***Chemistry for Changing Times, 14e* (Hill/McCreary)**

**Chapter 1 Chemistry**

1.1 Multiple Choice Questions

1) Which science is **primarily** concerned with the study of matter and the changes it undergoes?

A) biology

B) chemistry

C) geology

D) physics

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

2) What is natural philosophy?

A) a belief in natural foods

B) an experimental approach to philosophy

C) an experimental approach to the study of nature

D) theoretical speculation about nature

Answer: D

Diff: 1 Var: 1 Page Ref: Sec 1.1

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

3) The ancient Greek philosophers were probably the first to consider the behavior of matter in an organized way. What is the major distinction between the "Greek philosophers" and "modern scientists"?

A) observation

B) hypotheses

C) experimentation

D) logic

Answer: C

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

4) Which developed first?

A) technology

B) chemistry

C) alchemy

D) natural philosophy

Answer: A

Diff: 1 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

5) Chemistry is

A) the mystical search for the elixir of life.

B) the study of matter and the changes it undergoes.

C) speculation about the nature of matter.

D) none of these

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

6) Green chemistry uses

A) only water as a solvent.

B) materials and processes that are intended to prevent or reduce pollution at its source.

C) only grocery store bought chemicals.

D) reactions that are not heated.

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.2 Describe the importance of green chemistry and sustainable chemistry.

7) Archaeological evidence indicates that ancient Egyptians were brewing beer and other fermented beverages over 4000 years ago. In the mid-19th century, French scientist Louis Pasteur discovered and explained the source of fermentation using yeast. This example illustrates that

A) scientific knowledge may come before technological knowledge.

B) technological knowledge may come before scientific knowledge.

C) science and technology mean the same thing.

D) science and technology are not related.

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

8) Which of the following was **NOT** a result of alchemy?

A) The philosopher's stone was successfully used to change base metals, such as lead, into gold.

B) Many new chemicals were discovered.

C) Alchemists developed techniques such as distillation and extraction that are still used today.

D) Many modern chemists inherited an interest in health and medicines from the alchemists.

Answer: A

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

9) Rachel Carson was an early proponent of

A) environmental awareness.

B) conservation.

C) pesticides to improve crops.

D) using insects to improve pollination.

Answer: A

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

10) "Better Living Through Chemistry" was a slogan used

A) by morphine users.

B) by Cheech and Chong on their television series.

C) in the television show *Breaking Bad* each time that a batch of meth was produced.

D) at Dupont in the 1970s.

Answer: D

Diff: 1 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

11) DDT was widely used as an insecticide during and following World War II. However, the egg shells of birds that live in areas where DDT was used were very thin, and the young did not hatch. This is an example of

A) Sam Kean's book, *The Disappearing Spoon*.

B) Dan Schwartz's book, *No Cure for Nature*.

C) George Orwell's book, *1984*.

D) Rachel Carson's book, *Silent Spring*.

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

12) \_\_\_\_\_\_\_\_ chemistry is designed to meet the needs of the present generation without compromising the needs of future generations.

A) Experimental

B) Green

C) Organic

D) Sustainable

Answer: D

Diff: 1 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.2 Describe the importance of green chemistry and sustainable chemistry.

13) Science is tentative, explanatory, and

A) absolute.

B) testable.

C) unpredictable.

D) mystical.

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

14) A scientific hypothesis is

A) absolute.

B) complex.

C) simple.

D) tentative.

Answer: D

Diff: 1 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

15) Scientific results must be verified by

A) constructing plausible theories.

B) consulting noted scientific authorities.

C) further experiment.

D) government agencies.

Answer: C

Diff: 2 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

16) A brief statement summarizing many observations of a physical phenomenon is called a

A) scientific theory.

B) hypothesis.

C) fact.

D) scientific law.

Answer: D

Diff: 1 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

17) Tangible items or pictures used by scientists to represent invisible processes are called

A) theories.

B) models.

C) laws.

D) experiments.

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

18) Kim Chemist proposes that increasing the proportion of butadiene in her glue formulation will make the glue stickier. Her proposal is called a(n)

A) theory.

B) experiment.

C) law.

D) hypothesis.

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

19) A variable

A) does not change over the course of the experiment.

B) is something that can change over the course of an experiment.

C) does not affect the outcome of an experiment.

D) can be controlled.

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

20) A scientific hypothesis is

A) explanatory.

B) predictive.

C) testable.

D) all of the above.

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

21) Which of the following is **NOT** true for a scientific law?

A) It summarizes observed scientific data.

B) It is often stated in mathematical terms.

C) It explains observed scientific data.

D) It is universal and will hold everywhere under the stated conditions.

Answer: C

Diff: 2 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

22) One method of rating complexity in scientific disciplines is with respect to the number of variables that are involved in experiments. Using this method, which of the following disciplines is the **most complex**?

