

Matter Properties, Structure

**Question 1 (1 point)**

The atomic number of an atom is

- A. The mass of the atom.
- B. The number of protons added to the number of neutrons in the nucleus.
- C. The number of protons in the nucleus.
- D. Negatively charged.

**Question 2 (1 point)**

Which of the following examples in nature represents a chemical change?

- A. water freezing in a pond
- B. a tree branch breaking
- C. a tree burning after a lightning strike
- D. steam rising from pavement

**Question 3 (1 point)**

The periodic table shows that a carbon atom has six protons. This means that a carbon atom also has

- A. Six electrons.
- B. Six neutrons.
- C. More protons than neutrons.
- D. An atomic mass of Six.

**Question 4 (1 point)**

Which state of matter has neither a definite volume nor a definite shape?

- A. solid
- B. liquid
- C. gas
- D. none of the above

**Question 5 (1 point)**

What happens in an exothermic chemical change?

- A. Electrical energy is absorbed.
- B. Electrical energy is released.
- C. Chemical energy is absorbed as thermal energy.
- D. Chemical energy is released as thermal energy.

**Question 6 (1 point)**

Grape soda is a solution of the solutes carbon dioxide ( $\text{CO}_2$ ), sugar ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ), and grape flavoring ( $\text{C}_8\text{H}_9\text{NO}_2$ ) dissolved in the solvent water ( $\text{H}_2\text{O}$ ). Which parts of the grape soda are pure substances and which are mixtures?

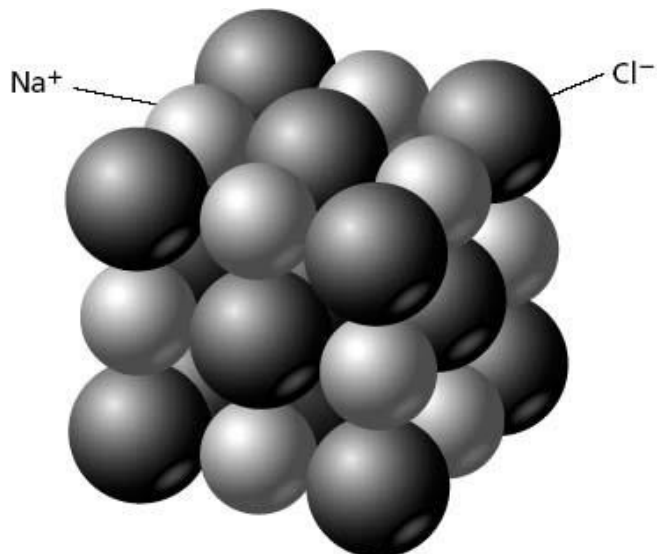
- A. The pure substances are carbon dioxide, water, sugar, and grape flavoring; the mixture is all of these combined.
- B. The pure substances are carbon dioxide and water; mixtures are sugar and grape flavoring.
- C. All of the ingredients are pure substances; there are no mixtures.
- D. None of the ingredients are pure substances; all of the ingredients are mixtures.

**Question 7 (1 point)**

Matter has thermal energy because its particles are in motion. Which of the following **best** describes how thermal energy moves from one place to another?

- A. from areas where particles are cold to areas where particles are hot
- B. from areas of rapid particle motion to areas of slower particle motion
- C. from areas of lower thermal energy to areas of higher thermal energy
- D. from areas where particles are dense to areas where particles are less dense

**Question 8 (1 point)**



The diagram shows how sodium and chlorine atoms are arranged in table salt. Which type of matter does this represent?

- A. a compound
- B. an element
- C. a suspension
- D. a mixture

**Question 9 (1 point)**

When water freezes, it undergoes

- A. a physical change.
- B. a chemical change.
- C. a chemical change.
  
- D. sublimation.

**Question 10 (1 point)**

Protons are located in the nucleus of the atom. A proton has

- A. No charge.
- B. A negative charge.
- C. A positive and a negative charge.
- D. A positive charge.

**Question 11 (1 point)**

When a few spoonfuls of sugar are mixed into a cup of water, sugar is the

- A. acid.
- B. base.
- C. solvent.
- D. solute.

**Question 12 (1 point)**

When a solid compound dissolves in water,

- A. it breaks up into individual crystals.
- B. it always conducts electricity.
- C. its particles surround individual water molecules.
- D. each of its particles becomes surrounded by water molecules.

