

Package Title: Hein Test Bank
Course Title: Hein GOB 11e
Chapter Number: 1

Question type: Multiple Choice

1) Why study chemistry?

- a) to help inform us about our world
- b) to be better able to make informed decisions
- c) to help us learn a technique for identifying and solving problems
- d) all of these choices

Answer: D

Difficulty: easy

Learning Objective 1: State the definition of chemistry and why the study of chemistry is important.

Section Reference 1: Section 1.1

2) The science of chemistry may involve:

- a) observation
- b) hypothesis development
- c) experimentation
- d) all of these choices

Answer: D

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

3) Which is an observation?

- a) Atoms consist of protons, neutrons, and electrons.
- b) All matter is composed of atoms.
- c) Water is colorless.
- d) Atoms can form chemical bonds by sharing electrons.

Answer: C

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

4) A tentative explanation of certain facts that provides the basis for further experimentation is a(n) ____.

- a) observation
- b) hypothesis
- c) theory
- d) law

Answer: B

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

5) A well established hypothesis is often called a(n) ____.

- a) observation
- b) fact
- c) theory
- d) law

Answer: C

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

6) Which of the following is a “pure” substance?

- a) tap water
- b) Coca Cola®
- c) sea water
- d) water

Answer: D

Difficulty: easy

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: 1.4

7) Which is a scientific observation?

- a) Freezing and boiling are called physical changes.
- b) Water freezes at 0 °C.
- c) If a substance has a density of 1.00 g/mL it must be water.
- d) When a substance freezes its molecules lose potential energy.

Answer: B

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

8) The statement, “An apple a day keeps the doctor away”, is best described as a(n) ____.

- a) observation
- b) law
- c) theory
- d) hypothesis

Answer: D

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

9) The statement, “An atom consists of a dense nucleus surrounded by a cloud of electrons”, is best described as a(n) ____.

- a) theory
- b) law
- c) hypothesis
- d) observation

Answer: A

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

10) An explanation that accounts for a set of facts is best known as ____.

- a) experiment
- b) law
- c) theory
- d) hypothesis

Answer: D

Difficulty: medium

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: 1.2

11) Which has both a definite shape and definite volume?

- a) solid
- b) vapor
- c) gas
- d) liquid

Answer: A

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

12) Which state of matter consists of particles held together firmly but not rigidly? These particles are held together by strong attractive forces, are in close contact with one another, but are able to flow by one another.

- a) gas
- b) liquid
- c) solid
- d) vapor

Answer: B

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

13) Which has a definite volume but no definite shape?

- a) vapor
- b) gas
- c) solid
- d) liquid

Answer: D

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

14) Which is composed of particles with enough energy to completely overcome the attractive forces between them?

- a) solid
- b) gas
- c) liquid
- d) crystal

Answer: B

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

15) Which has neither a definite shape nor a definite volume?

- a) crystal
- b) solid
- c) gas
- d) liquid

Answer: C

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

16) In which phase of matter are the particles furthest apart?

- a) gas
- b) solid
- c) liquid
- d) crystal

Answer: A

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

17) Which phase of matter contains the greatest force of attraction between particles?

- a) solid
- b) vapor
- c) liquid
- d) gas

Answer: A

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

18) Which phase of matter contains the least force of attraction between particles?

- a) solid
- b) gas
- c) crystal
- d) liquid

Answer: B

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

19) Which is a pure substance?

- a) compound

- b) mixture
- c) solution
- d) both mixture and solution

Answer: A

Difficulty: easy

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

20) Which of the following is a homogenous mixture?

- a) Coca Cola[®]
- b) bowl of pasta and meat sauce
- c) pure water
- d) your chemistry professor

Answer: A

Difficulty: easy

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: 1.4

21) Which of the following is a pure substance existing as different phases in a heterogeneous system?

- a) salt dissolved in water
- b) flour suspended in water
- c) cork floating in water
- d) ice floating in water

Answer: B

Difficulty: medium

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

22) In which of the following classifications would a solution be placed?

- a) element

- b) compound
- c) homogeneous mixture
- d) heterogeneous mixture

Answer: C

Difficulty: easy

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

23) Which of the following is classified as a solution?

- a) air
- b) liquid water
- c) solid iron
- D) soil

Answer: A

Difficulty: medium

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

24) Which of the following is a pure substance?

- a) table salt
- b) bronze
- c) air
- d) soil

Answer: A

Difficulty: medium

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

25) Which of the following is a mixture?

