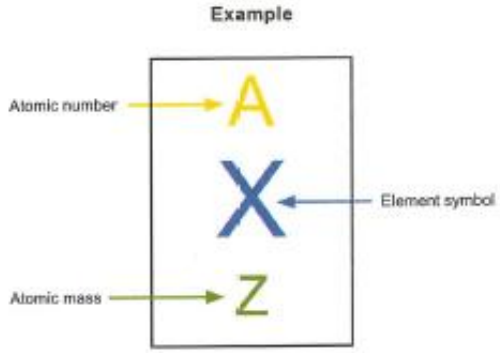
Chemistry Review

DIRECTIONS: Study the information and graphic, read each question, and choose the **best** answer.

The periodic table is an organized list of all the elements. Each box of the periodic table presents information about the atoms that comprise an element. For example, each atom of element "X" in the example box below has an atomic number of "A" and an average atomic mass of "Z." The atomic number is the number of protons per atom. The atomic mass is the average number of protons and neutrons of the atoms of the element.



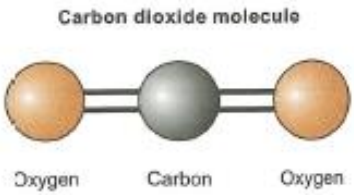
1. What information about silicon is provided by the excerpt from the periodic table?

   A. An atom of silicon has 14 protons.
   B. There is an average of 14 protons in each silicon atom.
   C. There are 28.09 protons in each silicon atom.
   D. Each silicon atom has 28.09 neutrons.

2. Why is atomic mass an average?

   A. The number of neutrons is variable.
   B. The number of protons is variable.
   C. The mass of electrons is variable.
   D. The mass of protons is variable.

DIRECTIONS: Study the model, read the question, and choose the **best** answer.



4. The model indicates that a carbon dioxide molecule is formed when

   A. one carbon atom loses electrons and two oxygen atoms gain electrons.
   B. two oxygen atoms lose electrons and one carbon atom gains electrons.
   C. one carbon atom and two oxygen atoms share electrons.
   D. a carbon atom is connected to two oxygen atoms by rods.

During a chemical reaction, energy can be released or absorbed. An exothermic chemical reaction produces thermal energy, or heat. During an exothermic reaction, chemical energy changes to thermal energy. An endothermic chemical reaction absorbs thermal energy. During an endothermic reaction, heat is absorbed from the environment to drive the reaction. Thermal energy changes to chemical energy.

6. Which event demonstrates an endothermic reaction?

   A. On a family camping trip, a dad and his daughters enjoy a campfire.
   B. A student combines citric acid and baking soda in a plastic bag, and the bag feels cooler.
   C. A construction worker uses hand warmers while on a break.
   D. A student combines sugar, water, and sulfuric acid in a beaker, and the reaction produces heat, steam, and an odor.

DIRECTIONS: Study the information and table. Then read the question, and write your response on the lines. This task may take approximately 10 minutes to complete.

Alisha has found two unlabeled powders in the lab. She is certain that one of the powders is copper sulfate and the other is sodium chloride, but she does not know which is which. She knows that when mixed with water, copper sulfate undergoes a chemical reaction but sodium chloride does not. She decides to carry out an investigation to determine the identities of the powders. The table to the right provides information about the investigation.

	A	B
Materials	Beaker 10 milliliters (ml) water 0.5 gram (g) Powder A	Beaker 10 ml water 0.5 g Powder B
Procedure	Place water in beaker. Add powder to water. Stir water 10 times.	Place water in beaker. Add powder to water. Stir water 10 times.
Observations	When the powder is added to the water and stirred, it quickly disappears.	When the powder is added to the water, the water turns blue and the beaker becomes warm.

5. Which powder is copper sulfate, and which is sodium chloride? Include support from the passage and table in your response.

DIRECTIONS: Read the passage. Then read each question, and choose the **best** answer.

A student in a science classroom conducts an investigation to test heat flow. She creates equal size dots of candle wax, places the dots of wax equal distances apart on a copper rod, and then inserts one end of the rod into a flame. She observes as the dots of wax melt in order from the dot closest to the heat source to the dot farthest from the heat source. Her observation supports her hypothesis.

7. What hypothesis is the student **most likely** testing?

   A. Heat flows from warmer parts of a solid to cooler parts of a solid.
   B. Heat flows from warmer parts of a metal object to cooler parts of a metal object.
   C. Copper is a better conductor of heat than other metals.
   D. Bringing about heat transfer by radiation is an effective method for melting objects.

8. Another student attempts to repeat the investigation. He also uses wax from a candle and a copper rod, but he observes that one dot of wax appears to begin to melt before a dot of wax that is closer to the flame. What is a likely source of error in his investigation?