**Question 13 (1 point)**

The only *definite* evidence of a chemical reaction is

- A. the formation of a gas.
- B. a color change.
- C. the production of new substances.
- D. changes in properties.

**Question 14 (1 point)**

Rotting food is an example of a chemical reaction. Many foods will rot quickly unless kept in a refrigerator. From this information, what inference can you make about the relationship between the rate or speed of chemical reactions and temperature?

- A. Increasing the temperature of a chemical reaction speeds up the reaction rate.
- B. Temperature does not affect the reaction rate.
- C. Decreasing the temperature of a chemical reaction speeds up the reaction rate.
- D. Increasing the temperature of a chemical reaction slows down the reaction rate.

**Question 15 (1 point)**

The substances listed on the left side of a chemical equation are the

- A. products.
- B. coefficients.
- C. precipitates.
- D. reactants.

**Question 16 (1 point)**

Compounds consist of two or more elements. Which of the following properties must each of the elements in a compound have?

- A. solubility
- B. conductivity
- C. high density
- D. chemical reactivity

**Question 17 (1 point)**

When a thermometer is heated, the red liquid inside the thermometer moves up. This is mainly because:

- A. The red liquid is thin.
- B. The molecules of the liquid move faster and get a little further apart.
- C. Hot liquid is lighter.
- D. The glass of the thermometer gets hot.

**Question 18 (1 point)**

An uncovered pot of soup is simmering on a stove, and there are water droplets on the wall above the back of the stove. What sequence can you infer has occurred?

- A. melting, then boiling
- B. freezing, then thawing
- C. vaporization, then condensation
- D. condensation, then vaporization

**Question 19 (1 point)**

**Periodic Table of the Elements (Top Section)**

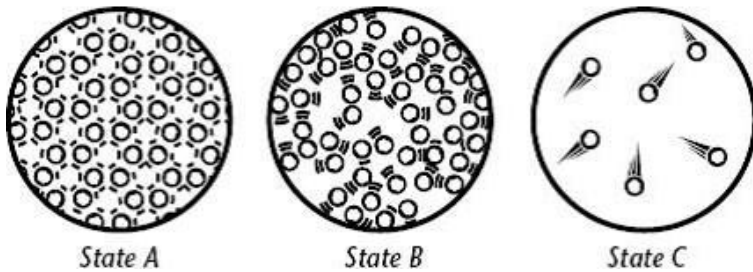
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Which group of the periodic table contains the most reactive metals?

- A. Group 1
- B. Group 12
- C. Group 17
- D. Group 18

**Question 20 (1 point)**

**Three States of a Substance**

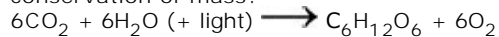


The diagram compares the particles in three different states of matter. What process causes particles in State B to change to State A?

- A. condensation
- B. evaporation
- C. freezing
- D. melting

**Question 21 (1 point)**

How does the chemical equation for photosynthesis shown below demonstrate the law of conservation of mass?



- A. The same number of atoms of each element is present both before and after the chemical reaction.
- B. The same number of each kind of molecule is present both before and after the chemical reaction.
- C. The same amount of water is present both before and after the chemical reaction.
- D. The same amount of glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) is present both before and after the chemical reaction.

**Question 22 (1 point)**

From an element's location in the periodic table, you can predict

- A. its properties.
- B. its chemical name.
- C. its chemical symbol.
- D. when it was discovered.

**Question 23 (1 point)**

In order to boil water, Jacy places a pan of water on the burner of a stove. By which process of thermal energy transfer does the burner transfer heat to the pan?

- A. conduction
- B. convection
- C. radiation
- D. respiration

**Question 24 (1 point)**

How would a solute such as salt affect the boiling point of water?

- A. The water will boil at a lower temperature.
- B. The water will boil at a higher temperature.
- C. The water will not boil.
- D. The boiling point will be the same as the freezing point.

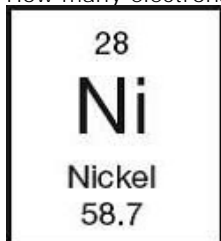
**Question 25 (1 point)**

Neutrons are in the nucleus of the atom. A neutron has

- A. A positive charge.
- B. No charge.
- C. A negative charge.
- D. Twice as much positive charge as a proton.

