Experiment 3: The Qual Scheme
Selected Cations in Group IV

Note: Procedures start with Procedure 19, rather than Procedure 1 because this is part of an extensive qual scheme containing Cation Groups I, II, III, and IV. We did not investigate Groups II and III, and will examine only three of the five cations in Group IV.

In Proc 19 we test for the presence of the ammonium ion outside the flow of the qual scheme. The test depends on the volatility, thus mobility, of NH_3 which is readily formed from NH_4^+.

$$NH_4^+(aq) \; + \; 8M \;\; NaOH \;\; \rightarrow \;\; NH_3 \uparrow \; + \; H_2O \; + \; Na^+$$

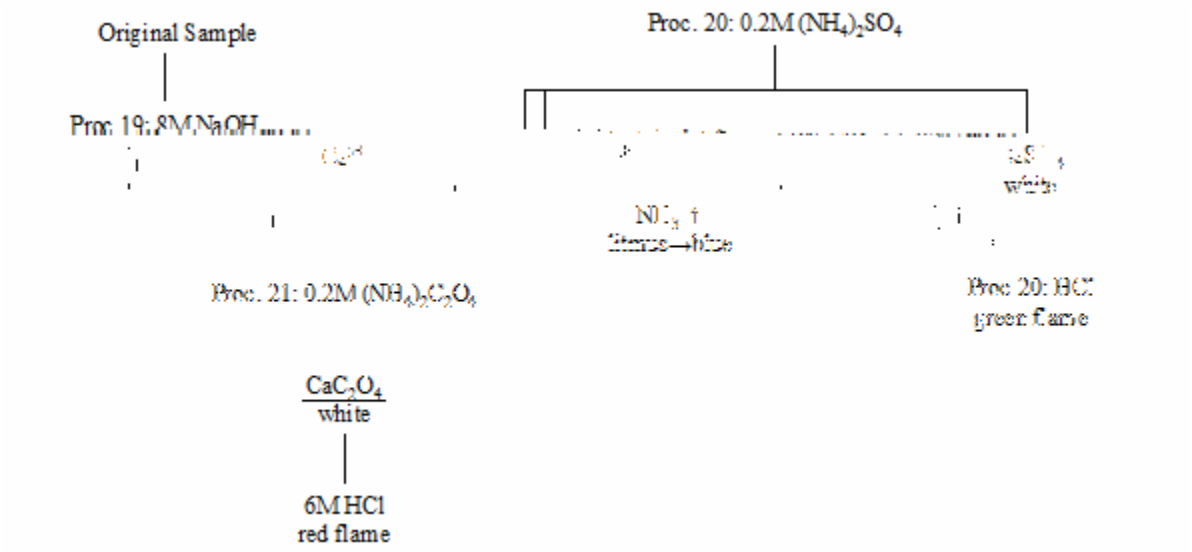
repeatedly. After several tries, barium (probably as the oxide) often tends to build up on the wire making the test easier to see.

The calcium flame is a distinct brick-red but always of short duration and seems to sputter. However, if you allow calcium oxide to build up on the wire through several flamings, then dip once into l2M HCl, this often gives a more intense and more persistent test.

When starting flame test you should clean your wire thoroughly with l2M HC1 a couple of inches deep in a test tube, repeatedly dipping and burning for a sustained period until the yellow-orange sodium flame is minimized and no other flame color is noted. If your wire becomes too dirty you could clip off the worst part and role yourself another loop or install a new piece of wire.

Flow Diagram for Group IV : 19-21

Ba^{2+}, Ca^{2+}, NH_4^+
(all colorless)



Group IV Procedures

Procedure 19

The test for ammonium ion is performed on the most original, unadulterated, sample you have. We will do the procedure so as to include a reagent blank test. Using a clean casserole mix a few drops of water and a few drops of 8M NaOH. Cover this with