A) anatomy

B) chemistry

C) mathematics

D) psychology

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

23) The results of an experiment are easiest to interpret when the experiment has \_\_\_\_\_\_\_\_ variable(s).

A) 1

B) 2

C) 4

D) 10

Answer: A

Diff: 1 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

24) Which of the following variables would be the easiest to control?

A) atmospheric air pressure

B) a teenager's diet

C) amount of antibiotic added to a bacterial culture

D) political opinion

Answer: C

Diff: 2 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

25) Joe conducts an experiment to test the effectiveness of a new drug for cancer. Which of the following variables would be easiest to control?

A) amount of drug administered

B) patient's diet

C) exposure to air pollution

D) exposure to other people

Answer: A

Diff: 3 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

26) Which of the following variables can be most easily controlled?

A) blood pressure

B) diet

C) humidity

D) indoor temperature

Answer: D

Diff: 3 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

27) Methapyrilene, once an active ingredient in certain over-the-counter sleeping pills, was found to be a potent carcinogen (a substance that causes cancer). The pills were also found to be about as effective as placebos in promoting sleep. The desirability quotient (DQ) for methapyrilene is

A) low.

B) moderate.

C) high.

D) uncertain.

Answer: A

Diff: 3 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.5 Estimate a desirability quotient from benefit and risk analysis.

28) Saccharin is used in some artificial sweeteners. Saccharin has been shown to be a very weak carcinogen (a substance that causes cancer) in animal tests, but there is little evidence of carcinogenicity in humans. Studies have also shown that artificial sweeteners provide little benefit to those who want to lose weight. The DQ for saccharin is

A) low.

B) moderate.

C) high.

D) uncertain.

Answer: D

Diff: 3 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.5 Estimate a desirability quotient from benefit and risk analysis.

29) The evaluation of societal risk includes all of the components of individual risk plus

A) the probability that an incident will occur.

B) the degree of severity of the incident.

C) the number of people affected by the incident.

D) the benefit associated with the incident.

Answer: C

Diff: 4 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.4 Define risk and benefit, and give an example of each.

30) When doing a risk-benefit analysis and determining DQ, which situation is often the most difficult to evaluate from both an individual and societal perspective?

A) small benefit and high risk

B) large benefit and high risk

C) large benefit and low risk

D) All are equally difficult to evaluate.

Answer: B

Diff: 3 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.4 Define risk and benefit, and give an example of each.

31) \_\_\_\_\_\_\_\_ is considered by many people to play a central role among the sciences.

A) Biology

B) Chemistry

C) Geology

D) Physics

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

32) Which of the following statements about chemistry is **NOT** true?

A) Chemistry is an important component of the economy of the United States.

B) Chemistry affects every area of our daily lives.

C) Chemical products account for 10% of U.S. exports every year.

D) All of the above are true.

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

33) Which of the following does **NOT** involve chemistry?

A) creating materials for computers

B) glycolysis

C) burning of a forest

D) All of the above involve chemistry.

Answer: D

Diff: 2 Var: 12 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

34) A biochemist is hired by a pharmaceutical firm to synthesize a medical remedy for cancer. This person is engaged in

A) applied research.

B) basic research.

C) natural speculation.

D) medical technology.

Answer: A

Diff: 2 Var: 1 Page Ref: Sec. 1.4

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.6 Distinguish basic research from applied research.

35) A chemist employed by an airplane manufacturer investigates new adhesives for the purpose of building airplanes without rivets. She is engaged in

A) alchemy.

B) applied research.

C) basic research.

D) risk-benefit analysis.

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.4

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.6 Distinguish basic research from applied research.

36) The woman who shared the 1988 Nobel prize in physiology and medicine and who in 1991 became the first woman inducted into the National Inventors Hall of Fame was

A) Madame Curie.

B) Rachel Carson.

C) Gertrude Elion.

D) Amelia Earhart.

Answer: C

Diff: 1 Var: 1 Page Ref: Sec. 1.4

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

37) Which of the following statements about basic research is **NOT** correct?

A) Basic research is conducted primarily in universities and research institutes.

B) The results of basic research are often used as the basis for technological advances.

C) Basic research is carried out to develop a particular product.

D) Basic research is the search for knowledge for its own sake.

Answer: C

Diff: 3 Var: 1 Page Ref: Sec. 1.4

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.6 Distinguish basic research from applied research.

38) MRI

A) is a noninvasive diagnostic technique.

B) is nuclear magnetic resonance imaging scans of the human body.

C) has replaced many exploratory surgical operations.

D) all of the above

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.4

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

39) Mass is

A) the measure of the amount of space that matter occupies.

B) the measure of the amount of matter.

C) the measure of the force of gravity on matter.