- a) copper wire

- b) sugar
- c) water
- d) mud

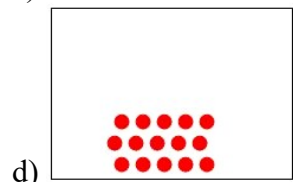
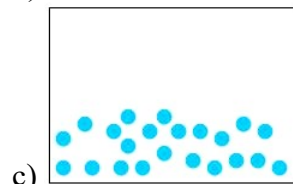
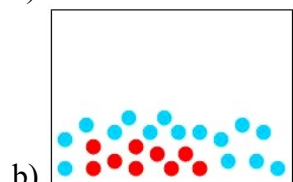
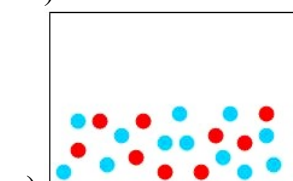
Answer: D

Difficulty: easy

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

26) Which of the following diagrams represents a solution?



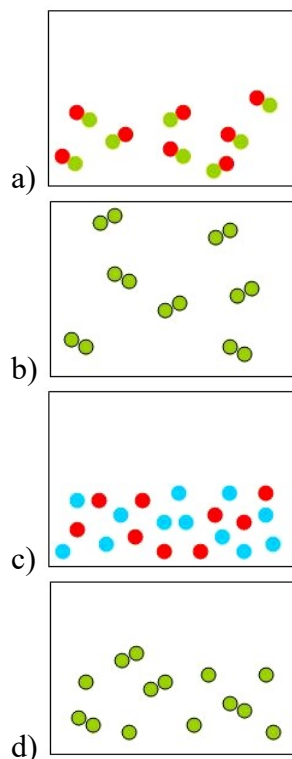
Answer: A

Difficulty: medium

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

27) Which of the following diagrams represents an element?



Answer: B

Difficulty: medium

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

28) Your lab instructor gives you a red solid and tells you that it is a pure substance. Which of the following statements is true given this information?

- a) The solid has a fixed composition by mass.
- b) The solid is a compound.
- c) The solid cannot be decomposed into simpler substances.
- d) The solid cannot be melted.

Answer: A

Difficulty: medium

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

29) “When Jill opened the bottle containing a clear liquid, the whole room smelled like roses.”
Based on this statement we can infer that:

- a) The liquid is a homogeneous mixture.
- b) The liquid is a compound.
- c) Inside the bottle was a liquid and a gas.
- d) Opening the bottle caused the liquid to evaporate.

Answer: C

Difficulty: medium

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

30) “Life on Earth originated from the condensation of carbon monoxide molecules on hot mineral surfaces underground to form fatty acids, the building blocks of cellular membranes.”
This statement is an example of:

- a) a theory
- b) a hypothesis
- c) a natural law
- d) an observation

Answer: B

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

31) What can you observe in the following beaker?



- a) a pure substance in two phases
- b) a heterogeneous mixture
- c) two compounds in the same phase
- d) a homogeneous mixture

Answer: B

Difficulty: easy

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

32) “Energy cannot be created nor destroyed, only transformed” is an example of a:

- a) law
- b) theory
- c) observation
- d) hypothesis

Answer: A

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

33) After careful studies and measurements in a laboratory, scientists concluded that volume of a gas is directly proportional to its temperature if the pressure and amount of the gas are kept constant. This statement is best described as a ____.

- a) theory
- b) experiment
- c) law
- d) definition

Answer: C

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: 1.2

Question type: True/False

34) A key feature of the scientific method is to design and perform experiments to test hypotheses.

Answer: true

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

35) Chemistry is the science that deals with the composition of substances and the transformations they undergo.

Answer: True

Difficulty: easy

Learning Objective 1: State the definition of chemistry and why the study of chemistry is important.

Section Reference 1: Section 1.1

36) Chemistry has applications in all other fields of science.

Answer: True

Difficulty: easy

Learning Objective 1: State the definition of chemistry and why the study of chemistry is important.

Section Reference 1: Section 1.1

37) Matter always has both mass and occupies space.

Answer: True

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

38) A substance must be heterogeneous and have a fixed composition.

Answer: False

Difficulty: easy

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

39) A substance may be heterogeneous or homogeneous.

Answer: False

Difficulty: easy

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

40) A liquid has a definite shape and a definite volume.

Answer: False

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

41) Gas molecules try to fill most of the volume of their container.

Answer: False

Difficulty: medium

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

42) Elements and compounds are the two types of pure substances.

Answer: True

Difficulty: easy

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

43) Air is a substance.

Answer: False

Difficulty: medium

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

Question type: Essay

44) Define matter. Explain what is meant by mass and occupies space. Is everything in nature matter? If not, what else exists?

