The potassium problem

K must have only 1 valence electron

<table>
<thead>
<tr>
<th>Subshells</th>
<th>#e⁻</th>
<th>each n has n &quot; # of subshells</th>
</tr>
</thead>
<tbody>
<tr>
<td>s</td>
<td>2</td>
<td>n=1 1s</td>
</tr>
<tr>
<td>p</td>
<td>6</td>
<td>n=2 2s 2p</td>
</tr>
<tr>
<td>d</td>
<td>10</td>
<td>n=3 3s 3p 3d</td>
</tr>
<tr>
<td>f</td>
<td>14</td>
<td>n=4 4s 4p 4d 4f</td>
</tr>
</tbody>
</table>

Electrons go into lowest energy available subshell

Order of subshell filling

1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p

Electron configuration

\[1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^6 \ 4s^1\]
Use periodic table to fill subshells!

Subshells = Sections of periodic table.

Cl : electron configuration.
  \[1s^2, 2s^2, 2p^6, 3s^2, 3p^5\]

Ti : \((22e^-)\)
  \[1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^{2}\]

W : \((74e^-)\)
let’s start at 37
  \[5s^2, 4d^{10}, 5p^6, 6s^2, 4f^{14}, 5d^{4}\]

Energy level = row # -1

Energy level = row #

Energy level = row # -2

\(\text{H} \quad \rightarrow \quad 1s \quad \rightarrow \quad \text{He}\)
Pd (46e−)

\[ 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^{10}, 4p^6, 5s^2, 4d^8 \]

**Abbreviated electron configuration**

Noble gases are stable because all subshells are full!

\[
\text{Ne: } 1s^2, 2s^2, 2p^6 \\
\text{full full full}
\]

Any electron configuration contains Noble gas Configurations

\[
\text{Mg: } 1s^2, 2s^2, 2p^6, 3s^2 = [\text{Ne}] 3s^2
\]

\[ \text{Ne } e^- \text{ config} \]

- find nearest smaller noble gas
- write its symbol in [brackets]
- continue e− config. after that.
Abbreviated electron config.

These are all ground state electron configs.

C: \[ 1s^2, 2s^2, 2p^2 \] ground state

Some poss. excited states:
- \[ 1s^2, 2s^2, 2p^1, 3s^1 \]
- \[ 1s^2, 2s^2, 3s^1 \]
- \[ 1s^2, 3s^2, 3p^2 \]

Excited states.

Many more combinations

Ions: atoms with a charge.
- Lost e- or gained e-

Na: \[ [\text{Ne}] 3s^1 \]
\[ \text{lose 1}^- \rightarrow [\text{Ne}] = \text{Na}^+ \]

<table>
<thead>
<tr>
<th>Valence electron</th>
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<tbody>
<tr>
<td>1 more e- than Ne</td>
</tr>
<tr>
<td>t chargeable</td>
</tr>
<tr>
<td>lost e-</td>
</tr>
</tbody>
</table>

Stable ions have a noble gas e- configuration.

Na: 11p, 11e- \[ \text{Na}^+ = 11p, 10e^- \]

Cation: positively charged ion.
- Metals usu. form cations