D) the measure of the volume of matter.

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

40) Mass is a better measure of the amount of matter than weight is because

A) mass is dependent upon location.

B) mass is independent of location.

C) mass is easier to measure.

D) mass is measured using the metric system.

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

41) On Mars gravity is one-third that on Earth. What would be the weight on Mars of a person who has a weight of 150 pounds (lb) on Earth?

A) 50 lb

B) 150 lb

C) 450 lb

D) 300 lb

Answer: A

Diff: 2 Var: 4 Page Ref: Sec. 1.5

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry and Global 5: Demonstrate an understanding of the impact of science in society.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

42) On Mars, gravity is one-third that on Earth. What would be the mass on Mars of a person who has a mass of 90 kilograms (kg) on Earth?

A) 30 kg

B) 270 kg

C) 90 kg

D) 180 kg

Answer: C

Diff: 2 Var: 4 Page Ref: Sec. 1.5

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry and Global 5: Demonstrate an understanding of the impact of science in society.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

43) Which of the following is a **physical** change?

A) Carbon combines with oxygen to form carbon dioxide.

B) Ice melts at 0°C.

C) A red substance is decomposed by heat to form mercury and oxygen.

D) Water is decomposed by electricity into hydrogen and oxygen.

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

44) Which of the following is a **chemical** property?

A) Potassium reacts with water to form potassium hydroxide.

B) Sugar dissolves in water.

C) Sugar is a solid at room temperature.

D) Gasoline and water do not mix.

Answer: A

Diff: 2 Var: 16 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

45) Which of these is a chemical change?

A) The hair stylist cuts your hair.

B) Bleaching powder dissolves in water.

C) Silkworms convert mulberry leaves into silk.

D) Wool is spun into yarn.

Answer: C

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

46) Which of these does **NOT** involve a chemical change?

A) Cocaine causes the release of norepinephrine from nerve cells.

B) Red delicious apples taste sweet.

C) Antacids often help an upset stomach.

D) Mercury is used in barometers because it has a high density.

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

47) A mixture of iron, salt and sand can be separated using a magnet, water, a filter and a hot plate. Think about this separation. The separation of this mixture

A) uses only physical changes or processes.

B) uses only chemical changes or processes.

C) uses both chemical and physical changes or processes.

D) cannot be done with the materials listed.

Answer: A

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

48) A chemical change always involves a change in the \_\_\_\_\_\_\_\_ of matter.

A) state

B) composition

C) volume

D) temperature

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

49) The gravity on the moon is one-sixth that on Earth. What would be the weight of an object on Earth if it has a weight of 40 kg on the moon?

A) 6.7 kg

B) 13.3 kg

C) 40 kg

D) 240 kg

Answer: D

Diff: 2 Var: 5 Page Ref: Sec. 1.5

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry and Global 5: Demonstrate an understanding of the impact of science in society.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

50) On Mars, gravity is one-third that on Earth. What would be the weight on Mars of a person who has a weight of 200 pounds (lb) on Earth?

A) 66.7 lb

B) 133 lb

C) 200 lb

D) 600 lb

Answer: A

Diff: 2 Var: 5 Page Ref: Sec. 1.5

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry and Global 5: Demonstrate an understanding of the impact of science in society.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

51) The gravity on Mars is one-third that on Earth. What would be the weight of an object on Earth if it has a weight of 60 kg on Mars?

A) 10 kg

B) 20 kg

C) 60 kg

D) 180 kg

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry and Global 5: Demonstrate an understanding of the impact of science in society.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

52) The physical state that retains both shape and volume is

A) solid.

B) liquid.

C) gas.

D) element.

Answer: A

Diff: 2 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

53) A gas is characterized by a(n)

A) definite shape and definite volume.

B) definite shape and indefinite volume.

C) indefinite shape and definite volume.

D) indefinite shape and indefinite volume.

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

54) The label on a can of sparkling mineral water lists the following ingredients: carbonated water and natural lime flavor. Which one of the following best classifies the beverage?

A) mixture

B) element

C) compound

D) pure substance

Answer: A

Diff: 2 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

55) The label on a bottle of shampoo lists many ingredients, such as water, sodium laureth sulfate, lauramide DEA, sodium chloride, etc. From this information, shampoo is best classified as

A) a pure substance.

B) an element.

C) a compound.

D) a mixture.

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

56) Pure water is an excellent substance for dissolving many other substances. Given this, the tap water that you drink is best classified as a(n)

A) pure substance.

B) mixture.

C) element.

D) compound.

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

57) Vinegar is composed of approximately 5% acetic acid and 95% water. Which one of the following is the best classification of vinegar?