**Question 26 (1 point)**

How many electrons does a nickel atom have?



- A. 14
- B. 28
- C. 30.7
- D. 58.7

**Question 27 (1 point)**

Magnesium (Mg) and Bromine (Br) chemically bond to form Magnesium Bromide, an ionic compound with the chemical formula  $\text{MgBr}_2$ . What does the "2" tell you?

- A. Magnesium bromide has a 2- charge.
- B. There are two magnesium ions to every bromide ion.
- C. There are two bromine ions for every magnesium ion.
- D. Bromide has a 2+ charge.

**Question 28 (1 point)**

Most elements on the periodic table are \_\_\_.

- A. metalloids
- B. nonmetals
- C. metals
- D. transition elements

**Question 29 (1 point)**

If more reactants are used in a chemical reaction, more products will be produced. This is because

- A. More reactants cause the reaction to heat up.
- B. More reactants take up the same volume.
- C. More reactants have more atoms to react to form more products.
- D. Too many products can slow down the reaction.

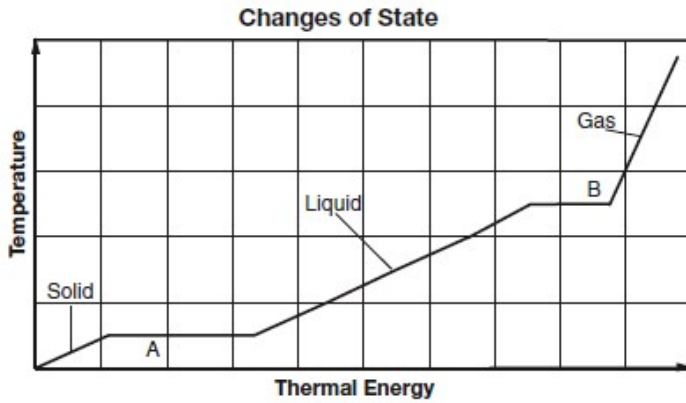
**Question 30 (1 point)**

Which of these properties of an iron nail is a physical property?

- A. does not burn when a flame is applied
- B. reacts with hydrochloric acid to release hydrogen gas
- C. composed of only one piece instead of fragments
- D. rusts

**Question 31 (1 point)**

Li Mei conducted an experiment to measure the thermal energy of a substance as it changed state. She made the following graph to summarize her results.



What can Li Mei conclude?

- A. As temperature increases, thermal energy decreases.
- B. As temperature decreases, more particles are present.
- C. As temperature increases, the molecules in a substance move faster.
- D. Temperature plays little or no role in the motion of molecules in a substance.

**Question 32 (1 point)**

If two substances react and the temperature of the mixture decreases, the reaction is

- A. endothermic.
- B. never going to happen unless it is heated.
- C. exothermic.
- D. one that causes atoms to be destroyed.

**Question 33 (1 point)**

You can find the pH of a substance by using

- A. a thermometer.
- B. plain paper.
- C. a conductivity tester.
- D. litmus or pH indicator paper.

**Question 34 (1 point)**

Which type of solution is a mixture has as much dissolved solute as is possible at a given temperature?

- A. dilute
- B. saturated
- C. concentrated
- D. colloid



**Question 35 (1 point)**

Acids are described as corrosive because they

- A. turn litmus blue.
- B. taste bitter.
- C. "wear away" at other materials.
- D. feel slippery.

**Question 36 (1 point)**

At which of the following temperatures will the average energy of motion of the particles in a substance be **greatest**?

- A.  $-12^{\circ}\text{C}$
- B.  $0^{\circ}\text{C}$
- C.  $12^{\circ}\text{C}$
- D.  $20^{\circ}\text{C}$

**Question 37 (1 point)**

In the periodic table, how are elements in the same group related to each other?

- A. They have the same atomic mass.
- B. They have very different properties.
- C. They have the same atomic number.
- D. They have similar properties.

**Question 38 (1 point)**

The chemical formula for a molecule of sulfuric acid is  $\text{H}_2\text{SO}_4$ . How many different elements make up the compound sulfuric acid?

