DILUTION CALCULATIONS INVOLVING TWO SOLUTIONS
(Chemistry 11)

1. What is the concentration of SO_4^{2-} present in 0.135 M $Al_2(SO_4)_3$?

2. What is the $[Cl^-]$ formed when 10.0 g of $BaCl_2(s)$ is dissolved and diluted to 0.600 L?

3. What is the concentration of Cl^- produced when 55.0 mL of 0.300 M HCl is mixed with 80.0 mL of 0.550 M $CaCl_2$?

4. When 350.0 mL of 0.250 M $MgCl_2$ is boiled down to a final volume of 275.0 mL, what is the $[Cl^-]$ in the resulting solution?

5. Calculate the number of moles of all aqueous ions in the following solutions, assuming that each dissolved substance dissociates completely in solution.
   (a) 0.60 L of 0.20 M K_2SO_4
   (b) 0.450 L of 0.300 M Na_3PO_4
   (c) 75.0 mL of 0.160 M $MnCl_2$
   (d) 0.0950 L of 0.235 M $Fe_2(SO_4)_3$

6. A solution is made by mixing 100.0 mL of 0.200 M $BaCl_2$ and 150.0 mL of 0.400 M NaCl. What is the concentration of each ionic species in the final solution?

7. If 75.0 mL of 0.200 M Na_3PO_4 is added to 25.0 mL of 0.800 M K_3PO_4, what is the final concentration of each ion in solution?

8. What is the concentration of all the ions in a solution produced by mixing 15.0 mL of 0.325 M Na_3PO_4 with 35.0 mL of 0.225 M K_2SO_4.

9. A chemistry student dissolves 3.25 g of K_2CrO_4 and 1.75 g of $K_2Cr_2O_7$ in water and dilutes the mixture to a total volume of 100.0 mL. What is the concentration of all the ions in the solution?

Answers:

1) $[SO_4^{2-}] = 0.405M$
2) $[Cl^-] = 0.160M$
3) $[Cl^-]_{total} = 0.774M$
4) $[Cl^-] = 0.636M$
5) (a) moles $K^+ = 0.24$ mol
   moles $SO_4^{2-} = 0.12$ mol
   (b) moles $Na^+ = 0.405$ mole
   moles of $PO_4^{3-} = 0.135$ mole
   (c) moles of $Mn^{2+} = 0.0120$ mol
   moles of $Cl^- = 0.0240$ mol
   (d) moles of $Al^{3+} = 0.0447$ mol
   moles of $SO_4^{2-} = 0.0670$ mol
6) $[Ba^{2+}] = 0.0800M$
   $[Na^+] = 0.240/M$
   $[Cl^-] = 0.400M$
7) $[Na^+] = 0.450M$
   $[K^+] = 0.600M$
   $[PO_4^{3-}] = 0.350M$
8) $[Na^+] = 0.293M$
   $[PO_4^{3-}] = 0.0975M$
   $[K^+] = 0.315M$
   $[SO_4^{2-}] = 0.158M$

9) $[K^+] = 0.454M$, $[CrO_4^{2-}] = 0.168M$, $[Cr_2O_7^{2-}] = 0.0595M$