A) pure substance

B) element

C) compound

D) mixture

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

58) Refined white table sugar is usually derived from either sugar cane or sugar beets. Irrespective of the source of table sugar, after refining it always has the same composition of carbon, hydrogen and oxygen. Sugar is best classified as which one of the following?

A) ideal mixture

B) element

C) compound

D) mixture

Answer: C

Diff: 2 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

59) Molasses is a by-product of the refining of sugar from sugar cane. The specific composition of molasses varies depending upon the source of the sugar cane. Which one of the following is the best classification of molasses?

A) pure substance

B) element

C) compound

D) mixture

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

60) A substance that cannot be broken down by chemical means into simpler substances is called a(n)

A) solid.

B) element.

C) compound.

D) mixture.

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

61) A molecule

A) is a charged atom.

B) consists of one proton.

C) is the smallest characteristic part of a compound.

D) consists of a mixture of two ions.

Answer: C

Diff: 3 Var: 24 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

62) A mixture of sand and salt is a(n)

A) element.

B) heterogeneous mixture.

C) homogeneous mixture.

D) molecule.

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

63) Which of the following **CANNOT** be the chemical symbol for an **element**?

A) Ca

B) Se

C) B

D) H2

Answer: D

Diff: 2 Var: 50+ Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

64) What is the chemical symbol for potassium?

A) P

B) Po

C) Pu

D) K

Answer: D

Diff: 1 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

65) What is the chemical symbol for chromium?

A) C

B) Cr

C) Ch

D) Cm

Answer: B

Diff: 1 Var: 6 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

66) What is the chemical symbol for sodium?

A) Na

B) K

C) S

D) Sm

Answer: A

Diff: 1 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

67) What is the chemical symbol for iodine?

A) I

B) Id

C) In

D) Io

Answer: A

Diff: 1 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

68) What is the chemical symbol for iron?

A) Fe

B) I

C) In

D) Ir

Answer: A

Diff: 1 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

69) \_\_\_\_\_\_\_\_ are pure substances.

A) Homogeneous mixtures and elements

B) Elements and compounds

C) Heterogeneous mixtures and compounds

D) Homogeneous and heterogeneous compounds

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

70) What is the name of the element with the symbol Ag?

A) silver

B) gold

C) mercury

D) antimony

Answer: A

Diff: 1 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

71) What is the name of the element with the symbol Hg?

A) silver

B) gold

C) mercury

D) antimony

Answer: C

Diff: 1 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

72) What is the name of the element with the symbol Au?

A) silver

B) gold

C) plutonium

D) nickel

Answer: B

Diff: 1 Var: 40 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

73) Which of the following represents an element?

A) HF

B) Se

C) F2

D) CO2

Answer: B

Diff: 2 Var: 50+ Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

74) Which of the following represents a compound?

A) Co

B) Mn

C) CO2

D) Na

Answer: C

Diff: 2 Var: 50+ Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

75) The species represented by CO is

A) an atom of cobalt.

B) an atom made up of carbon and oxygen.

C) a molecule of cobalt.

D) a molecule made up of carbon and oxygen.

Answer: D

Diff: 4 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

76) After a yellow solid is dissolved in water, the liquid appears to be uniformly yellow throughout. This yellow liquid is best classified as a(n)

A) compound.

B) heterogeneous mixture.

C) homogeneous mixture.

D) ideal mixture.

Answer: C

Diff: 3 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

77) A solution is another name for a(n)

A) compound.

B) element.

C) heterogeneous mixture.

D) homogeneous mixture.

Answer: D

Diff: 1 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

78) In the SI system of measurement, the unit of length is the

A) kilogram.

B) meter.

C) liter.

D) yard.

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

79) In the SI system of measurement the unit of mass is the

A) kilogram.

B) kilometer.

C) liter.

D) yard.

Answer: A

Diff: 1 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

80) How many meters are in 10.0 cm?

A) 0.0100

B) 0.100

C) 1.00

D) 1,000

Answer: B

Diff: 2 Var: 5 Page Ref: 1.7

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

81) How many kilometers are in 800 m?

A) 0.008

B) 0.08

C) 0.8

D) 800

Answer: C

Diff: 2 Var: 5 Page Ref: 1.7

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

82) How many micrograms are in 20 mg?

A) 20,000 μg

B) 200,000 μg

C) 2,000,000 μg

D) 2.0 μg

Answer: A

Diff: 2 Var: 5 Page Ref: Sec. 1.7

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

83) A tablet contains 325.0 mg of the active ingredient. This mass may also be expressed as

A) 325.0 μg.

B) 0.0003250 g.

C) 0.3250 g.

D) 32.50 μg.

Answer: C

Diff: 2 Var: 5 Page Ref: Sec. 1.7

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry and Global 5: Demonstrate an understanding of the impact of science in society.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

84) The prefix **nano** means \_\_\_\_\_\_\_\_.

