

MATTER-C

1. Give the normal state (solid-liquid-gas) of each of the following.

- A. oxygen
- B. carbon (diamond)
- C. bromine
- D. iodine
- E. nitrogen
- F. copper
- G. aluminum
- H. chlorine
- I. table salt
- J. table sugar
- K. water

2. For each of the following, decide whether a physical or a chemical change is involved.

- A. dissolving of sugar in water
- B. rusting of iron
- C. burning of wood
- D. evaporation of alcohol

3. The following are properties of substances. Decide whether each is a physical property or a chemical property.

- A. chlorine gas liquefies at -35°C under normal pressure.
- B. Hydrogen burns in chlorine gas
- C. Bromine is a red -brown liquid.
- D. Lithium is a soft, silvery colored metal.
- E. Iron rusts in an atmosphere of moist air.
- F. Sodium chloride dissolves readily in water.
- G. A diamond burns in oxygen.
- H. Oxygen and nitrogen are colorless, odorless gases.

4. Iodine is a solid having somewhat lustrous, blue black crystals. The crystals vaporize readily to a violet-colored gas. Iodine, like chlorine, combines with many metals. For example, aluminum combines with iodine to give aluminum iodide. Identify the physical and chemical properties of iodine that are cited.

5. Consider the following separation materials. State whether a physical process or a chemical reaction is involved in each separation.

- A. sodium chloride is obtained from seawater by evaporation of the water.
- B. Mercury is obtained by heating the substance mercury II oxide; oxygen is also obtained.
- C. Pure water is obtained from ocean water by evaporating the water, then condensing it.
- D. Sodium metal is obtained from the substance sodium chloride.

6. Tungsten metal, which is used in light -bulb filaments, has the highest melting point of any metal (3410°C). What is this melting point in Kelvin degrees?

7. Titanium metal is used in aerospace alloys to add strength and corrosion resistance. Titanium melts at 1950 K. What is this temperature in degrees Celsius?

8. Gallium metal can be melted by the heat of one's hand. Its melting point is 29.8°C . What is this temperature in Kelvin degrees?

9. The density of quartz mineral was determined by adding a weighed piece to a graduated cylinder containing 51.2 ml of water. After submerging the quartz, the water level was 65.7 ml. The quartz piece weighed 38.4 g. What was the density of the quartz?

10. The mass of the earth is $5.976 \cdot 10^{24}$ kg and the volume of the earth is $1.083 \cdot 10^{21}$ m³. What is the density of the earth in grams per cubic centimeter?

11. Consider a supersonic transport airplane that consumes about 18000 L of the fuel kerosene per hour of flight. Kerosene has a density of 0.965 g/ml. What mass of kerosene is conserved on a 2 hour flight?

12. Classify the given characteristic properties of liquid water as physical or chemical properties;

- A. colorless
- B. can be decomposed into hydrogen and oxygen gases by electrolysis
- C. density = 1 g/ml at 4°C
- D. boiling point = 100°C at 1 atm pressure
- E. can react with sodium metal to form sodium hydroxide

13. Classify each of the following as an element, compound, or mixture;

- A. chlorine; a yellow, poisonous gas with the formula Cl_2
- B. zinc alloy; containing varying amounts of zinc and mercury
- C. a carbonated beverage; containing fruit juice, sugar and carbon dioxide
- D. caustic soda; a white crystalline solid of formula NaOH
- E. aluminum; a metal with the formula Al
- F. Aspirin; a substance with the formula $\text{C}_9\text{H}_8\text{O}_4$