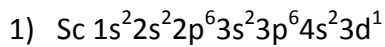
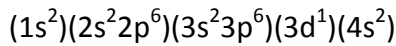


Resolução (átomos)



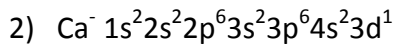
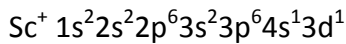
Tanto os electrões 4s como os 3d são de valência. É preciso ver qual a energia de cada um deles para saber qual é arrancado.



$$Z_{\text{ef}}(3d) = 21 - 18 = 3$$

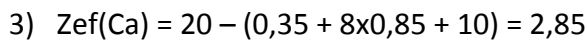
$$Z_{\text{ef}}(4s) = 21 - (0,35 + 9 \times 0,85 + 10) = 3$$

$$E_i \propto (Z_{\text{ef}}/n)^2 \Rightarrow E_i(3d) > E_i(4s)$$

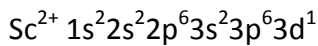
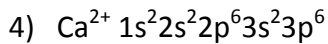


$$Z_{\text{ef}}(\text{Ca}^-) = 20 - (0,35 + 9 \times 0,85 + 10) = 2$$

$$E_i \propto (Z_{\text{ef}}/n)^2 \Rightarrow E_i(\text{Sc}) > E_a(\text{Ca})$$



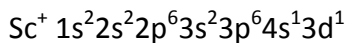
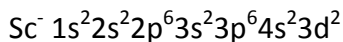
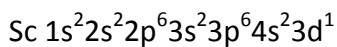
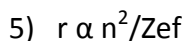
$$E_i \propto (Z_{\text{ef}}/n)^2 \Rightarrow E_i(\text{Sc}) > E_i(\text{Ca})$$



$$Z_{\text{ef}}(3p\text{Ca}) = 20 - (7 \times 0,35 + 8 \times 0,85 + 2) = 8,75$$

$$Z_{\text{ef}}(3d\text{Sc}) = 21 - 18 = 3$$

$$E_i \propto (Z_{\text{ef}}/n)^2 \Rightarrow E_i(3p\text{Ca}) \gg E_i(3d\text{Sc})$$



$$Z_{\text{ef}}(4s\text{Sc}^+) > Z_{\text{ef}}(4s\text{Sc}) > Z_{\text{ef}}(4s\text{Sc}^-) \Rightarrow r(+1) > r(0) > r(-1)$$

6) (b) porque o Zef é maior em 0,5 (um electrão no nível 3d contribui com 0,85 enquanto o mesmo electrão em 4s só contribui com 0,35).

