

- Calculate the molar solubility of barium fluoride at 25 °C.
- Explain how adding each of the following substances affects the solubility of  $\text{BaF}_2$  in water.
  - 0.10 M  $\text{Ba}(\text{NO}_3)_2$
  - 0.10 M  $\text{HNO}_3$
- In an experiment to determine the  $K_{\text{sp}}$  of  $\text{PbF}_2$  a student starts with 0.10 M  $\text{Pb}(\text{NO}_3)_2$  and 0.10 M  $\text{KF}$  and uses the method of serial dilutions to find the lowest  $[\text{Pb}^{2+}]$  and  $[\text{F}^-]$  that form a precipitate when mixed. If the student uses the concentration of the ions in the combined solution to determine  $K_{\text{sp}}$ , will the value of  $K_{\text{sp}}$  calculated be too large, too small or just right? Explain.  
 $K_{\text{sp}}$  for  $\text{PbF}_2 = 4.0 \times 10^{-8}$
- In a solution of 0.010 M barium nitrate and 0.010 M lead(II) nitrate, which will precipitate first,  $\text{BaF}_2$  or  $\text{PbF}_2$ , as  $\text{NaF}(\text{s})$  is added? Assume volume changes are negligible. Explain (support your answer with calculations).
  - When the more soluble fluoride begins to precipitate, what is the concentration of the cation for the less soluble fluoride that remains in solution?