   A. The flame produces higher heat later in the investigation.
   B. The copper rod is longer than that used in the first investigation.
   C. The two dots are different types of wax.
   D. The dots are not equal in size.

9. Which investigation design would be best for testing differences in conductivity among metals?

   A. Insert two equal size rods—one copper, one aluminum—into a flame for equal amounts of time, and observe the difference in their temperatures.
   B. Insert two copper rods of different thicknesses into a flame for equal amounts of time, and observe the difference in their temperatures.
   C. Insert two equal size rods—one copper, one glass—into a flame for equal amounts of time, and observe the difference in their temperatures.
   D. Place wax dots on a copper rod and an aluminum rod, insert the rods into a flame, and observe whether the wax dots melt in

DIRECTIONS: Read the passage. Then read each question, and choose the **best** answer.

When dry nitrogen triiodide (NI_3) is touched with a feather, it explodes and gives off a violet cloud of iodine (I_2).

10. Which statement describes evidence that this is a chemical reaction?

    A. Nitrogen triiodide is touched by a feather.
    B. Nitrogen triiodide explodes and gives off a violet cloud.
    C. Nitrogen triiodide is made of two distinct elements.
    D. Nitrogen triiodide maintains its chemical makeup.

11. Which chemical equation represents the reaction described?

    A. $I_2 + N_2 + O_2 \rightarrow 2NI_3$
    B. $N_2 + 3I_2 \rightarrow 2NI_3$
    C. $NI_3 \rightarrow N_2 + I_2 + O_2$
    D. $2NI_3 \rightarrow N_2 + 3I_2$

12. What type of reaction is described?

    A. decomposition
    B. synthesis
    C. single displacement
    D. double displacement

DIRECTIONS: Read the passage and question, and choose the **best** answer.

A student knows that solubility generally increases as temperature increases. He wants to learn more about solubility and saturation and plans the steps for an investigation. He will divide a 100 ml solution of potassium nitrate (KNO_3) dissolved in water evenly between Beaker A and Beaker B. Then he will heat the solution in Beaker A to 20 degrees Celsius (°C) and the solution in Beaker B to 60°C.

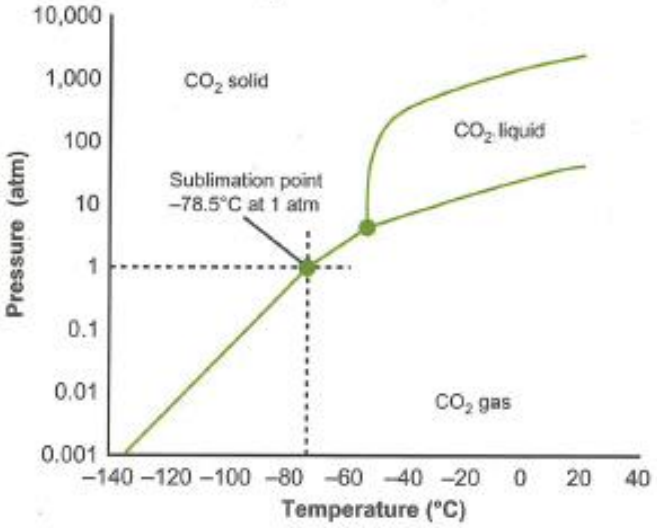
13. What prediction can be made about how the solution in Beaker B will differ from the solution in Beaker A at the end of the investigation?

    A. It will have greater solubility.
    B. It will contain more KNO_3.
    C. No more KNO_3 will dissolve in it.
    D. Its temperature will be lower.

DIRECTIONS: Study the information and diagram, read each question, and choose the **best** answer.

When carbon dioxide (CO_2) is in a solid state, it is called dry ice. Unlike regular ice, which is the solid state of water, dry ice is not melted into a liquid at room temperature and standard atmospheric pressure. Room temperature is 20°C, and standard pressure is 1 atmosphere (atm). Instead, it goes directly to a gaseous phase, as indicated in the phase diagram. The fog that comes from a block of dry ice is actually water vapor that has condensed around the cold CO_2 gas that is being emitted.

CO_2 PHASE DIAGRAM



23. Which conclusion is supported by the information presented?

    A. Dry ice evaporates into water vapor.
    B. Dry ice is sublimated at room temperature and standard pressure.
    C. Dry ice undergoes a chemical change to become fog.
    D. Dry ice is melted at room temperature and standard pressure.

24. At which combination of atmospheric pressure and temperature is carbon dioxide a liquid?

    A. 0.1 atm and −100 °C
    B. 1 atm and −80 °C
    C. 10 atm and −60 °C
    D. 100 atm and −20 °C