

Solubility Rules Quiz Answer Key PDF

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Which of the following compounds is always soluble in water?

- A. Silver chloride (AgCl)
- B. Sodium nitrate (NaNO_3) ✓**
- C. Calcium carbonate (CaCO_3)
- D. Lead sulfate (PbSO_4)

Discuss how solubility rules can be applied in qualitative chemical analysis.

In qualitative chemical analysis, solubility rules are applied to determine which ions will precipitate when mixed with certain reagents, thus aiding in the identification of unknown substances.

Explain the significance of understanding solubility rules in industrial applications such as water treatment.

The significance of understanding solubility rules in industrial applications such as water treatment lies in its ability to guide the selection of chemicals for coagulation, precipitation, and filtration processes, ultimately enhancing the efficiency of contaminant removal.

Why are alkali metal salts generally soluble in water? Provide a chemical explanation.

Alkali metal salts are soluble in water because the hydration energy released when water molecules surround and solvate the ions is greater than the lattice energy holding the ions together in the solid state.

Which of the following sulfates are insoluble?

- A. Calcium sulfate (CaSO_4) ✓**
- B. Sodium sulfate (Na_2SO_4)
- C. Lead(II) sulfate (PbSO_4) ✓**

D. Barium sulfate (BaSO_4) ✓

Explain why most nitrates are soluble in water.

Most nitrates are soluble in water because they are ionic compounds that interact favorably with water molecules, allowing them to dissociate into their constituent ions.

Which of the following compounds are generally soluble in water?

A. Potassium chloride (KCl) ✓

B. Calcium carbonate (CaCO_3)

C. Ammonium sulfate ($(\text{NH}_4)_2\text{SO}_4$) ✓

D. Silver nitrate (AgNO_3) ✓

Which ion, when combined with any anions, will always form a soluble compound?

A. Ag^+

B. Pb^{2+}

C. NH_4^+ ✓

D. Hg_2^{2+}

Describe the role of solubility rules in predicting precipitation reactions.

Solubility rules are guidelines that indicate which ionic compounds are soluble or insoluble in water, allowing chemists to predict the formation of precipitates in precipitation reactions.

List three exceptions to the solubility of sulfates and explain why they are exceptions.

The three exceptions to the solubility of sulfates are barium sulfate (BaSO_4), lead(II) sulfate (PbSO_4), and calcium sulfate (CaSO_4). Barium sulfate is insoluble due to the large size of the barium ion, which leads to a strong lattice energy that outweighs the hydration energy. Lead(II) sulfate is also insoluble because of the strong ionic bonds formed in the solid state, and calcium sulfate has limited solubility due to its relatively low solubility product.

Which halide is insoluble when combined with silver?

A. Chloride (Cl^-)

- B. Bromide (Br)
- C. Iodide (I)
- D. Fluoride (F) ✓**

Which of the following hydroxides is slightly soluble in water?

- A. Sodium hydroxide (NaOH)
- B. Calcium hydroxide (Ca(OH)₂) ✓**
- C. Iron(III) hydroxide (Fe(OH)₃)
- D. Aluminum hydroxide (Al(OH)₃)

Which compound is insoluble in water?

- A. Ammonium chloride (NH₄Cl)
- B. Calcium phosphate (Ca₃(PO₄)₂) ✓**
- C. Potassium bromide (KBr)
- D. Magnesium sulfate (MgSO₄)

Which of the following is not a general solubility rule?

- A. All nitrates are soluble.
- B. All sulfates are soluble.
- C. All alkali metal salts are soluble.
- D. All carbonates are soluble. ✓**

Which of the following is an exception to the solubility of sulfates?

- A. Sodium sulfate (Na₂SO₄)
- B. Potassium sulfate (K₂SO₄)
- C. Barium sulfate (BaSO₄) ✓**
- D. Ammonium sulfate ((NH₄)₂SO₄)

Which ions typically form insoluble compounds?

- A. Ag⁺ ✓**
- B. Na⁺
- C. CO₃²⁻ ✓**

D. NO_3^-

Which of the following is a soluble compound?

- A. Lead(II) iodide (PbI_2)
- B. Barium sulfate (BaSO_4)
- C. Ammonium nitrate (NH_4NO_3) ✓**
- D. Silver bromide (AgBr)

Which compounds are exceptions to the solubility of chlorides?

- A. Silver chloride (AgCl) ✓**
- B. Sodium chloride (NaCl)
- C. Lead(II) chloride (PbCl_2) ✓**
- D. Mercury(I) chloride (Hg_2Cl_2) ✓**

Which compounds are typically insoluble in water?

- A. Barium carbonate (BaCO_3) ✓**
- B. Potassium sulfate (K_2SO_4)
- C. Magnesium phosphate ($\text{Mg}_3(\text{PO}_4)_2$) ✓**
- D. Ammonium chloride (NH_4Cl)

Which hydroxides are soluble or slightly soluble in water?

- A. Sodium hydroxide (NaOH) ✓**
- B. Potassium hydroxide (KOH) ✓**
- C. Calcium hydroxide ($\text{Ca}(\text{OH})_2$) ✓**
- D. Iron(III) hydroxide ($\text{Fe}(\text{OH})_3$)