8.4

Ar $3p^6 \rightarrow 3p^5 4s^1$

Kr $4p^6 \rightarrow 4p^5 5s^1$

9.5

K $1s^2 5s^2 2p^6 3s^2 3p^6 4s^1$

V $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$

Se $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$

FERMILAB
ENGINEERING NOTE

SECTION	PROJECT	SERIAL-CATEGORY	PAGE

SUBJECT

NAME

DATE

REVISION DATE

8.12

Zr ... $5s^2 4d^2$

$S = 1 \quad L = 3 \rightarrow \quad J = 3+1, \ldots, (3-1)$

$= 4, 3, 2$

$^{2S+1}L_J \qquad ^3D_4 \quad ^3D_3 \quad ^3D_2$

hund's rules

smallest J smallest energy $^3D_2$

8.14

no spin orbit $\Rightarrow$ $L=0$ $\cup$ $S=0$

$L=0$ H, Li, Na, K

$S=0$ Be, Mg, Ca, He, Ne, Ar

#5

∞ well

$$\psi_n(x) = \sqrt{\frac{2}{L}} \sin \frac{n\pi x}{L}$$

$$E = \frac{n^2 \pi^2 \hbar^2}{2mL^2}$$

a)

let $E_1 = \frac{\pi^2 \hbar^2}{2mL^2}$ and $E_2 = \frac{4\pi^2 \hbar^2}{2mL^2}$

ground state $E = 2E_1$

first excited state $E = E_1 + E_2$

b) not identical

	n_1, n_2	
ground	1, 1	1
first	1, 2	2 (one in the other could be excited)
	2, 1	

b) not identical with $S = 1/2$

	# space states	# spin states	total
ground	1	4	4
1st	2	4	8

c) identical with spin $S = 1/2$

now the overall wave function must be antisymmetric

	space	spin	total
ground	S(1)	A(1)	1
1st	S, A	A(1), S(3)	4

d

	space	spin	total
ground	S	S	1
1st	S	S	1