Compounds

1 What is the chemical formula for sodium oxalate?
(1) NaO
(2) Na_2O
(3) NaC_2O_4
(4) $Na_2C_2O_4$

2 What is the chemical name of the compound NH_4SCN?
(1) ammonium thiocyanate
(2) ammonium cyanide
(3) nitrogen hydrogen cyanide
(4) nitrogen hydrogen sulfate

3 Which statement explains why NaBr is classifi ed as a compound?
(1) Na and Br are chemically combined in a fixed proportion.
(2) Na and Br are both nonmetals.
(3) NaBr is a solid at 298 K and standard pressure.
(4) NaBr dissolves in H_2O at 298 K.

4 What is the formula for iron(II) oxide?
(1) FeO
(2) FeO_2
(3) Fe_2O
(4) Fe_2O_3

5 Which substance can be broken down by chemical means?
(1) ammonia
(2) aluminum
(3) antimony
(4) argon

6 Which formula represents ammonium nitrate?
(1) NH_4NO_3
(2) NH_4NO_2
(3) $NH_4(NO_3)_2$
(4) $NH_4(NO_2)_2$

7 What is represented by the chemical formula $PbCl_2(s)$?
(1) a substance
(2) a solution
(3) a homogeneous mixture
(4) a heterogeneous mixture

8 What is the chemical formula for ammonium sulfide?
(1) $(NH_4)_2S$
(2) $(NH_4)_2SO_3$
(3) $(NH_4)_2SO_4$
(4) $(NH_4)_2S_2O_3$

9 What is the chemical formula of titanium(II) oxide?
(1) TiO
(2) Ti_2O
(3) TiO_2
(4) Ti_2O_3

10 What is the chemical formula for sodium sulfate?
(1) Na_2SO_4
(2) Na_2SO_3
(3) $NaSO_4$
(4) $NaSO_3$

11 A compound is a substance composed of two or more elements that are
(1) physically mixed in a fixed proportion
(2) physically mixed in a variable proportion
(3) chemically combined in a fixed proportion
(4) chemically combined in a variable proportion

Base your answers to questions 12 on the information below and on your knowledge of chemistry.

During a laboratory activity, appropriate safety equipment was used and safety procedures were followed. A laboratory technician heated a sample of solid $KClO_3$ in a crucible to determine the percent composition by mass of oxygen in the compound. The unbalanced equation and the data for the decomposition of solid $KClO_3$ are shown below.

$$KClO_3(s) \rightarrow KCl(s) + O_2(g)$$

Lab Data and Calculated Results

Object or Material	Mass (g)
empty crucible and cover	22.14
empty crucible, cover, and $KClO_3$	24.21
$KClO_3$	2.07
crucible, cover, and KCl after heating	23.41
KCl	?
O_2	0.80

12 Write a chemical name for the compound that decomposed.

Base your answers to questions 13 on the information below and on your knowledge of chemistry.

Thermal energy is absorbed as chemical reactions occur during the process of baking muffins. The batter for muffins often contains baking soda, $NaHCO_3(s)$, which decomposes as the muffins are baked in an oven at 200.°C. The balanced equation below represents this reaction, which releases $CO_2(g)$ and causes the muffins to rise as they bake. The $H_2O(\ell)$ is released into the air of the oven as it becomes a vapor.

$$2NaHCO_3(s) + \text{heat} \rightarrow Na_2CO_3(s) + H_2O(\ell) + CO_2(g)$$

13 Based on Table E, identify the polyatomic ion in the solid product of the reaction.

Base your answers to questions 14 on the information below and on your knowledge of chemistry.

A sample of seawater is analyzed. The table below gives the concentration of some ions in the sample.

Concentration of Some Ions in a Seawater Sample

Ion	Concentration (M)
Cl^-	0.545
Na^+	0.468
Mg^{2+}	0.054
SO_4^{2-}	0.028
Ca^{2+}	0.010
K^+	0.010

14 Write a chemical formula of one compound formed by the combination of K^+ ions with one of these ions as water completely evaporates from the seawater sample.

Base your answers to questions 15 on the information below and on your knowledge of chemistry.

Baking soda, $NaHCO_3$, can be commercially produced during a series of chemical reactions called the Solvay process. In this process, $NH_3(aq)$, $NaCl(aq)$, and other chemicals are used to produce $NaHCO_3(s)$ and $NH_4Cl(aq)$.

To reduce production costs, $NH_3(aq)$ is recovered from $NH_4Cl(aq)$ through a different series of reactions. This series of reactions can be summarized by the overall reaction represented by the unbalanced equation below.

$$NH_4Cl(aq) + CaO(s) \rightarrow NH_3(aq) + H_2O(\ell) + CaCl_2(aq)$$

15 Write a chemical name for baking soda.

Answer Keys

1 4

2 1

3 1

4 1

5 1

6 1

7 1

8 1

9 1

10 1

11 3

12 Allow 1 credit for potassium chlorate.

13 Allow 1 credit. Acceptable responses include, but are not limited to:
- carbonate ion
- carbonate
- CO_3^{2-}

14 Allow 1 credit. Acceptable responses include, but are not limited to:
- KCl
- K_2SO_4

15 Allow 1 credit. Acceptable responses include, but are not limited to:
- sodium hydrogen carbonate
- sodium bicarbonate
- sodium acid carbonate
- monosodium carbonate
- bicarbonate of soda