

Solubility of Common Ionic Compounds in Water

Soluble		Common Exceptions
Compounds containing	NH_4^+	None
	$\text{C}_2\text{H}_3\text{O}_2^-$	None
	Br^-	Compounds of Ag^+ , Hg_2^{2+} , and Pb^{2+}
	Cl^-	Compounds of Ag^+ , Hg_2^{2+} , and Pb^{2+}
	I^-	Compounds of Ag^+ , Hg_2^{2+} , and Pb^{2+}
	NO_3^-	None
	SO_4^{2-}	Compounds of Sr^{2+} , Ba^{2+} , Hg_2^{2+} , and Pb^{2+}
Insoluble		Common Exceptions
Compounds containing	CO_3^{2-}	Compounds of NH_4^+ , the alkali metal cations
	OH^-	Compounds of the alkali metal cations, and Ca^{2+} , Sr^{2+} , and Ba^{2+}
	PO_4^{3-}	Compounds of NH_4^+ , the alkali metal cations
	S^{2-}	Compounds of the alkali metal cations, and Ca^{2+} , Sr^{2+} , and Ba^{2+}
	CrO_4^{2-}	Compounds of NH_4^+ , the alkali metal cations

Multiple choice:

- 1) Which of these salts is the least soluble in water?
 - a) PbCl_2 **Correct; according to the solubility rules all Cl^- are soluble EXCEPT those with Ag^+ , Hg_2^{2+} , and Pb^{2+} .**
 - b) LiCl **Incorrect; according to the solubility rules all Cl^- are soluble EXCEPT those with Ag^+ , Hg_2^{2+} , and Pb^{2+} , since Li is not one of the exceptions it must be soluble.**
 - c) FeCl_2 **Incorrect; according to the solubility rules all Cl^- are soluble EXCEPT those with Ag^+ , Hg_2^{2+} , and Pb^{2+} , since Fe is not one of the exceptions it must be soluble.**
 - d) RbCl **Incorrect; according to the solubility rules all Cl^- are soluble EXCEPT those with Ag^+ , Hg_2^{2+} , and Pb^{2+} , since Rb is not one of the exceptions it must be soluble.**

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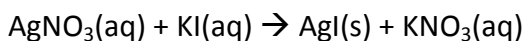
2) Which ion, when combined with sulfate ions, SO_4^{2-} , forms an insoluble substance in water?

- NH_4^+ **Incorrect**; according to the solubility rules all ionic compounds containing NH_4^+ are soluble.
- Sr^{2+} **Correct**; according to the solubility rules all compounds containing SO_4^{2-} are soluble EXCEPT those containing Sr^{2+} , Ba^{2+} , Hg_2^{2+} , and Pb^{2+}
- Mg^{2+} **Incorrect**; according to the solubility rules all compounds containing SO_4^{2-} are soluble EXCEPT those containing Sr^{2+} , Ba^{2+} , Hg_2^{2+} , and Pb^{2+} , since Mg^{2+} is not one of the exceptions it must be soluble.
- Zn^{2+} **Incorrect**; according to the solubility rules all compounds containing SO_4^{2-} are soluble EXCEPT those containing Sr^{2+} , Ba^{2+} , Hg_2^{2+} , and Pb^{2+} , since Zn^{2+} is not one of the exceptions it must be soluble.

3) At 70°C, which 1.0g sample of aluminum will react fastest with dilute sulfuric acid?

- a) Powdered **Correct; powdered aluminum would have the greatest surface area so it would react the fastest.**
- b) Bars **Incorrect; this answer does not have the greatest surface area so it would not react the fastest.**
- c) lumps **Incorrect; this answer does not have the greatest surface area so it would not react the fastest.**
- d) sheet of foil **Incorrect; this answer does not have the greatest surface area so it would not react the fastest.**

4) Which change will decrease the rate of this reaction?



- a) stir the reactants **Incorrect; stirring would increase the rate of reaction**
- b) increase the pressure in the reaction vessel **Incorrect, pressure would not affect the rate of reaction.**
- c) add potassium nitrate to the reaction vessel **Incorrect; adding more product would not affect the rate of reaction.**
- d) place the reaction vessel in an ice bath **Correct; decreasing the temperature would decrease the rate of reaction because the molecules would be moving slower so they would collide less frequently**

5) Consider the information in this diagram. By test tube label, what are the rates of reaction from fastest to slowest?

- a) I, II, III **Incorrect; the powder would react faster than the solid since it has a greater surface area.**
- b) II, I, III **Incorrect; the powder would react faster than the solid since it has a greater surface area.**
- c) III, II, I **Incorrect; the solid in the higher concentrated acid would react faster than the solid in the lower concentration acid.**
- d) III, I, II **Correct; the powder in the highest concentration of acid (III) would react the fastest and then the solid in the highest concentration of acid (I) would react the second fastest followed by the solid in the lower concentration of acid.**