A) 103

B) 10-9

C) 106

D) 109

Answer: B

Diff: 3 Var: 5 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

85) The prefix **centi** means \_\_\_\_\_\_\_\_.

A) 10-3

B) 10-2

C) 10-1

D) 102

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

86) The prefix **centi** means \_\_\_\_\_\_\_\_.

A) 1/1,000

B) 1/100

C) 1/10

D) 100

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

87) The prefix **deci** means \_\_\_\_\_\_\_\_.

A) 0.001

B) 0.1

C) 0.01

D) 100

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

88) The prefix **nano** means \_\_\_\_\_\_\_\_.

A) a billion

B) one-millionth

C) one-billionth

D) a million

Answer: C

Diff: 2 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

89) The prefix **milli** means \_\_\_\_\_\_\_\_.

A) 1/1,000,000

B) 1/1,000

C) 1/10

D) 1,000

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

90) The prefix **milli** means \_\_\_\_\_\_\_\_.

A) 0.000001

B) 0.001

C) 0.1

D) 1000

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

91) The prefix **micro** means \_\_\_\_\_\_\_\_.

A) 10-9

B) 10-6

C) 10-3

D) 103

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

92) The prefix **micro** means \_\_\_\_\_\_\_\_.

A) 0.000001

B) 0.001

C) 100

D) 1000

Answer: A

Diff: 2 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

93) The prefix **giga** means \_\_\_\_\_\_\_\_.

A) 1,000

B) 1,000,000,000,000

C) 1,000,000

D) 1,000,000,000

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

94) The prefix **mega** means \_\_\_\_\_\_\_\_.

A) 10-6

B) 10-3

C) 103

D) 106

Answer: D

Diff: 2 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

95) The symbol for the prefix **micro** is \_\_\_\_\_\_\_\_.

A) M

B) m

C) mm

D) μ

Answer: D

Diff: 1 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

96) The prefix **kilo** means \_\_\_\_\_\_\_\_.

A) 10-9

B) 10-6

C) 10-3

D) 103

Answer: D

Diff: 2 Var: 1 Page Ref: 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

97) The symbol for the prefix **mega** is \_\_\_\_\_\_\_\_.

A) M

B) m

C) mm

D) μ

Answer: A

Diff: 1 Var: 1 Page Ref: 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

98) The SI unit for temperature is the

A) Calorie.

B) Celsius.

C) Fahrenheit.

D) Kelvin.

Answer: D

Diff: 2 Var: 1 Page Ref: 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

99) Which of the following is equal to 1 mL?

A) 1 cm3

B) 1000 cm3

C) 1 dm3

D) 0.01 L

Answer: A

Diff: 2 Var: 1 Page Ref: 1.7

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

100) Most molecules have dimensions in the nanometer (nm) or \_\_\_\_\_\_\_\_ range.

A) centimeter (cm)

B) millimeter (mm)

C) kilometer (km)

D) picometer (pm)

Answer: D

Diff: 2 Var: 1 Page Ref: 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.9 Assign proper units of measurement to observations, and manipulate unit conversions.

101) The density of a certain type of steel is 8.1 g/cm3. What is the **mass** of a 100.0 cm3 chunk of this steel?

A) 0.08100 g

B) 8.100 g

C) 12.00 g

D) 810.0 g

Answer: D

Diff: 3 Var: 1 Page Ref: Sec. 1.8

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.10a Calculate the density, mass, or volume of an object given the two quantities.

102) The density of gold is 19.3 g/cm3. What is the **volume** of a 50.00 g gold ingot?

A) 0.5000 cm3

B) 2.593 cm3

C) 50.00 cm3

D) 965.0 cm3

Answer: B

Diff: 4 Var: 5 Page Ref: Sec. 1.8

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.10a Calculate the density, mass, or volume of an object given the two quantities.

103) What is the **density** of a liquid that has a volume of 10.0 mL and a mass of 22.00 grams?

A) 0.220 g/mL

B) 0.460 g/mL

C) 2.20 g/mL

D) 4.60 g/mL

Answer: C

Diff: 4 Var: 5 Page Ref: Sec. 1.8

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.10a Calculate the density, mass, or volume of an object given the two quantities.

104) The density of lead is 11.3 g/cm3. What **mass** of lead is required to make a 1.00 cm3 fishing sinker?

A) 1.00 g

B) 1.13 g

C) 11.3 g

D) 113 g

Answer: C

Diff: 3 Var: 1 Page Ref: Sec. 1.8

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.10a Calculate the density, mass, or volume of an object given the two quantities.

105) A train robber in a western movie steals two gold ingots, each of which has a volume of 1000. cm3. The density of gold is 19.3 g/cm3. What is the **mass** of the two ingots?

