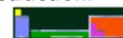


Revised August 2012



AP LAB 7c: Periodic Table Simulation



This lab uses the Carolina Biological Supply Co., *Periodic Table Simulator (84-0110)*

Introduction

The Russian Chemist Dmitri Mendeleev is usually thought of as the “father” of the periodic table. His initial work (supplemented later by many others) led to the sequencing of the elements into the modern, ‘super-useful’ predictive tool that the periodic table has become.

Mendeleev’s early work (in 1869) involved sequencing the elements by atomic weight and “grouping” of similar chemical properties. In this activity you can re-create his work to sequence the elements.

Instructions

1. Collect two sets of cards (one small set with red dots on the back, and one larger set with plain backs). Using *only* the larger set, arrange the element cards into “groups” by considering **only** the oxygen combination ratio.

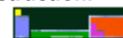
What does the oxygen combination ratio refer to?

Once sorted, how many different “groups” do you have?

2. Consider each “group” separately. Place the cards into order of **increasing** atomic weight (with the smallest atomic weight on the top of the pile).

Which elements are on top of each pile?

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3. Combine the "groups" into one large sequence by expanding them to show ALL cards, **but being careful to maintain the rank order of atomic weights BOTH within each column vertically, AND across each row horizontally. You should leave gaps in each column/row that allow for the sequence to be maintained.**

Fill in the grid below to show your complete sequence.

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4. Based on your table above, make predictions about any "missing" elements in the sequence.

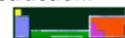
| Position of Missing Element | Oxygen combination ratio | Approx. atomic weight |
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5. Add the four extra cards (with red dots on the back) to the card sequence.

Where were the cards added?

Note: ekaboron (Sc), ekaaluminium (Ga), and ekasilicon (Ge) were predicted by Mendeleev.

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- Did you notice any anomalies when sequencing the table?
- From the sequence created in 3., remove three elements from each vertical column (**but only two from the fluorine column**) that do not fit in with the other members of the group **based solely upon the transition property. DO NOT REMOVE THE FIRST ELEMENT** in any column.
- Compress the remaining elements into a smaller version of the original sequence. Fill in the grid below to show your new sequence.

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- "Group" the **removed** cards by oxygen combination ratio **only**. Consider each "group" separately. Put the cards into order of **increasing** atomic weight (with the smallest atomic weight on the top of the pile).

Which elements are on top of each pile?

- Combine the "groups" into one large sequence by expanding them to show ALL cards, **but being careful to maintain the rank order of atomic weights BOTH within each column vertically, AND across each row horizontally. You should leave gaps in each column/row that allows for the sequence to be maintained.**

Fill in the grid below to show your sequence.

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- Compare the two sequences that you now have. Combine the two sequences in order to form one, large sequence, again **maintaining the rank order of atomic weights BOTH within each column vertically, AND across each row horizontally**. Show the final sequence below.

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