**Test Tube Mystery - Final Performance Task**

**Introduction**

You are the chemical detective. You must correctly identify each solution before time runs out. Since the Chemical Abstracts Services (CAS) has registered over ten million compounds, this would seem to be an impossible task. In this case however, you're in luck! All the other compounds have an alibi for the time in question and we have narrowed the list of suspects down to thirteen solutions.

The Suspects

1M H2SO4 6M NH3 1M K2CrO4  1M AgNO3 1M Fe(NO3)3 1M K2C2O4 1M Ba(NO3)2 1M Cu(NO3)2 1M NiSO4 0.1M SnCl2 1M KCl 1M KSCN 1M Na2S

All you have to do is match these identities to the code on each test tube. This kind of process is called qualitative analysis. This means identifying what is present.

You are fortunate to have a limited list of suspects. It would be a much harder job to identify one out of ten million. On the other hand, your investigation will be severely limited. No fancy electronic equipment, and you may not question any other chemicals or have them assist in your investigation. This means that all your chemical tests will have to make use of these chemicals themselves. Once you identify one chemical, you may be able to use it to identify others.

You may submit each to a lie detector test in the form of litmus paper or a flame test. You must be very careful to avoid contaminating one solution with another. Don't forget to clean and dry the stirring rod between solutions. Contamination of solutions is a gross violation of their chemical rights and shall result in dismissed cases (and possibly no credit). One set will be provided for each group of detectives. If it is spilled, lost, dropped or stolen NO MORE will be given. Don't bother consulting your neighbor group; every set is different. Do your own work.

**Materials**

A uniquely-labeled assortment of unknowns in test tubes that contain some of the suspects above.

Test tubes Racks Litmus paper Bunsen burner Pipets Well plates

Stirring rods coffee stirrers (for flame test)

**Safety Precautions**

You cannot tell a harmful chemical from a harmless one just by looking. Follow all normal laboratory practices during this experiment. Avoid skin contact with the chemicals. Wear your safety glasses at all times.

**Procedure (See “Data Collection” Handout for more info on what to record)**

In preparation for this experiment, you should read through your “list of suspects” to become familiar with their chemical and physical properties. You should also prepare a neat, organized data sheet or table to record your observations on. Bring this table and any notes, books, or lists that you think you might need to lab.

Round up your container of suspects. Record the code on the beaker holding your test tubes on your report sheet. Take care of your suspects; if you need a replacement you will be deducted points!

You may (and should) perform litmus tests.

Use a coffee stirrer to perform flame tests on the suspects. Ask for help if you are uncertain how to perform or interpret these tests. Take care, however, that you do not wastefully exhaust all of your solution.

**Mystery Tube Report Sheet:**

Group Member Names:

Code Identifying your set:

**Scientific Explanation**: Claim, Evidence and Reasoning

Complete for EACH of your unknowns.

**Claim**: Report the formula of the solution in each bottle and also give the correct chemical name of each

reagent.

**Evidence**: Use the data collected as evidence to support your claim.

**Reasoning**: What have you learned that helps to connect your evidence to your claim?

Honors identify 1-10 (ten total paragraphs), CP identify 1-6 (six total paragraphs)