A) 38.6 g

B) 19,300 g

C) 38,600 g

D) 104 g

Answer: C

Diff: 3 Var: 1 Page Ref: Sec. 1.8

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry and Global 5: Demonstrate an understanding of the impact of science in society.

Learning Obj: LO 1.10a Calculate the density, mass, or volume of an object given the two quantities.

106) A student working in the laboratory needs 200.0 g of a liquid chemical whose density is 0.690 g/cm3. What **volume** of this liquid should he measure?

A) 138 cm3

B) 69.0 cm3

C) 200. cm3

D) 290 cm3

Answer: D

Diff: 3 Var: 1 Page Ref: Sec. 1.8

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.10a Calculate the density, mass, or volume of an object given the two quantities.

107) The density of mercury is 13.6 g/cm3. What **approximate mass** of mercury is required to fill a 4.0 ounce bottle? An ounce is approximately 30 cm3.

A) 1632 g

B) 540 g

C) 53 g

D) 2 g

Answer: A

Diff: 2 Var: 5 Page Ref: Sec. 1.8

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.10a Calculate the density, mass, or volume of an object given the two quantities.

108) The freezing point of water on the **Celsius** temperature scale is

A) -32°C.

B) 0°C.

C) 100°C.

D) 212°C.

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 1.9

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.12 Explain how the temperature scales are related.

109) The boiling point of water on the **Celsius** temperature scale is

A) 100°C.

B) 212°C.

C) 273°C.

D) 373°C.

Answer: A

Diff: 2 Var: 1 Page Ref: Sec. 1.9

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.12 Explain how the temperature scales are related.

110) The freezing point of water on the **Kelvin** temperature scale is

A) 0 K.

B) 100 K.

C) 273 K.

D) 373 K.

Answer: C

Diff: 1 Var: 1 Page Ref: Sec. 1.9

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.12 Explain how the temperature scales are related.

111) The boiling point of water on the **Kelvin** temperature scale is

A) 0 K.

B) 100 K.

C) 273 K.

D) 373 K.

Answer: D

Diff: 1 Var: 1 Page Ref: Sec. 1.9

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.12 Explain how the temperature scales are related.

112) The boiling point of a liquid is 178°C. What is this temperature on the **Kelvin** scale?

A) 451 K

B) 95 K

C) 178 K

D) -95 K

Answer: A

Diff: 2 Var: 5 Page Ref: Sec. 1.9

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.12 Explain how the temperature scales are related.

113) The melting point of a compound is 2400 K. What is this temperature on the **Celsius** scale?

A) 2673°C

B) 2300°C

C) 2188°C

D) 2127°C

Answer: D

Diff: 2 Var: 5 Page Ref: Sec. 1.9

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.12 Explain how the temperature scales are related.

114) The melting point of fluorine, F, is -220°C. What is this temperature on the **Kelvin** scale?

A) 320 K

B) 120 K

C) 493 K

D) 53 K

Answer: D

Diff: 2 Var: 5 Page Ref: Sec. 1.9

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.12 Explain how the temperature scales are related.

115) The energy content of foods is stated on food labels in **Calories**. The Calorie is equal to

A) 1000 calories.

B) 1000 kilocalories.

C) 1000°C.

D) 1000 joules.

Answer: A

Diff: 1 Var: 1 Page Ref: Sec. 1.9

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

116) Which of the following could **NOT** be the temperature of a solid?

A) 2°C

B) 2 K

C) -2°C

D) -2 K

Answer: D

Diff: 2 Var: 4 Page Ref: Sec. 1.9

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.12 Explain how the temperature scales are related.

117) Which of the following statements about the **size** of temperature units is **NOT** true?

A) 1 Celsius degree is equal to 1 kelvin.

B) 1 Celsius degree is bigger than 1 kelvin.

C) 1 kelvin is bigger than 1 Fahrenheit degree.

D) 1 Celsius degree is bigger than 1 Fahrenheit degree.

Answer: B

Diff: 3 Var: 1 Page Ref: Sec. 1.9

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.12 Explain how the temperature scales are related.

118) Which of the following is **NOT** an outcome for companies that use green chemistry?

A) They produce less waste.

B) Their costs are lower.

C) They no longer have to follow federal pollution guidelines.

D) They use less energy.

Answer: C

Diff: 3 Var: 1 Page Ref: Sec. 1.9

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.15 Describe how green chemistry reduces risk and prevents environmental problems.

119) Green chemists reduce the risks associated with the manufacture of a product by doing all of the following **EXCEPT**

A) using materials that are less toxic.

B) requiring workers to use protective equipment.

C) using smaller amounts of materials.

D) considering the biodegradability of chemicals used to make the product.

Answer: B

Diff: 3 Var: 1 Page Ref: Sec. 1.9

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.15 Describe how green chemistry reduces risk and prevents environmental problems.

