AS 2.2 – Carry out procedures to identify ions in solutions

**Scenario 1:**

Mr H has been a bit careless when making up solutions for his year 12 class. He has four bottles of colourless solutions. The only problem is that he forgot to put labels on them. He knows that the four solutions have to be Sodium carbonate, Sodium sulphate, Magnesium sulphate and Sodium hydroxide.

Task:

Devise a method which will help Mr H determine the cation and anion in each bottle. Describe any observations he might see, and include balanced equations for any reactions which may occur.

**Scenario 2:**

The Drama department has asked Mr H to help him out with special effects for the latest school production. Being the kind person that he is, Mr H has agreed to help. They require 5 Litres of fake blood. However, Mr H can’t remember if it was FeSO4 or Fe(NO3)3 that he is supposed to use for his fake blood recipe.

Task:

Describe a test Mr H could use to determine which solution will give him the fake blood he needs. Include any observations and balanced equations for reactions that may occur.

**Scenario 3:**

Mr H has been invited over for dinner at a friend’s house. However, his friend is a terrible cook. Before tucking into his meal, Mr H conducted a quick test on the evening’s entrée. These were his observations:

Upon addition of 2 drops of NaOH a white ppt formed. When excess NaOH was added, the ppt disappeared. When 2 drops of NH3, then excess was added to a new sample, a white ppt formed. Adding Sulphuric acid to another new sample resulted in a white ppt.

When litmus was added to the solution, it stayed red. The sample did not react with Barium nitrate or Silver nitrate.

Task:

Identify the cation and anion present in Mr H’s meal. Write balanced reactions for the formation of any precipitates or complex ions.

Should Mr H eat the rest of the meal? Give reasons why he should/shouldn’t.

**Scenario 4:**

Mr H has forgotten that it is Valentine’s day. His date is ten minutes away and he needs to find a gift ASAP. Luckily, he remembers that he has some aqueous silver solution in his storeroom which he can use to make some jewellery. Unfortunately, he’s forgotten to label these bottles too, so he has no idea which bottle contains the silver.

Task:

Design a method which will allow Mr H to determine which solution has the silver cation in it. Write down any observations he might see. Remember to include balanced equations for all precipitates and complex ions formed.