

Solubility Review

***All substances in each equation should have states written!**

1. Write a balanced chemical equation for the equilibrium in a saturated solution of an ionic compound with low solubility.
2. Write the dissociation equation and give ionic concentrations for 0.25M AlCl_3 .
3. Define **solubility**.
4. Define **saturated solution**.
5. Which is better at conducting: a 0.1M NaCl solution or a 1.0M CH_3OH solution. Why?
6. Can a 0.1M solution of MgCl_2 at room temperature be a saturated solution? Explain.
7. A solution of CaBr_2 is found to have 6.78g of CaBr_2 per 250.0 mL of solution. What is the $[\text{Br}^-]$ in the solution?
8. If a 500.0 mL solution contains 0.050 mol of $\text{Al}_2(\text{SO}_4)_3$, write a dissociation equation and calculate the molar concentrations of each ion in solution.
9. Devise a method to separate a solution with a mixture of SO_4^{2-} , I^- , and OH^- .
10. Give the formula, complete, and net ionic equation when 0.1M solutions of $\text{Ca}(\text{NO}_3)_2$ and Na_2SO_4 are mixed.
11. A saturated solution of AgCH_3COO was evaporated to dryness. The 250.0 mL sample was found to contain 1.84g of AgCH_3COO . Calculate the K_{sp} for AgCH_3COO .
12. A saturated solution of $\text{Pb}(\text{IO}_3)_2$ has a concentration of 0.038M. Calculate the solubility product constant for $\text{Pb}(\text{IO}_3)_2$.
13. What is the solubility of CaCO_3 in mol/L?
14. Calculate the solubility of $\text{Ag}_2\text{C}_2\text{O}_4$ in g/L.

15. Calculate the maximum mass (g) of CaSO_4 that could dissolve in 50.0L of water.
16. Will a precipitate form if 30.0 mL of 0.054M $\text{Ca}(\text{NO}_3)_2$ is mixed with 60.0 mL of $8.1 \times 10^{-4}\text{M}$ Na_2SO_4 ?
17. Will a precipitate form when 90.0 mL of $1.00 \times 10^{-2}\text{M}$ $\text{Cu}(\text{NO}_3)_2$ and 10.0 mL of $1.00 \times 10^{-2}\text{M}$ NaIO_3 are mixed? Explain using appropriate calculations.
18. Calculate the maximum moles of Br^- that can be added to 0.500L of 0.10M $\text{Pb}(\text{NO}_3)_2$ so a precipitate just starts to form. Then write the net ionic equation for the precipitate formation.
19. Calculate the maximum mass of $\text{Pb}(\text{NO}_3)_2$ that could be dissolved in 100.0 mL of 0.100M NaCl without forming a precipitate.
20. Consider the following equilibrium:
- $$\text{MgCO}_3(\text{s}) \rightleftharpoons \text{Mg}^{2+}(\text{aq}) + \text{CO}_3^{2-}(\text{aq})$$
- When solid $\text{Ca}(\text{NO}_3)_2$ is added, more MgCO_3 dissolves. Explain.
21. In which of the following is $\text{Ag}_2\text{C}_2\text{O}_4$ likely to be least soluble: pure water, 0.10M K_2CrO_4 , or 0.10M AgNO_3 ? Explain.
22. A saturated solution of CaSO_4 is prepared by adding excess solute to water.
- Write an equation that represents the saturated solution.
 - Identify a soluble salt that when added to the equilibrium in a) would cause more solid to dissolve. Explain how this would work.
23. A student adds Ag^+ to a solution containing 0.10M Cl^- and 0.10M CO_3^{2-} . Determine the colour of the first precipitate to form, given the following data:
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|--------------------------|------------|---------------------------------------|
| AgCl | white ppt | $K_{\text{sp}} = 1.8 \times 10^{-10}$ |
| Ag_2CO_3 | yellow ppt | $K_{\text{sp}} = 8.5 \times 10^{-12}$ |
- *Hint: use type D strategy
24. In an experiment a student pipettes a sample of saturated MgBr_2 solution into a beaker and evaporates the sample to dryness. The following data is recorded:
- | | |
|---------------------------------------|---------|
| Volume of saturated MgBr_2 : | 25.00mL |
| Mass of Beaker: | 89.05g |
| Mass of Beaker and solid | 93.47g |
- Calculate the solubility of MgBr_2 in moles per litre.