120) One of the hallmarks of science is the ability to think \_\_\_\_\_\_\_\_.

A) often

B) constantly

C) critically

D) independently

Answer: C

Diff: 1 Var: 1 Page Ref: Sec. 1.10

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.16 Use critical thinking to evaluate claims and statements.

121) The acronym FLaReS is a mnemonic that helps us remember the rules that can be used to test a claim. Which of the following is **NOT** one of these rules?

A) falsifiability

B) logic

C) replicability

D) societal acceptance

Answer: D

Diff: 1 Var: 1 Page Ref: Sec. 1.10

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.16 Use critical thinking to evaluate claims and statements.

122) Chemist A claims that a new compound will inhibit the growth of a virulent strain of bacteria. When Chemist B from a different laboratory tests the compound against the same bacterial strain, the bacteria grow at their normal rate. Which of the following statements best describes what has happened?

A) The claim is correct, because the test has been replicated.

B) The claim is incorrect, because the test has been replicated.

C) The claim is incorrect, because the test has not been replicated.

D) The claim is correct, because the data is not falsifiable.

Answer: C

Diff: 3 Var: 1 Page Ref: Sec. 1.10

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.16 Use critical thinking to evaluate claims and statements.

1.2 True/False Questions

1) Chemistry is the study of matter and the changes it undergoes.

Answer: TRUE

Diff: 1 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

2) Organic foods do not contain chemicals.

Answer: FALSE

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

3) All clothing contains chemicals.

Answer: TRUE

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

4) The **technology** of smelting metals into ores was performed long before the **science** of metallurgy evolved.

Answer: TRUE

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

5) Green chemistry uses materials and methods that are designed to prevent or reduce pollution.

Answer: TRUE

Diff: 1 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.2 Describe the importance of green chemistry and sustainable chemistry.

6) A scientific law summarizes data while a scientific theory explains the data.

Answer: TRUE

Diff: 1 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

7) John eats shrimp for the first time and develops chills and a fever that evening. He can therefore conclude that eating shrimp was the cause of his fever and chills.

Answer: FALSE

Diff: 3 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

8) In order for an experiment to be successful, scientists must be able to control all variables.

Answer: FALSE

Diff: 2 Var: 1 Page Ref: Sec 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

9) Science does not prove a theory or hypothesis to be true. It can only prove something false.

Answer: TRUE

Diff: 1 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

10) A psychic claims he can bend a spoon using only the power of his mind. However, he says he can do so only when the conditions are right and there must be no one with negative energy present. This claim is falsifiable.

Answer: FALSE

Diff: 2 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

11) It is possible to prove that an hypothesis is absolutely true.

Answer: FALSE

Diff: 1 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

12) The desirability quotient, DQ, is equal to risks/benefits.

Answer: FALSE

Diff: 1 Var: 1 Page Ref: Sec 1.3

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.5 Estimate a desirability quotient from benefit and risk analysis.

13) New technologies provide current benefits, but often present future risks.

Answer: TRUE

Diff: 1 Var: 1 Page Ref: Sec 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.4 Define risk and benefit, and give an example of each.

14) Chemistry affects every aspect of our daily lives.

Answer: TRUE

Diff: 1 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

15) Chemistry is important not only as a separate science but also because it is fundamental to other sciences.

Answer: TRUE

Diff: 2 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

16) A person engages in **basic research** to discover knowledge for the sake of knowing, while a person engages in **applied research** usually directs that research toward a specific goal.

Answer: TRUE

Diff: 2 Var: 1 Page Ref: Sec. 1.4

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.6 Distinguish basic research from applied research.

17) The research work of Gertrude Elion is an example of basic research.

Answer: TRUE

Diff: 2 Var: 1 Page Ref: Sec. 1.4

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.6 Distinguish basic research from applied research.

18) The knowledge gained from basic research has rarely been applied to improving our lives.

Answer: FALSE

Diff: 3 Var: 1 Page Ref: Sec. 1.4

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.6 Distinguish basic research from applied research.

19) Matter is a measure of the amount of mass in an object.

Answer: FALSE

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

20) Mass is a measure of the amount of matter in an object.

Answer: TRUE

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

21) An example of a physical change is a gas becoming a liquid.

Answer: TRUE

Diff: 1 Var: 6 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

22) An example of a chemical change is browning of meat.

Answer: TRUE

Diff: 1 Var: 3 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

23) Composition and structure are both terms used to describe the kinds of atoms that are present in a substance.

Answer: FALSE

Diff: 3 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

24) The substances in a heterogeneous mixture retain their chemical identity, but those in a homogeneous mixture do not.

Answer: FALSE

Diff: 3 Var: 1 Page Ref: Sec. 1.6

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.8 Classify matter according to state and as mixture, substance, compound, and/or element.

