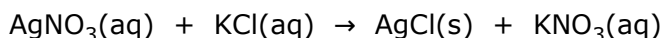


Describing reactions in solution

An ionic reaction can be described in three ways:

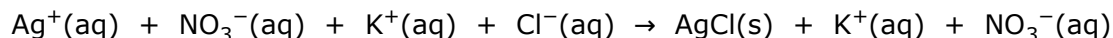
Formula equation

The reaction is written using the "molecular formula" of compounds with the state of matter. Ionic compounds are written in solution like "molecules":



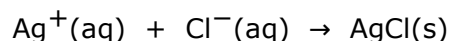
Complete ionic equation

The ions of soluble ionic compounds are dissociated in solution. For all non-soluble compounds, the ions remain "attached" together:



Net ionic equation

It is the complete ionic reaction written without the spectator ions:



Spectator ions

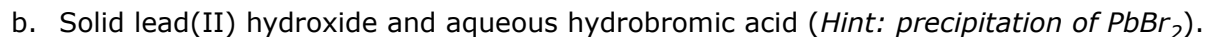
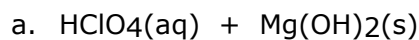
They are easily recognized in a reaction because they have the same state of matter on the reactant side as on the product side.

They are necessary to balance the charges of any reaction involving ions.

However, they can be replaced by another ion because they are not "chemically" involved in the reaction. They are absent from the net ionic equation.

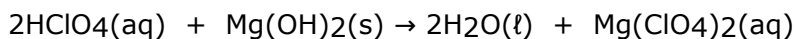
Problems

Complete and balance each reactions and write the corresponding molecular equation, complete ionic equation and net ionic equation. Identify any spectator ion(s).

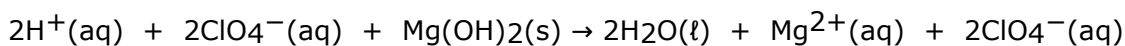


Answers

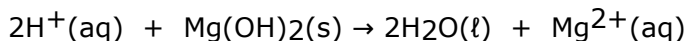
a. Molecular equation



Complete ionic:

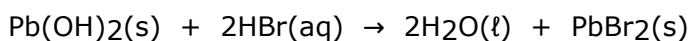


Net ionic:

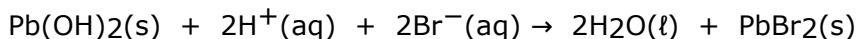


Spectator ion: $\text{ClO}_4^-(\text{aq})$

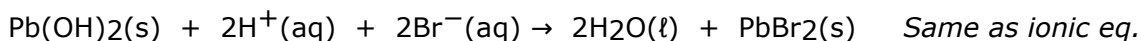
b. Molecular equation:



Complete ionic equation:



Net ionic equation:



No spectator ions.