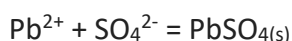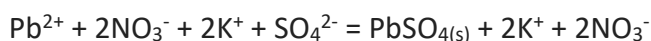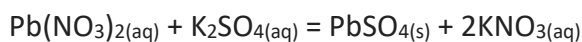Question #83461, Chemistry / General chemistry

Potassium and nitrate containing compounds are soluble in water. Most sulfates are soluble but one of the exceptions is lead(II). When 25.5 mL of aqueous lead(II) nitrate was reacted with excess potassium sulfate solution, 5.377 grams of lead(II) sulfate were produced. (a) Write a chemical equation, ionic equation, and net ionic equation for the reaction. Include phase labels.

(b) Calculate the molarity of the lead(II) nitrate solution used.

Solution

$Pb(NO_3)_{2(aq)} + K_2SO_{4(aq)} = PbSO_{4(s)} + 2KNO_{3(aq)}$

$Pb^{2+} + 2NO_3^- + 2K^+ + SO_4^{2-} = PbSO_{4(s)} + 2K^+ + 2NO_3^-$

$Pb^{2+} + SO_4^{2-} = PbSO_{4(s)}$

$M(PbSO_4) = 207 + 32 + 16*4 = 303 \text{ (g/mol)}$

$n(PbSO_4) = m/M = 5.377 / 303 = 0,0177 \text{ (mol)}$

$n(Pb(NO_3)_2) = n(PbSO_4) = 0,0177 \text{ mol}$

$c(Pb(NO_3)_2) = n/V = 0.0177 / 0.0255 = 0.69 \text{ (mol/l)}$

Answer

$c(Pb(NO_3)_2) = 0.69 \text{ M}$

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