

Question #79115

i'm struggling to produce a method to distinguish solutions of 9 ionic compounds labelled A-I by a series of test tube reactions. This method needs to be in a logical sequence to prevent too many test being done unnecessarily. These must be test tube reactions so no flame tests.

These are the ionic compounds

potassium iodide

potassium chloride

potassium bromide

potassium sulfate

potassium hydroxide

potassium carbonate

ammonium chloride

barium chloride

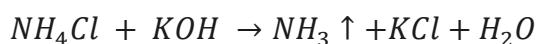
magnesium chloride

thank you

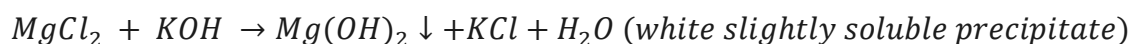
Solution/Answer:

First of all, we can identify a tube with KOH by a litmus paper (pH should be > 11) or by a reaction with phenolphthalein (crimson color).

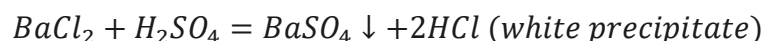
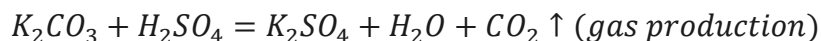
After that, we can identify NH_4Cl and MgCl_2 by those reactions (you can also use NaOH):



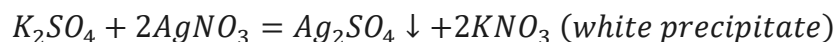
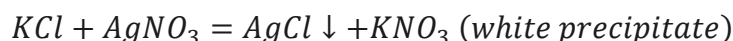
(gas is released which gives an alkaline reaction on the wet litmus paper)



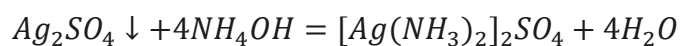
Also, we can identify potassium carbonate and barium chloride by the reaction with H_2SO_4 :



After that, we should use argentum nitrate (AgNO_3):



To separate argentum sulfate and argentum chloride, we should use concentrated ammonia solution (only argentum sulfate reacts with ammonium hydroxide (the white precipitate is dissolved)):



Also, we can use a mixture $AgNO_3$ and NH_4OH (ammonium solution of argentum nitrate), which exist as a complex compound – $[Ag(NH_3)_4]OH$ (hydrogen is more active than ammonium cation):

