CHEMISTRY 235 EXPERIMENT 1
QUALITATIVE ANALYSIS

INTRODUCTION

For a long time in chemistry courses it became unfashionable to do the sort of tests we shall do in the next few practicals. The emphasis was on the "theoretical framework". Then it was suddenly realised that students were unable to appreciate the theory without the facts that it was supposed to rationalise. A whole generation of students was coming up without ever having seen a precipitate redissolve! Not only that, but most people find pure theory is so dull! The sudden appearance of a beautiful blue solution, for example, is one thing that often fascinates students right from the beginning. That's why the practical aspect of inorganic chemistry is once again receiving considerable attention. Not least, however, these practicals will help to train your powers of observation.

METHOD

You are provided with two compounds, A, and B. Each one contains one of the cations Pb^{2+}, or Hg^{2+}. Perform the following tests on the original solution (unless otherwise instructed) to identify the cation in each compound. Write down your observations and deductions. The first few .observations are written for you so that you can see what is expected but make sure that you try these tests yourself too. Note how brief and to-the-point the observations are. **Write any relevant equations in the deduction column.** Remember you are supposed to be identifying the cation in A, B, or C so limit your comments to the nature of these ions. Remember that if it's cloudy it's not a *solution* it's a *suspension*. A precipitate is present, though perhaps it has not settled.

Be careful not to confuse the words *clear* and *colourless*. A clear solution is one that is not cloudy. A colourless solution is one with no colour. A solution (such as copper(II) sulfate solution) may be both clear and coloured. In fact all true solutions are clear. (Some *suspensions* also appear clear, but usually if it is a solution it is clear, and if it is clear it is a solution.)

Safety note: lead and mercury compounds are very toxic. Avoid contact with skin. Collect ALL washings for this experiment and place them in the beaker provided on the front bench. Rinse hands thoroughly and often, and again before leaving the laboratory. Do not eat, snack or drink!

RESULTS

COMPOUND A

TESTS	OBSERVATION	DEDUCTIONS
Make a dilute solution of A in distilled water. Warm if necessary. Use the soln. for the following tests. Use a fresh portion for each test unless otherwise instructed.	Colourless solution present.	1st row transition metal seems to be absent. (Consistent with ions given.) (No equation since no reaction.)
a) Add dil. HCl(aq) Divide the result into 2 parts. i) Add conc. HCl. ii) Heat the 2nd portion and then cool to room temperature.	White ppt. insol. in excess. Ppt. sol. in conc. HCl. Ppt, dissolves on heating, re-ppt's on cooling.	(Write equation) (Write equation) (Write equilibrium)
b) Add very conc. KI (aq) until in excess.		
c) Add H_2S (aq). Wash the ppt. and divide into 2 parts. i) Add dil HNO_3 to 1st. part and warm. ii) Treat 2nd part with H_2O_2 (aq)		

TESTS	OBSERVATION	DEDUCTIONS
d) Add dil. H_2SO_4. Warm and then cool to room temp.		
e) Add K_2CrO_4 (aq) . Warm and then cool.		
f) Add NaOH(aq)until in excess.		

COMPOUND B

TESTS	OBSERVATION	DEDUCTIONS
Add 1 drop of dil. HNO_3 to a little B. Dissolve in water. Use the solution for these tests. Use a fresh portion for each test unless otherwise instructed.		
a) Add KI(aq) until in excess.		
b) Add K_2CrO_4(aq) and boil.		
c) Add dil. HCl.		
d) Add a small piece of copper metal. Observe over several minutes.		
e) Add a small piece of aluminium foil. Observe over several minutes.		
e) Add NaOH(aq) until in excess.		
f) Add H_2S(aq)		