25) The SI unit of length is the kilometer.

Answer: FALSE

Diff: 1 Var: 1 Page Ref: Sec. 1.7

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

26) Density is equal to volume divided by mass.

Answer: FALSE

Diff: 1 Var: 3 Page Ref: Sec. 1.8

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.10a Calculate the density, mass, or volume of an object given the two quantities.

27) Water has a density of 1.00 g/mL. If you put an object that has a density of 0.79 g/mL into water, it will sink to the bottom.

Answer: FALSE

Diff: 2 Var: 5 Page Ref: Sec. 1.8

Global Obj: Global 4: Demonstrate the quantitative skills needed to succeed in chemistry.

Learning Obj: LO 1.10a Calculate the density, mass, or volume of an object given the two quantities.

28) Temperature is a measure of the amount of heat an object contains.

Answer: FALSE

Diff: 2 Var: 1 Page Ref: Sec. 1.9

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.11 Distinguish between heat and temperature.

29) Heat will always flow from a warmer object to a cooler object.

Answer: TRUE

Diff: 2 Var: 1 Page Ref: Sec. 1.9

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.11 Distinguish between heat and temperature.

1.3 Short Answer Questions

1) The "Aristotelian philosophy" is generally non-productive. What does that mean?

Answer: Aristotle was a natural philosopher who contemplated nature, but did no experiments to support his speculations.

Diff: 3 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 8: Communicate effectively in writing.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

2) Drugs and vaccinations relieve \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_.

Answer: pain, suffering

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

3) The negative impact of the overuse of pesticides on plant and animal life is an example a topic in the book by \_\_\_\_\_\_\_\_.

Answer: Rachel Carson

Diff: 2 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

4) Science is testable, explanatory, and \_\_\_\_\_\_\_\_.

Answer: tentative, predictive

Diff: 2 Var: 1 Page Ref: Sec. 1.2

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

Learning Obj: LO 1.3 Define hypothesis, scientific law, scientific theory, and scientific model, and explain their relationships in science.

5) A chemist is hired by a major petroleum company to do research into developing a gasoline mixture that burns more efficiently in automobile engines. This is best described as \_\_\_\_\_\_\_\_ research.

Answer: applied

Diff: 3 Var: 1 Page Ref: Sec. 1.4

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 5: Demonstrate an understanding of the impact of science on society.

Learning Obj: LO 1.6 Distinguish basic research from applied research.

6) Mass is \_\_\_\_\_\_\_\_ no "matter" where you are in the universe.

Answer: constant ("conserved" would work, too)

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

7) The production of hydrogen gas by the electrolysis of water is a(n) \_\_\_\_\_\_\_\_ process.

Answer: chemical

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

8) The purification of water by distillation is a(n) \_\_\_\_\_\_\_\_ process.

Answer: physical

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

9) The melting of ice is an example of a(n) \_\_\_\_\_\_\_\_ change.

Answer: physical

Diff: 2 Var: 1 Page Ref: Sec. 1.5

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills.

Learning Obj: LO 1.7 Differentiate mass and weight; physical and chemical change; and physical and chemical properties.

10) The acronym FLaReS helps to remember four rules: Falsifiability, logic, replicability and \_\_\_\_\_\_\_\_.

Answer: sufficiency

Diff: 3 Var: 1 Page Ref: Sec. 1.10

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry.

1.4 Essay Questions

1) What is green chemistry? Give an example.

Diff: 3 Var: 3 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 8: Communicate effectively in writing.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

2) The words science and technology are often used incorrectly as synonyms. Distinguish these two terms. Use an example of each.

Diff: 4 Var: 1 Page Ref: Sec. 1.1

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 8: Communicate effectively in writing.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

3) Use the automobile and automobile travel to explain risk-benefit analysis.

Diff: 3 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 8: Communicate effectively in writing.

Learning Obj: LO 1.5 Estimate a desirability quotient from benefit and risk analysis.

4) Explain the impact of the U.S. chemical industry on trade with other nations.

Diff: 3 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 8: Communicate effectively in writing.

5) Briefly describe the central role of chemistry in science. Use an example.

Diff: 3 Var: 1 Page Ref: Sec. 1.3

Global Obj: Global 2: Demonstrate the ability to think critically and employ critical thinking skills and Global 8: Communicate effectively in writing.

Learning Obj: LO 1.1 Define science, chemistry, technology, and alchemy.

6) What is the difference between basic research and applied research? Give an example of each.

Diff: 4 Var: 1 Page Ref: Sec. 1.4

Global Obj: Global 1: Demonstrate an understanding of the principles of scientific inquiry and Global 8: Communicate effectively in writing.

Learning Obj: LO 1.6 Distinguish basic research from applied research.