulting solution plus the heat energy
 - C. An ordinary chemical reaction occurs, so the Law of Conservation of Energy does not apply
 - D. The thermometer used to measure the temperature of the solutions must be faulty
 - E. The Law of Conservation of Energy does not apply to heat energy
49. Which of the following is the best statement of the Law of Conservation of Energy?
- A. Kinetic energy cannot be converted into potential energy
 - B. Kinetic energy cannot be converted into chemical energy
 - C. Potential energy cannot be converted into chemical energy
 - D. Energy is neither created nor destroyed in an ordinary change
 - E. The total energy of the products of a chemical reaction is greater than or equal to the total energy of the reactants
50. Under what condition is the Law of Conservation of Energy not obeyed?
- A. Digestion of food
 - B. Human (and some animal) metabolism of sports drinks
 - C. High speed travel, such as in military jets and the space shuttle
 - D. Nuclear changes
 - E. The Law of Conservation of Energy is always obeyed

Answers
Chapter 2
Matter and Energy

- 1. C
- 2. B
- 3. A
- 4. D
- 5. B
- 6. D
- 7. A
- 8. E
- 9. E
- 10. C

- 11. D
- 12. B
- 13. C
- 14. B
- 15. E
- 16. A
- 17. C
- 18. D
- 19. E
- 20. A
- 21. C
- 22. E
- 23. E
- 24. B
- 25. D
- 26. B
- 27. A
- 28. D
- 29. C
- 30. A

- 31. C
- 32. C
- 33. C
- 34. A
- 35. E
- 36. E
- 37. B
- 38. D
- 39. A
- 40. B
- 41. C
- 42. D
- 43. A
- 44. D
- 45. B
- 46. E
- 47. A
- 48. B
- 49. D
- 50. D