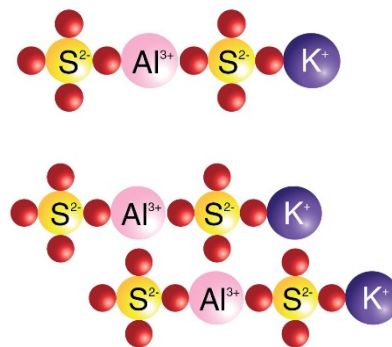


Alum, another Soluble Substance

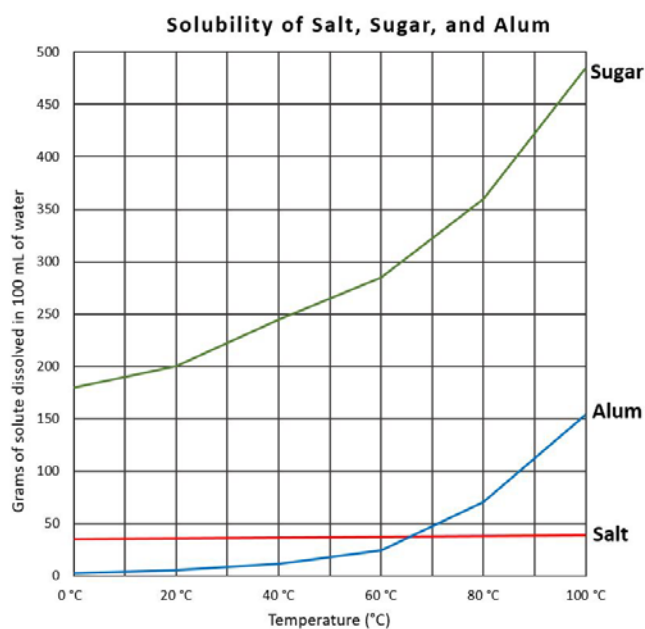
Another solid that is soluble in water is alum (potassium aluminum sulfate, $KAl(SO_4)_2$). A molecule of alum is made up of a potassium ion (K^+) and an aluminum ion (Al^{3+}) and two sulfate ions (SO_4^{2-}).

Here is a model of two alum molecules. Its structure and charges are different from both salt and sugar and has its own characteristic solubility.



Solubility of Salt, Sugar, and Alum

Here is a graph showing the solubility of salt, sugar, and alum in 100 milliliters of water over a range of temperatures from 0 to 100 °C. The substances all have different structures made from different atoms so you might expect them to have different solubilities.



You can see that at all temperatures, many more grams of sugar dissolve than salt. The graph also shows that the solubility of sugar increases much more than the solubility of salt as the temperature of the water increases. Alum is the least soluble until the temperature of the water increases to about 65 °C. After that point, the solubility of alum is greater than that of salt but never as great as sugar.

Since the experiment was run with room temperature water (about 20 °C) the results agree with the graph showing that alum was the least soluble, salt was more soluble than alum, and sugar was the most soluble.