

The periodic table (1869 Mendeleev)

[illegible]

Diagram illustrating a 14-bit bus structure. The bus is divided into two main sections: a 4f section (top) and a 5f section (bottom). The 5f section is further divided into three sub-sections: u (underlined), Np (underlined), and Pu (underlined). A double-headed arrow below the bus indicates a total width of 14 bits.

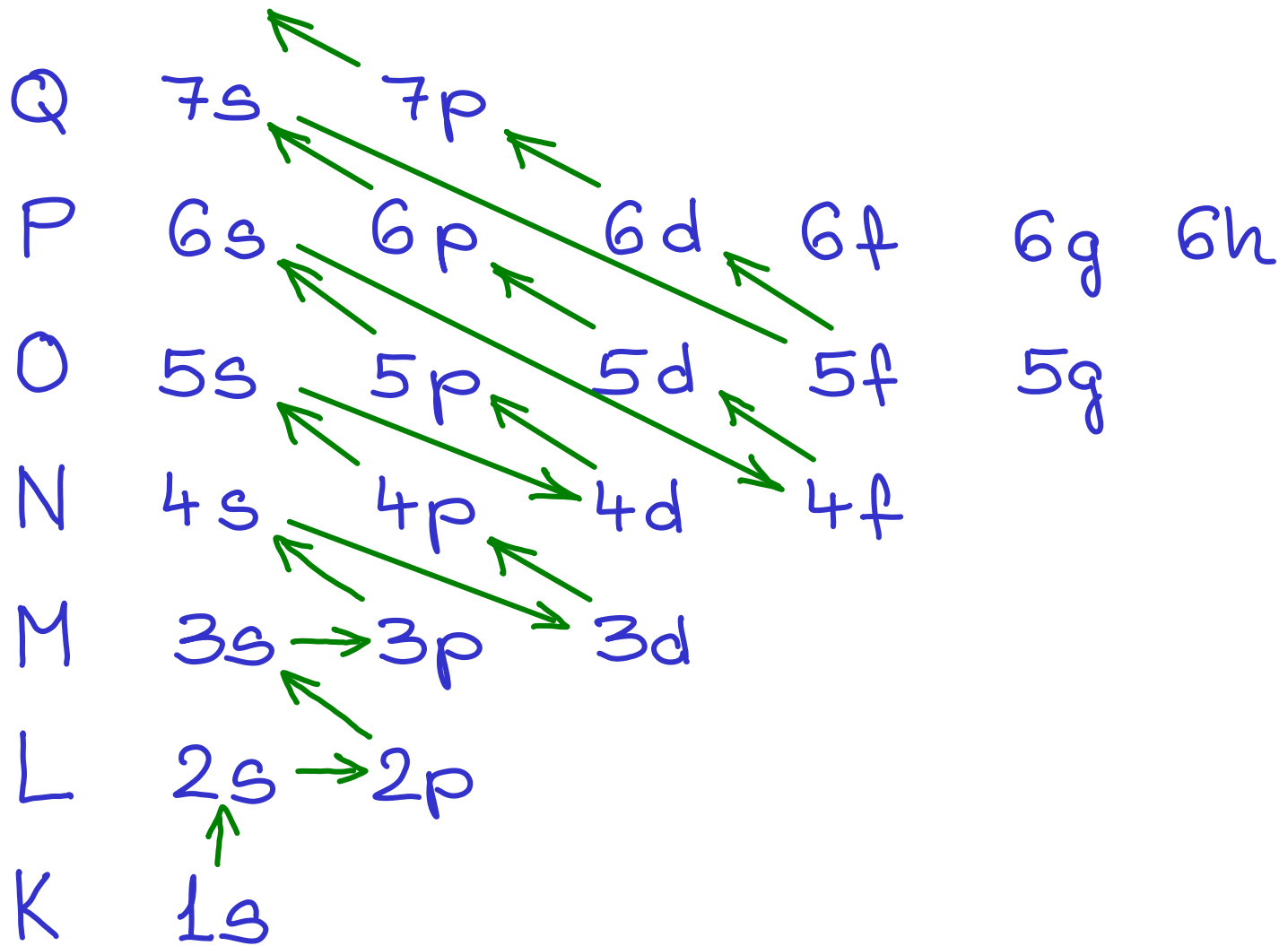
Principles and rules

1. Minimum energy principle
2. Pauli Exclusion Principle: no two electrons in an atom may have the exact same set of quantum numbers n, l, m_l, m_s

Hund's rules

1. The total spin S should be maximized.
2. The total angular momentum L should be maximized.
3. For atoms having subshells less than half full, the total angular momentum J should be minimized.

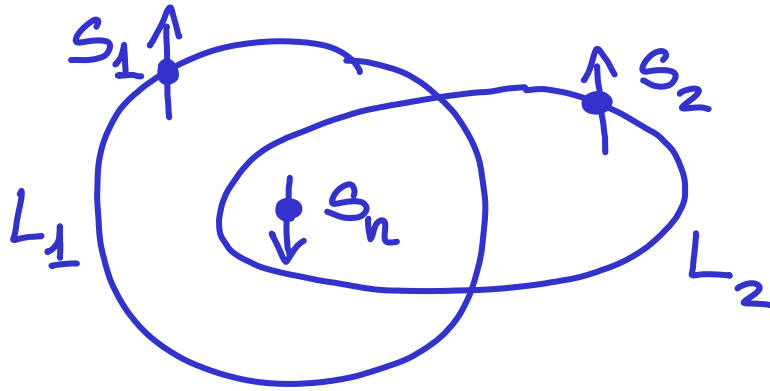
Filling the orbitals



→ increasing $(n+l)$

→ in case of identical $(n+l)$
increasing n

Interactions within the atom



Coulomb: $Z e^+ - e^-$: attractive
 $e^- - e^-$: repulsive

S_{e_1}, S_{e_2} : exchange

$(\vec{S} \cdot \vec{L})$: spin-orbit

L_1, L_2 : orbit-orbit

S_e, S_n : hyperfine

↓
weaker

Pig barn model of the atoms

