**Lab 4: Reactions of Three Chemical Families; Alkali Metals, Alkali Earths and Transition Metals**

The original periodic table developed by Dimitri Mendeleev had nothing to do with the electrons in the atom. *He knew nothing about that structur*e. Instead, he based his table on the facts that had been compiled through many **centuries**.

You will come to see why certain elements are grouped together into **families**. These elements have similar characteristics just as members of a human family will have similarities in looks or talents for example. Also similar to human families, these elements are unique in their behavior.

In doing this lab you should see the *similarities* and *differences* between members of these families, the Alkali Metals, Alkali Earths and Transition Metals.

MATERIALS:

Alkali

Metals

Transition

Metals

Earths

H Mg

Li Ca Cr Fe

Na Sr Sn Ni Cu

K Cs Ba Zn Pb

* Set of dropper bottles with solutions of Alkali Metals Alkali Earths, Transition Metals and Halogens.
* Well Plate(s)
* Dropper bottles with Polyatomic Anions

You will need a way to keep everything straight. Use the pattern on the right.

One well plate has space for four sets, so up to 4 anions could be done at once. We will use 3, so: 2 drops of H will go into wells A1, A7 and E1, etc. See the diagram below.

1 2 3 4 5 6 7 8 9 10 11 12

H Mg

Li Ca Cr Fe Co

Na Sr Sn Ni Cu

K Cs Ba Zn Pb

H Mg

Li Ca Cr Fe Co

Na Sr Sn Ni Cu

K Cs Ba Zn Pb

A

B

C

D

E

F

G

H

H Mg

Li Ca Cr Fe Co

Na Sr Sn Ni Cu

K Cs Ba Zn Pb

1. Find the dropper bottles with all of the Cations (H+, Li+, Ca+2, Cu+2 etc) (there is a set on each of your lab tables)

2. Place 2 drops of each Cation into the wells of the spot plate according to the pattern above. Note that the Alkali Metals are the first column of each group, etc.

3. Next, find the bottle with SO4-2(sulfate) anion

4. Put 2 drops of SO4-2into each spot in group 1 of the spot plate (spots A1 to D6) that have cation in them. Don’t put it into the empty spots like A2.

5. Draw a table for this lab in your data section and record all observations in that table. (See the board from an example of this)

**Observations:**

**A-** What do you see as you start?

**B-** You may have difficulty deciding whether or not a reaction has occurred. If so, slide a plastic covered sheet under the plate. Try both the White and black sides and observe vs. spots that haven’t had anion in them. 2- Place 3-4 drops of those solutions into your smallest test tube and observe again.

7. Find the bottle with CO3 -2 (carbonate) and repeat steps 4 and 5but using wells in group 2 (A7 to D12).

8. Then use CHO-3 (bicarbonate) and repeat steps 4 and 5 for the group 3 cations (E1 to H6)

9. Empty ALL spots into a large beaker. Then clean the entire plate rinsing with water and drying it.

10. Empty the waste beaker into the waste container. **DO NOT** put down the drain!

**Questions to think about while writing your conclusion…**

1. Which elements reacted with the SO4 solution? Which did NOT?
2. Which reacted with CO3 solution, and which did not?
3. Which reacted with the CHO solution, and which did not?
4. Looking at all of the data, is there a pattern? (compare with the trends on the periodic table)
5. Was there any element that was different in some case(s).
6. Finally, does this follow the periodic table? (Is there a family resemblance? Differences?)
7. Was your hypothesis right?