

Name: Key
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Chemistry 12 The Common Ion Effect and Altering Solubility

1. The following table shows some compounds with low solubility in the left column. In column 2, a solution (reagent) is added. In column 3, indicate whether the solubility of the compound on the left will be increased, decreased or not affected. In column 4 give a brief explanation for your answer. You don't need to include equilibrium equations in your explanations in this case.

Low Solubility

Compound

Added Reagent

Effect on Solubility of

Compound in

Column 1

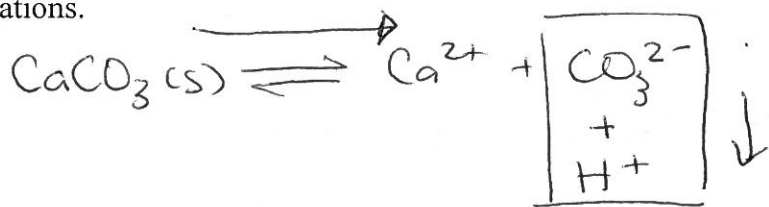
Explanation for Effect

Low Solubility Compound	Added Reagent	Effect on Solubility of Compound in Column 1	Explanation for Effect
1. SrSO ₄	Ba(NO ₃) ₂ (aq)	increase	$SrSO_4(s) \rightleftharpoons Sr^{2+} + SO_4^{2-}$ + Ba ²⁺ ↓
2. Ag ₂ S	AgNO ₃ (aq)	decrease	$Ag_2S \rightleftharpoons 2Ag^+ + S^{2-}$ + NO ₃ ⁻
SrCO ₃	HNO ₃ (aq) (nitric acid)	increase	$SrCO_3(s) \rightleftharpoons Sr^{2+} + CO_3^{2-}$ + H ⁺ ↓
3. AgBr	Pb(NO ₃) ₂ (aq)	increase	$AgBr(s) \rightleftharpoons Ag^+ + Br^-$ + Pb ²⁺ ↓
4. PbCl ₂	KCl(aq)	decrease	$PbCl_2(s) \rightleftharpoons Pb^{2+} + 2Cl^-$
5. Be(OH) ₂	NaCl(aq)	no effect	$Be(OH)_2(s) \rightleftharpoons Be^{2+} + 2OH^-$
PbCO ₃	HCl(aq)	increase	$PbCO_3(s) \rightleftharpoons Pb^{2+} + CO_3^{2-}$ + H ⁺ ↓
6. CuI	CaI ₂ (aq)	decrease	$CuI(s) \rightleftharpoons Cu^+ + I^-$ + 2I ⁻
7. Ag ₂ CO ₃	Na ₂ S(aq)	increase	$Ag_2CO_3 \rightleftharpoons 2Ag^+ + CO_3^{2-}$ + S ²⁻ ↓
8. Ca ₃ (PO ₄) ₂	K ₂ SO ₄ (aq)	increase	$Ca_3(PO_4)_2(s) \rightleftharpoons 3Ca^{2+} + 2PO_4^{3-}$ + SO ₄ ²⁻ ↓

omit

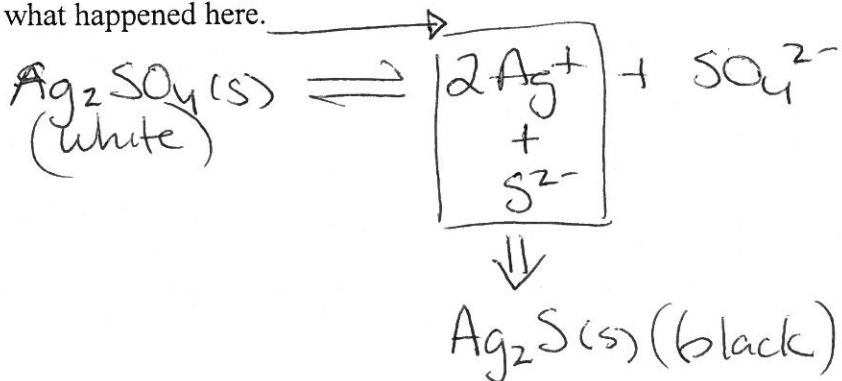
* 2.

Given that natural rainwater is slightly acidic, explain why rain will slowly dissolve limestone ($\text{CaCO}_3(\text{s})$) over a period of time. Give a full explanation including relevant equilibrium equations.



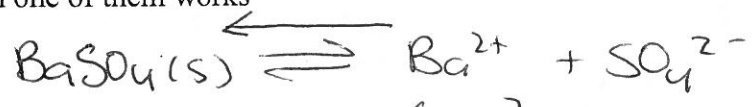
(Unit IV)

3. Silver sulphate is a white precipitate with low solubility. When a solution of ammonium sulphide ($(\text{NH}_4)_2\text{S}(\text{aq})$) is added, the white precipitate slowly dissolves and a black precipitate forms on the bottom. Using **equilibrium equations** and clear explanations, indicate what happened here.



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4. Name two compounds (not just ions) that can **decrease** the solubility of $\text{BaSO}_4(\text{s})$ and explain **why** each one of them works

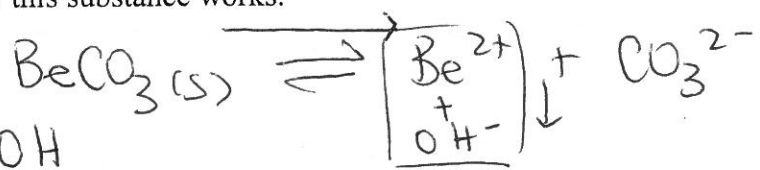


a) $\text{Ba}(\text{NO}_3)_2 \rightarrow \uparrow [\text{Ba}^{2+}]$: shift to reactants.

b) $\text{Na}_2\text{SO}_4 \rightarrow \uparrow [\text{SO}_4^{2-}]$: shift to reactants.

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5. Name a substance (not just an ion) which could **increase** the solubility of $\text{BeCO}_3(\text{s})$. Explain why this substance works.



a) NaOH

b) Na_3PO_4 or Na_2CO_3 or Na_2SO_3 .

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6. Briefly explain what is meant by the **common ion effect**.

The addition of a particular ion to prevent a salt from dissolving (decreasing solubility).

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