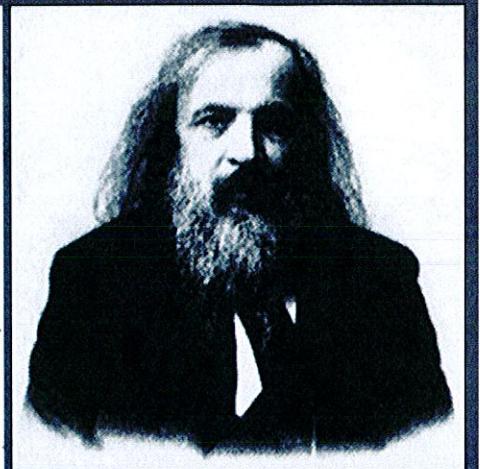


# Mendeleev's Periodic Table

| REIHE | GRUPPE I.<br>—<br>R <sup>2</sup> O | GRUPPE II.<br>—<br>R <sub>2</sub> O | GRUPPE III.<br>—<br>R <sup>2</sup> O <sub>3</sub> | GRUPPE IV.<br>RH <sup>4</sup><br>R <sub>2</sub> O <sub>2</sub> | GRUPPE V.<br>RH <sup>3</sup><br>R <sub>2</sub> O <sub>5</sub> | GRUPPE VI.<br>RH <sup>2</sup><br>R <sub>2</sub> O <sub>3</sub> | GRUPPE VII.<br>RH<br>R <sub>2</sub> O <sub>7</sub> | GRUPPE VIII.<br>—<br>R <sub>2</sub> O <sub>4</sub> |
|-------|------------------------------------|-------------------------------------|---|--|---|--|--|--|
| 1     | H=1                                |                                     |   |  |   |  |  |  |
| 2     | Li=7                               | B=9,4                               | B=11  | C=12   | N=14  | O=16   | F=19   |  |
| 3     | Na=23                              | Mg=24                               | Al=27,3   | Si=28  | P=31  | S=32   | Cl=35,5  |  |
| 4     | K=39                               | Cd=40                               | —<br>Ca=40  | Ti=48  | V=51  | Cr=52  | Mn=55  | Fe=56, Co=59,<br>Ni=59, Cu=63.                     |
| 5     | (Cu=63)                            | Zn=65                               | —<br>Zn=65  | —<br>Zn=68   | As=75   | Se=78  | Br=80  |  |
| 6     | Rb=85                              | Sr=87                               | ?Yt=88  | Zr=90  | Nb=94   | Mo=96  | —<br>Ru=104, Rh=104,<br>Pd=106, Ag=108.            |  |
| 7     | (Ag=108)                           | Cd=112                              | In=113  | Sn=118   | Sb=122  | Te=125   | J=127  |  |
| 8     | Cs=133                             | Ba=137                              | ?Di=138   | ?Ce=140  | —   | —  | —  | —  |
| 9     | (—)                                | —                                   | —   | —  | —   | —  | —  | —  |
| 10    | —                                  | —                                   | ?Ef=178   | ?La=180  | Ta=182  | W=184  | —  | Os=195, Ir=197,<br>Pt=198, Au=199                  |
| 11    | (Au=199)                           | Hg=200                              | Tl=204  | Pb=207   | Bi=208  | —  | —  | —  |
| 12    | —                                  | —                                   | —   | Th=231   | —   | U=240  | —  | —  |



Dmitri Mendeleev

**Figure 2.5** Dmitri Mendeleev's 1872 periodic table. The spaces marked with blank lines represent elements that Mendeleev deduced existed but were unknown at the time, so he left places for them in the table. The symbols at the top of the columns (e.g., R<sup>2</sup>O and RH<sup>3</sup>) are molecular formulas written in the style of the 19th century.

# Henry Moseley's Periodic Table

# Periodic Trends

- 1<sup>st</sup> Periodic Table - developed by Dmitri mendeleev
  - organized in order of increasing atomic mass
    - ↳ some elements seemed out of place
- modern Periodic Table - developed by Henry moseley
  - arranged in columns by increasing atomic #
  - elements in columns (groups) share similar properties

## Trends

### Melting & Boiling Points

metals - high mp & bp

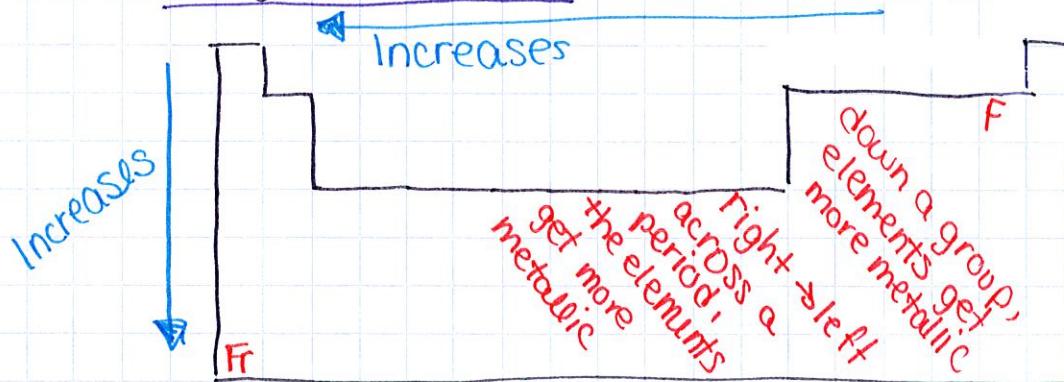
Ex

Ti mp = 1660.0°C bp = 3287.0°C

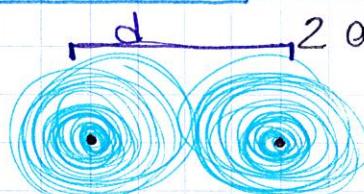
Nonmetals - low mp & bp.

O mp = -218.4°C bp = -183.0°C

### Metallic Character



### Atomic Radius - $\frac{1}{2}$ the distance b/w the nuclei of



2 atoms bonded together  
(measure in picometers)

$$1 \text{ m} = 1 \times 10^9 \text{ pm}$$

### Ionization Energy - energy needed to remove a valence e<sup>-</sup> from an atom, creates an ion

↳ charged atom that has lost/gained e<sup>-</sup>

- Ionic radius -  $\frac{1}{2}$  the distance b/w the nuclei of 2 ions bonded together
- Electronegativity - measure of an atom's tendency to attract  $e^-$  and form bonds. The higher the value, the higher the attraction.