

Qualitative understanding of many-electron atoms

1. centr. field $\Upsilon(r)$ "close" to $+Ze$ nucleus

$$V(r) = -\frac{Ze^2}{r}$$

the ratio $R(r)$

$$R(r) = \frac{\Upsilon(r)}{V(r)} = \frac{\Upsilon(r)}{-\frac{Ze^2}{r}}$$

is such that close to nucleus, $R(r \rightarrow 0) \rightarrow 1 - \frac{5}{16Z} \approx 1$ while for large r $R(r \rightarrow \infty) \rightarrow \frac{1}{Z}$

$$(1s)^2 (2s)^2 (2p)^6 \rightarrow \text{Ne}$$

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$$(1s)^2 (2s)^2 (2p)^6 (3s)^2 (3p)^6 (3d)^{10} \rightarrow \text{Ni} \quad \text{But this does not work}$$