# Chemistry Key Concepts

*Circle the letter of the best answer.*

1. An example of a chemical property of a substance is
	1. size
	2. melting point
	3. shape
	4. flammability
2. Which of the following is a physical property of an element?
	1. color
	2. ability to rust
	3. flammability
	4. ability to tarnish
3. Every chemical or physical change in matter includes a change in
	1. volume
	2. temperature
	3. energy
	4. mass
4. A measure of the amount of matter in an object is its
	1. mass
	2. density
	3. volume
	4. length
5. A block of metal has a length of 3 cm, a width of 5 cm, a height of 10 cm, and a mass of 3,000 grams. Find the density of the metal in g/cm3.
	1. 20 g/cm3
	2. 50 g/cm3
	3. 0.5 g/cm3
	4. 0.02 g/cm3
6. Bromine has atomic number 35. From this information you know that a bromine atom has
	1. 35 protons and 35 electrons
	2. 35 protons and 35 neutrons
	3. 35 electrons and 35 neutrons
	4. 35 protons and 7 electrons
7. The energy of matter in motion is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy.
	1. electromagnetic
	2. potential
	3. chemical
	4. kinetic
8. A cubic centimeter is a unit for measuring
	1. length
	2. volume
	3. mass
	4. density
9. When water freezes, it undergoes
	1. a physical change
	2. a chemical change
	3. vaporization
	4. sublimation
10. A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an example of a homogeneous mixture that is very evenly mixed.
	1. compound
	2. element
	3. pure substance
	4. solution
11. Which of the following is NOT a characteristic of a compound?
	1. has different properties from the elements that formed it
	2. pure substance made of two or more elements
	3. different samples have different properties
	4. can be represented by a chemical formula
12. Which of the following is an example of a chemical change?
	1. melting butter
	2. mixing milk and chocolate syrup
	3. breaking glass
	4. burning fuel
13. A chemical bond is
	1. a group of atoms that are joined together
	2. the basic particle of matter
	3. the force that holds two atoms together
	4. a substance formed from the chemical combination of two or more atoms
14. The elements in one period of the periodic table
	1. have the same number of electrons
	2. have the same number of protons
	3. decrease in atomic mass from left to right
	4. increase in atomic number from left to right
15. Which of the following is NOT true of atoms?
	1. They are composed of molecules
	2. They can combine with other atoms
	3. They make up elements
	4. They are extremely small
16. Which of the following does NOT describe physical properties of metals?
	1. malleable
	2. good conductivity
	3. brittle
	4. ductile
17. A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a positively charged particle in an atom’s nucleus.
	1. electron
	2. neutron
	3. plasma
	4. proton
18. Which of the following is NOT a characteristic of most metals?
	1. brittle
	2. ductile
	3. good conductor
	4. malleable
19. An element’s properties can be predicted from its
	1. number of isotopes
	2. number of neutrons
	3. atomic mass
	4. location in the periodic table
20. Where are nonmetals located in the periodic table?
	1. in Group 2
	2. on the left half of the table
	3. in the bottom row
	4. to the right of the metalloids
21. An element’s \_\_\_\_\_\_\_\_\_\_\_\_\_ tells the number of protons in its nucleus.
	1. atomic mass
	2. atomic number
	3. chemical symbol
	4. period
22. One problem of synthetic polymers is their
	1. strength
	2. inability to break down
	3. cost
	4. limited use
23. Which of the following is NOT a use of radioactive isotopes?
	1. improving the strength of metals
	2. diagnosing and treating disease
	3. tracing the steps of chemical reactions
	4. providing sources of energy
24. How do crystalline and amorphous solids differ?
	1. Crystalline solids do not melt at a distinct temperature
	2. Amorphous solids are made up of crystals
	3. Crystalline solids have a regular pattern of particles but amorphous solids do not
	4. Amorphous solids are always soft

## Chemistry - Fill in the Blanks

*Fill in the line to complete each statement.* (1 point each)