- A. 2
- B. 3
- C. 6
- D. 1

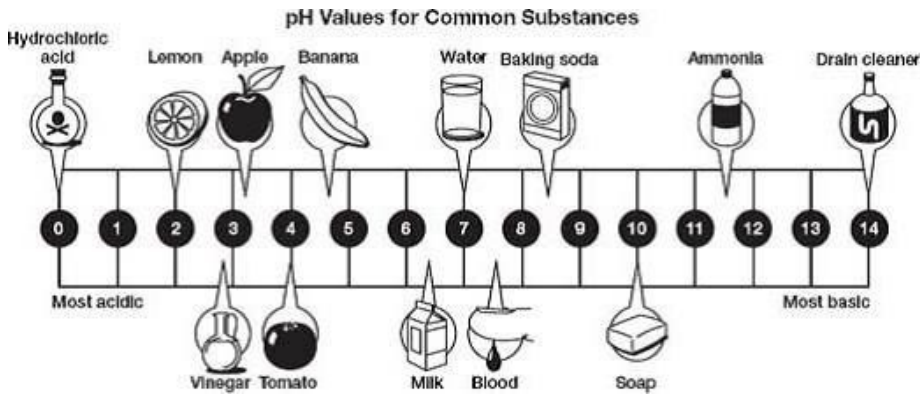
**Question 39 (1 point)**

Todd is making a chocolate dessert. The chocolate he is using changes as he cooks with it. When are the particles in the chocolate closest together?

- A. when the chocolate is frozen
- B. when the chocolate is melted
- C. when the chocolate is vaporized
- D. when the chocolate is at room temperature

**Question 40 (1 point)**

Based on the pH values given on the pH scale, which of the following solutions is the strongest base?



- A. hydrochloric acid
- B. lemon juice
- C. baking soda
- D. drain cleaner

**Question 41 (1 point)**

An electron is in a region outside the nucleus. An electron

- A. is larger than a proton and has no charge.
- B. Has less mass than a proton and has a negative charge.
- C. Is smaller than a proton and has no charge.
- D. Has a positive charge.

**Question 42 (1 point)**

How can a scientist *safely* tell whether an unknown solution is salt in water or sugar in water?

- A. by tasting the solution
- B. by smelling the solution
- C. by testing the electrical conductivity of the solution
- D. by filtering the solution

**Question 43 (1 point)**

The atomic mass of an element shown in each block of the periodic table is

- A. The average mass of all the isotopes of the element.
- B. A measure of the density of the element.
- C. The mass of the most common isotope of that element.
- D. The number of protons and electrons in the atoms of the element.

**Question 44 (1 point)**

What is one way to increase the solubility of sugar in water?

- A. Heat the water.
- B. Chill the water.
- C. Increase the amount of sugar.
- D. Decrease the amount of water.

**Question 45 (1 point)**

In general, which of the following statements about metals is true?

- A. Metals need to be stored in sealed containers for safety.
- B. Metals are malleable, ductile, and can carry an electric current.
- C. Metals are highly reactive substances.
- D. Metals do not react with oxygen.

**Question 46 (1 point)**

A hydrogen atom is made up of one proton and one electron. The proton and electron stay near each other because

- A. Positive and negative charges repel
- B. Positive and positive charges repel
- C. Positive and negative charges attract
- D. Two negatives make a positive

**Question 47 (1 point)**

If you put food coloring in room temperature water, the coloring spreads throughout the water. The water causes the color to spread mainly because:

- A. Water molecules are warm
- B. Water molecules are in motion
- C. Water is more dense than food coloring
- D. Food coloring molecules are small

**Question 48 (1 point)**

If two objects have the same volume but one has a greater mass, the one with greater mass

- A. Has a lower density
- B. Has a higher density
- C. Will float
- D. Will sink

**Question 49 (1 point)**

Which of the following statements about acids is *true*?

- A. Acids have a pH greater than 7.
- B. Acids corrode platinum and gold and have a bitter taste.
- C. Acids have a slippery feel and turn red litmus paper blue.
- D. Acids have a sour taste and have a pH less than 7.

**Question 50 (1 point)**

What must happen in order for water to change state?

- A. It must maintain its thermal energy level.
- B. It must absorb or release energy.
- C. It must be insulated.
- D. It must convert thermal energy to solar energy.