

## Differentiation Of Types Of Substances

- 1 Which statement describes  $\text{H}_2\text{O}(\ell)$  and  $\text{H}_2\text{O}_2(\ell)$ ?
  - (1) Both are compounds that have the same properties.
  - (2) Both are compounds that have different properties.
  - (3) Both are mixtures that have the same properties.
  - (4) Both are mixtures that have different properties.
  
- 2 Carbon monoxide and carbon dioxide have
  - (1) the same chemical properties and the same physical properties
  - (2) the same chemical properties and different physical properties
  - (3) different chemical properties and the same physical properties
  - (4) different chemical properties and different physical properties
  
- 3 Chemical properties can be used to
  - (1) determine the temperature of a substance
  - (2) determine the density of a substance
  - (3) differentiate between two compounds
  - (4) differentiate between two neutrons
  
- 4 Compared to the physical and chemical properties of the compound  $\text{NO}_2$ , the compound  $\text{N}_2\text{O}$  has
  - (1) different physical properties and different chemical properties
  - (2) different physical properties and the same chemical properties
  - (3) the same physical properties and different chemical properties
  - (4) the same physical properties and the same chemical properties
  
- 5 A sample of a substance has these characteristics: (cid:129) melting point of 984 K (cid:129) hard, brittle solid at room temperature (cid:129) poor conductor of heat and electricity as a solid (cid:129) good conductor of electricity as a liquid or in an aqueous solution
 

This sample is classified as

  - (1) a metallic element
  - (2) a radioactive element
  - (3) a molecular compound
  - (4) an ionic compound
  
- 6 Which formulas represent one ionic compound and one molecular compound?
 

(1) $\text{N}_2$ and $\text{SO}_2$	(3) $\text{BaCl}_2$ and $\text{N}_2\text{O}_4$
(2) $\text{Cl}_2$ and $\text{H}_2\text{S}$	(4) $\text{NaOH}$ and $\text{BaSO}_4$
  
- 7 Which terms identify two different categories of compounds?
  - (1) covalent and molecular
  - (2) covalent and empirical
  - (3) ionic and molecular
  - (4) ionic and empirical
  
- 8 Which two terms represent major categories of compounds?
  - (1) ionic and nuclear
  - (2) ionic and molecular
  - (3) empirical and nuclear
  - (4) empirical and molecular

9 The table below shows properties of two compounds at standard pressure.

Selected Properties of Two Compounds

Compound	Melting Point (°C)	Boiling Point (°C)	Electrical Conductivity
1	775	1935	good as a liquid or in an aqueous solution
2	- 112.1	46	poor as a liquid

Which statement classifies the two compounds?

- (1) Both compounds are ionic. (3) Compound 1 is ionic, and compound 2 is molecular.
- (2) Both compounds are molecular. (4) Compound 1 is molecular, and compound 2 is ionic.
- 10 A solid sample of a compound and a liquid sample of the same compound are each tested for electrical conductivity. Which test conclusion indicates that the compound is ionic?
- (1) Both the solid and the liquid are good conductors.
- (2) Both the solid and the liquid are poor conductors.
- (3) The solid is a good conductor, and the liquid is a poor conductor.
- (4) The solid is a poor conductor, and the liquid is a good conductor.

Base your answers to questions 11 on the information below and on your knowledge of chemistry.

A laboratory technician is given the table below and a sample of one of the three substances listed in the table. The technician makes an aqueous solution with a portion of the sample. When a conductivity tester is lowered into the solution, the lightbulb on the tester glows brightly. Another portion of the sample is placed in a heat-resistant container that is placed in an oven at 450.°C. The sample melts.

Some Properties of Three Substances

Property	Substance		
	Sodium nitrate	Potassium chromate	Sulfur
solubility in water at 20.°C	soluble	soluble	insoluble
electrical conductivity of aqueous solution	good	good	not applicable
melting point (°C)	307	974	115

- 11 State evidence that makes it necessary to use more than one property to identify the substance given to the technician.

## Answer Keys

1 2

2 4

3 3

4 1

5 4

6 3

7 3

8 2

9 3

10 4

11 Allow 1 credit. Acceptable responses include, but are not limited to:

- Sodium nitrate and potassium chromate are both soluble in water and are good conductors in solution. Therefore, the melting points are needed to identify the substance.
- Solubility alone cannot be used because two of the substances are soluble in water.
- Two of the substances melt below 450.°C.
- Electrical conductivity is not sufficient to differentiate the two salts.