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

Solution: Matter is anything that has both mass and occupies space. Mass is the amount of matter present and volume is the amount of space occupied. Everything in nature is not matter. Energy also exists in nature.

45) Define solid, liquid, and gas. Explain the differences in the three phases of matter on both the macroscopic and molecular levels.

Difficulty: easy

Learning Objective 1: Describe the characteristics of matter, including the states of matter.

Section Reference 1: Section 1.3

Solution: A solid has a definite shape and a definite volume. A liquid has a definite volume but no definite shape. A gas has neither a definite shape nor a definite volume. In the solid phase, particles do not have enough energy to escape their position. They vibrate about points in space. This inability to escape their position gives the solid both definite shape and volume on the macroscopic level.

In the liquid phase the particles have enough energy to escape these rigid points and the particles can flow by one another but they cannot escape from the larger group of particles. When viewed on the macroscopic level, this gives the liquid a definite volume but no definite shape. The liquid will take the shape of its container.

Gas particles have enough energy to completely escape from one another. They will fill their entire container. On the macroscopic level they have no definite shape or volume. They will take both the shape and volume of the container.

46) Explain what chemistry is.

Difficulty: easy

Learning Objective 1: State the definition of chemistry and why the study of chemistry is important.

Section Reference 1: Section 1.1

Solution: Chemistry is the study of matter and energy. Chemistry studies the composition and properties of matter. Chemistry also studies the transformations matter undergoes and the energy involvement in those changes.

47) Explain how the study of chemistry can be helpful to you in your everyday life.

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

Solution: The study of chemistry can be helpful because it will enhance your understanding of the properties of matter and how different forms of matter interact with one another. But, even more importantly, the study of chemistry will teach you the scientific method. This is a technique which is a powerful tool in studying the world around you. It can be used to deal with the problems of everyday life.

48) Matter is classified into substances and mixtures. Explain how these are different. Substances are either elements or compounds. Describe what these are and give examples of each. Mixtures can be either heterogeneous or homogeneous. Explain how these are different and give examples of each. What is a solution? Give examples of solutions.

Difficulty: medium

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

Solution: Substances are pure, they have a fixed composition, and they have fixed properties that can be used for identification. Substances are homogeneous. Mixtures are combinations of two or more substances with no fixed proportions. Mixtures may be heterogeneous or homogeneous. Mixtures have no fixed properties.

Elements are the basic building blocks of matter. They cannot be broken down into simpler forms by chemical means. Some elements are copper, chlorine and iron. Compounds are substances composed of two or more elements combined chemically in fixed proportion by mass. Some compounds are table salt (sodium chloride), sugar (sucrose), and water.

A heterogeneous mixture does not have a constant composition throughout. An example would be soil. A homogeneous mixture does have a uniform composition throughout. An example would be salt water.

A solution is a homogeneous mixture such as a soft drink or a piece of brass.

49) Name four different ways in which you could classify or organize twenty different types of fasteners such as nails or screws.

Difficulty: medium

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

Solution: Any four properties of the fasteners, such as: length of the fasteners, color of the fasteners, composition of the fasteners, thickness of the fasteners, shape of the fasteners, are the fasteners threaded? Are the fasteners curved or straight?

50) State the four steps of the scientific method.

Difficulty: easy

Learning Objective 1: Describe the steps involved in the scientific method.

Section Reference 1: Section 1.2

Solution: The four steps of the scientific method are:

1. Making observations to collect facts or data.
2. Formulating a hypothesis to explain your observations.
3. Designing and performing experiments to test your hypothesis.
4. Using the results of your experiments to reformulate your hypothesis. You then retest your hypothesis and continue on.

51) Mixtures can be separated by the differences in certain properties of their components. What properties might be used to separate the components of the following mixtures?

- a) Sand and salt
- b) Salt and water
- c) Iron filings and sulfur
- d) Fine sand and coarse gravel

Difficulty: medium

Learning Objective 1: Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Section Reference 1: Section 1.4

Solution: A) Sand and salt can be separated based on their solubility in water. The mixture can be placed in water and stirred. The salt will dissolve, but the sand will not. The salt water solution can then be poured off leaving the sand behind.

B) The mixture of salt and water can be separated because the water will evaporate while the salt will not. The mixture can be left in an open container and the water will evaporate. Heating the mixture can speed this up.

C) Iron and sulfur can be separated because of their different responses to magnetism. Passing a

magnet over the mixture will cause the iron to adhere to the magnet leaving the sulfur behind.

D) A mixture of fine sand and gravel can be separated based on particle size. The mixture can be passed through a series of sieves of different sized openings. The smaller sand particles will pass through while the larger sized gravel particles will be held behind.