Periodic Classification of Elements
1. Various attempts in the classification of elements
1. Various Attempts in the Classification of Elements

- Johann Wolfgang Goethe:
  - Identified elements by their properties
  - Used triads

- The atomic mass of the middle element in a triad was roughly the average of the atomic masses of the other two elements.

<table>
<thead>
<tr>
<th>Element</th>
<th></th>
<th>Mean atomic mass of element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
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</tr>
</tbody>
</table>

- Three triads containing elements
1.2 John Newlands  

**Newlands' Law of Octaves**

- E  
  > Increasing order of atomic mass  
  > arrangement  
  > Resembles

<table>
<thead>
<tr>
<th></th>
<th>H</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>da</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
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</table>

- Law applicable
- Adjusted two or more elements in the same slot
- Discovery of noble gases lead every ninth element to be the first one
Mendeleev Periodic Table

- Periodic function of
- Atomic mass

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<table>
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</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Li</td>
<td>Be</td>
<td>B</td>
<td>C</td>
<td>N</td>
<td>O</td>
<td>F</td>
</tr>
<tr>
<td>Na</td>
<td>Mg</td>
<td>Al</td>
<td>Si</td>
<td>P</td>
<td>S</td>
<td>Cl</td>
<td>Ar</td>
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<tr>
<td>K</td>
<td>Ca</td>
<td>Sc</td>
<td>Ti</td>
<td>V</td>
<td>Cr</td>
<td>Mn</td>
<td>Fe</td>
</tr>
<tr>
<td>Co</td>
<td>Ni</td>
<td>Cu</td>
<td>Zn</td>
<td>Ga</td>
<td>Ge</td>
<td>As</td>
<td>Se</td>
</tr>
<tr>
<td>Br</td>
<td>Kr</td>
<td>Rb</td>
<td>Sr</td>
<td>Y</td>
<td>Zr</td>
<td>Nb</td>
<td>Mo</td>
</tr>
<tr>
<td>Cd</td>
<td>In</td>
<td>Sn</td>
<td>Sb</td>
<td>Te</td>
<td>I</td>
<td>Xe</td>
<td>Ba</td>
</tr>
<tr>
<td>La</td>
<td>Ce</td>
<td>Pr</td>
<td>Nd</td>
<td>Pm</td>
<td>Sm</td>
<td>Eu</td>
<td>Gd</td>
</tr>
</tbody>
</table>

- Predicted the existence of some elements that had not been discovered at that time.

- Noble gases could be placed without disturbing the existing order.

- No fixed position was assigned to hydrogen.

- No room for...

- At a few instances, an element having slightly greater atomic mass was placed before an element with a slightly lower atomic mass.
2. Modern Periodic Table

Henry Moseley

2.1 Features of Modern Periodic Table

- There are ___________ periods.
- ___________ blocks in the Periodic Table.
- Number of shells increases.
- Number of valence electrons remain the same.
- If shells remain the same, number of valence shell electrons increases.
### 3. Trends in Modern Periodic Table

<table>
<thead>
<tr>
<th>Atomic radius</th>
<th>Valence electrons</th>
<th>Valency = Number of valence electrons</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

- **Atomic radius**: Distance between the center of the nucleus and the outermost shell.

- **Electronegativity**: Discounts electrons to attain stable electronic configuration.

- **Metallic character**: Tends to form bonds by losing electrons (electropositive).

- **Metallic character**: Tends to form bonds by gaining electrons (electronegative).

**Trends**:
- **Atomic radius**: Increases then decreases.
- **Electronegativity**: Increases.
- **Metallic character**: Decreases.
classification of elements

- Österrine triads
- Mendeleev periodic table
- Modern periodic

- Trends in valency
- Trends in atomic radius
- Trends in metallic and non-metallic character
- Trends in electronegative and electropositive character