Table F Solubility Guidelines For Aqueous Solutions

1 Which compound is soluble in water?
(1) PbS (3) Na_2S
(2) BaS (4) Fe_2S_3

2 Which compounds are electrolytes?
(1) C_2H_5OH and H_2SO_4 (3) KOH and H_2SO_4
(2) C_2H_5OH and CH_4 (4) KOH and CH_4

3 Which substance is an electrolyte?
(1) $C_6H_{12}O_6(s)$ (3) NaOH(s)
(2) $C_2H_5OH(\ell)$ (4) $H_2(g)$

4 According to Table F, which ions combine with chloride ions to form an insoluble compound?
(1) Fe^{2+} ions (3) Li^+ ions
(2) Ca^{2+} ions (4) Ag^+ ions

5 Which compound is an electrolyte?
(1) CH_3CHO (3) CH_3COOH
(2) CH_3OCH_3 (4) $CH_3CH_2CH_3$

6 A 1-gram sample of a compound is added to 100 grams of $H_2O(\ell)$ and the resulting mixture is then thoroughly stirred. Some of the compound is then separated from the mixture by filtration. Based on Table F, the compound could be
(1) AgCl (3) NaCl
(2) $CaCl_2$ (4) $NiCl_2$

7 Which ion combines with Ba^{2+} to form a compound that is most soluble in water?
(1) S^{2-} (3) CO_3^{2-}
(2) OH^- (4) SO_4^{2-}

8 Which compound is an electrolyte?
(1) H_2O (3) H_3PO_4
(2) C_2H_6 (4) CH_3OH

9 Which formula represents an electrolyte?
(1) H_2O (3) H_2SO_4
(2) CCl_4 (4) $C_6H_{12}O_6$

Base your answers to questions 10 on the information below and on your knowledge of chemistry.

In a titration, 50.0 milliliters of 0.026 M HCl(aq) is neutralized by 38.5 milliliters of KOH(aq).

10 Complete the equation below for the neutralization by writing the formula of the missing product.

$$KOH(aq) + HCl(aq) \rightarrow \_\_\_\_\_ (aq) + H_2O(\ell)$$

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

Natural gas and coal are two fuels burned to produce energy. Natural gas consists of approximately 80% methane, 10% ethane, 4% propane, 2% butane, and other components.

The burning of coal usually produces sulfur dioxide, $SO_2(g)$, and sulfur trioxide, $SO_3(g)$, which are major air pollutants. Both $SO_2(g)$ and $SO_3(g)$ react with water in the air to form acids.

11 Complete the equation below representing the reaction of sulfur trioxide with water to produce sulfuric acid, by writing the formula of the missing reactant and the formula of the missing product.

$$\_\_\_\_\_ (g) + H_2O(\ell) \rightarrow \_\_\_\_\_ (aq)$$

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

A student prepares two 141-gram mixtures, A and B. Each mixture consists of NH_4Cl, sand, and H_2O at 15°C. Both mixtures are thoroughly stirred and allowed to stand. The mass of each component used to make the mixtures is listed in the data table below.

Mass of the Components in Each Mixture

Component	Mixture A (g)	Mixture B (g)
NH_4Cl	40.	10.
sand	1	31
H_2O	100.	100.

12 Determine the temperature at which all of the NH_4Cl in mixture A dissolves to form a saturated solution.

Base your answers to questions 13 on the information below.

In a titration, 20.0 milliliters of 0.15 M HCl(aq) is exactly neutralized by 18.0 milliliters of KOH(aq).

13 Complete the equation below for the neutralization reaction by writing the formula of each product.

$$KOH(aq) + HCl(aq) \rightarrow \_\_\_\_\_ + \_\_\_\_\_$$

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

The elements in Group 17 are called halogens. The word “halogen” is derived from Greek and means “salt former.”

14 Based on Table F, identify one ion that reacts with iodide ions in an aqueous solution to form an insoluble compound.

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

Some compounds of silver are listed with their chemical formulas in the table below.

Silver Compounds

Name	Chemical Formula
silver carbonate	Ag_2CO_3
silver chlorate	$AgClO_3$
silver chloride	$AgCl$
silver sulfate	Ag_2SO_4

15 Identify the silver compound in the table that is most soluble in water.

Answer Keys

1 3

2 3

3 3

4 4

5 3

6 1

7 2

8 3

9 3

10 Allow 1 credit. Acceptable responses include, but are not limited to:
- KCl
- ClK
- $K^+(aq) + Cl^-(aq)$
- $K^+ + Cl^-$

11 Allow 1 credit. The order of the elements in each compound may vary.
- $SO_3(g) + H_2O(\ell) \rightarrow H_2SO_4(aq)$

12 Allow 1 credit for any value from 23ºC to 26ºC, inclusive.

13 Allow 1 credit. Acceptable responses include, but are not limited to:
- $H_2O(\ell)$ and KCl(aq)
- KCl and HOH

14 Allow 1 credit. Acceptable responses include, but are not limited to:
- Hg_2^{2+}
- Pb^{2+}
- mercury(I) ion
- silver

15 Allow 1 credit for $AgClO_3$ or silver chlorate.