***Lab: Restaurant Poisoning Investigation (Powder flame tests)***

Background: *Under certain circumstances, a simple flame test can be used to check for the presence of a metal salt. Many metal salts show a distinct color when heated. In fact, all elements when heated emit energy at characteristic wavelengths as electrons drop back to ground state levels. This is the basis of emission spectroscopy. The colors of some common metal salts are found in table 3.1 below.*

|  |
| --- |
| **Table 3.1: Flame Colors** |
| **Metal** | **Flame Colors** |
| **Arsenic** | Blue |
| **Barium** | Light green |
| **Boron** | Green |
| **Calcium** | Red |
| **Copper** | Blue-green |
| **Iron** | Gold |
| **Magnesium** | White |
| **Potassium** | Violet |
| **Sodium** | Orange |
| **Strontium** | Crimson |
| **Zinc** | Blue-green |
| **Cobalt** | Sparkler, magenta, green |

*In this case a white powder was found on a table at a restaurant where a customer became violently ill. Is it sugar, salt, or something that shouldn’t be there?*

**Procedure:**

1. Obtain approximately 10 mL of 1M HCl to keep in a beaker at your lab station.
2. Clean the nichrome wire by dipping it into the beaker of HCl and then holding the wire into the center dark blue flame of a Bunsen burner until there is no color.
3. Dip the wire into a labeled sample of powder and hold into the Bunsen burner flame noting the color.
4. Wash the wire with distilled water and then repeat steps 1-2.
5. Repeat steps 3-4 with all the known samples and record results in the data table.
6. Compare your results with those in table 3.1. Note and explain any discrepancies.

***\*This test only works with pure substances, mixtures will give false results\****

1. Now test the unknown from the restaurant and record results in the data table.

**Data Table:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample** | **Observations** | **Comparison to table 3.1** *(same color or not; why?)* | **ID of Unknown** |
| **NiCl2** |  |  |  |
| **FeCl3** |  |  |
| **CuCl2** |  |  |
| **KCl** |  |  |
| **NaCl** |  |  |
| **SrCl2** |  |  |
| **CaCl2** |  |  |
| **BaCl2** |  |  |
| **MgCl** |  |  |
| **ZnCl2** |  |  |  |
| **CoCl2** |  |  |  |
| **Unknown** |  |  |  |

**Post Lab Analysis:**

1. Could the unknown have caused the customer’s illness? Explain.
2. Is it logical that the unknown would be found at a restaurant? Why/Why not?
3. Should more testing be considered? If so, what?