1. A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a group of atoms that are joined together by chemical bonds.
2. An object’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is its mass divided by its volume.
3. A measure of the average energy of random motion of particles of matter is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. A pure substance that cannot be broken down into any other substances by chemical means is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the ability to do work or cause change.
6. When elements are chemically combined, they form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which have properties different from those of the uncombined elements.
7. A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has a definite shape and volume because its particles are packed tightly together and stay in fixed positions.
8. The graph for Boyle’s law shows that the pressure of a gas at constant temperature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with its volume.
9. Polymers form when chemical bonds link large numbers of small molecules called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a repeating pattern.
10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are often used to store food and make roofing tiles because they resist moisture and withstand heat.
11. A(n)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an example of a homogenous mixture that is very evenly mixed.
12. An element’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tells the number of protons in its nucleus.
13. Elements in the same\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the periodic table have the same valence (outer shell) electrons.
14. The family of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the most reactive group of metals in the periodic table.
15. The elements in a column are called a group or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
16. Electrons may be anywhere within this \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
17. Each horizontal row of the table is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It helps us identify the number of shells in a Bohr Model.
18. In an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ , energy is absorbed.
19. \_\_\_\_\_\_\_\_\_\_\_\_ is the ability to do work or cause change.
20. The law of conservation of mass states that in any chemical or physical change, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is not created or destroyed.

## Chemistry - True or False

*If the statement is true, write* true*. If it is false, write false and change the underlined word to make the statement true.* (1 point each)

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ During a chemical change, the form of a substance is altered, but not its identity.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ A change in matter in which energy is taken in is an endothermic change.
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Electrical energy is the energy of electrically charged particles moving from one place to another.
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ A solid block that sinks in a container of water has a lower density than water.
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ice is an example of the liquid state of matter.
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ An objects mass will change if you move it from Earth to the moon.
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ A motor oil with high viscosity moves through an engine quickly.
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ The reactivity of metals tends to decrease as you move from left to right across the periodic table.
9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Inside stars, the pressure is so high that nuclei are packed close together and collide with one another.
10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Alloys are used more than pure metals because they are generally softer and less likely to react with air or water.

## Scientific Method - Math Skills

*Use the figures and information to complete the following questions. Show your work. Be sure to use correct units of measurement*. (2 points each)

1. If 2.2 pounds equals 1 kilogram, and 1 kilogram equals 1000 grams. How many grams are in 5 pounds.
2. What is the volume of the solid in the figure? Show your work. Be sure to use correct units of measurement.



1. The solid has a mass of 120 g. What is the density of the solid? Would it sink or float in water?
2. Calculate the density of alcohol, if its volume is 12.9 cm3, and you have 10 grams of it.
3. Calculate the density of corn syrup if its volume is 7.20 cm3, and you have 10 grams of it.
4. Calculate the density of cooking oil if its volume is 10.4 cm3, and you have 10 grams of it.
5. Label each layer of liquid in the test tube above using the information on densities that you have calculated for alcohol, corn syrup, cooking oil, and water (given at 1 g/cm3).



## Chemistry - Interpreting Diagrams

*Use the figures below to answer the following questions in the spaces provided.* (2 points each)



1. Name the part of the atom labeled A. What particles make up A?

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1. Does this atom have a neutral electric charge? How can you tell?

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1. Why do elements within a group have similar chemical properties?

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1. What is the atomic number of a sodium atom that has 11 protons and 12 neutrons?

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1. Label each figure as a pure substance or a mixture.



1. Is an element or a compound represented in figure (d)? Explain your answer.

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## Chemistry - Short Answer

*Answer each of the following in the spaces provided.* (2 points each)

1. Explain why weight is NOT considered a constant measurement of the amount of matter an object contains.

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1. Compare and contrast an element and a compound.

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1. Give an example of a mixture that is a solution, and a mixture that is not a solution. Which mixture is heterogeneous? Explain your answer.

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1. An unknown sample of an element is a solid that crumbles easily into a powder and does not conduct electricity. Is this element a metal or a nonmetal? Explain how you know.

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1. Explain why the mass of a candle does not disappear while burning.

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1. Burning a piece of wood and sawing a piece of wood both make the original piece smaller. What type of change takes place when wood is burned? When wood is cut? Explain your answers.

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## Chemistry Essay Questions

*Answer the following in the spaces provided*. (5 points each)

1. Melting ice is a physical change. Heating table sugar until it becomes caramel is a chemical change. Compare and contrast the two types of changes.

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1. In terms of energy changes, explain how your ability to ride a bike is related to energy from the sun?

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1. Describe the energy transformations that occur when a person pushes a bike to the top of a hill and coasts down.

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1. Describe what is happening at a molecular level when water vapor at 110 C is cooled to -10 C.

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1. Explain what will happen to an inflated balloon that is stored in a refrigerator overnight, and then taken out and allowed to warm to room temperature.

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