Matter, Mixtures and Reactions

Choose one answer per question. Circle A, B, C, or D.

1. Which change alters the form of a material while keeping its chemical identity the same?
   A. Ice melts into liquid water.
   B. An iron nail forms rust.
   C. Sugar darkens as new compounds form.
   D. A candle wick burns.

2. Which description of a material is a chemical property?
   A. It has a mass of 12 grams.
   B. It is silvery gray.
   C. It can burn in air.
   D. It is solid at room temperature.

3. Which sample contains more than one substance mixed together?
   A. Pure helium
   B. Dry air
   C. Distilled water
   D. Pure copper

4. Which formula shows a compound made of two different elements?
   A. Cl_2
   B. O_2
   C. S_8
   D. MgO

5. Carbon dioxide is dissolved in a bottle of plain sparkling water. Which substance is the solvent in the liquid?
   A. Carbon dioxide
   B. Water
   C. Carbon
   D. Oxygen

6. A uniform block has a mass of 24 grams and a volume of 8 cubic centimeters. What is its density?

A. 3 grams per cubic centimeter
B. 8 grams per cubic centimeter
C. 16 grams per cubic centimeter
D. 32 grams per cubic centimeter

7. A solid block has uniform composition. It is cut into two equal pieces, with no change in temperature. Which property of each piece matches the original block?

A. Amount of material
B. Mass
C. Volume
D. Density

8. At a fixed temperature, a sample of water can hold up to 9 grams of a sugar in solution. A model shows 12 grams of total sugar at equilibrium, with some undissolved. How much is undissolved?

A. 12 grams
B. 9 grams
C. 3 grams
D. 21 grams

9. A metal surface develops a different color. Which added finding would most directly confirm a chemical change?

A. The new surface layer is a different compound from the original metal.
B. The new surface layer feels rougher.
C. The surface looks darker in dim light.
D. The new surface layer has a larger exposed area.

10. A bottle contains two different liquids in separate layers. Each layer looks uniform on its own. How should the whole sample be classified?

A. A pure element
B. A homogeneous solution
C. A pure compound
D. A heterogeneous mixture

11. The expression 2 NH_3 represents two molecules of ammonia. How many hydrogen atoms are represented altogether?

A. 3
B. 2
C. 6
D. 8

12. A sealed container holds 18 grams of one substance and 7 grams of another. They react. The container itself is excluded from the measurements. What is the resulting mass of all contents together?

A. 11 grams
B. 25 grams
C. 18 grams
D. 32 grams

13. A worksheet compares four ways to edit the expression H_2O. Which edit changes the chemical identity shown?

A. Replace H_2O with 4 H_2O.
B. Replace H_2O with 2 H_2O.
C. Replace H_2O with 3 H_2O.
D. Replace H_2O with H_2O_2.

14. An enthalpy diagram places the reactants at 90 kilojoules and the products at 65 kilojoules on the same scale. What does it show for the reaction as written?

A. A 25-kilojoule decrease, so the reaction is exothermic
B. A 25-kilojoule increase, so the reaction is endothermic
C. A 65-kilojoule decrease, so the reaction is exothermic
D. A 155-kilojoule increase, so the reaction is endothermic

15. In a fictional particle model, each reaction event uses two X_2 particles and one Y_2 particle to form two X_2Y particles. The model starts with five X_2 and two Y_2 particles. When no more events can occur, how many X_2Y are made and how many X_2 remain?

A. 2 X_2Y made and 3 X_2 left
B. 4 X_2Y made and 0 X_2 left
C. 4 X_2Y made and 1 X_2 left
D. 5 X_2Y made and 1 X_2 left