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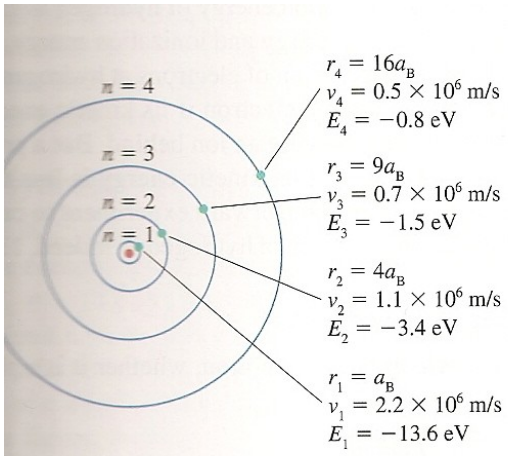
Complementary exercises for all groups, 7th of July 2011 at 12:00

Problem 1

a) An electromagnetic wave of intensity 300W/m² is incident normally on a rectangular black card with sides of 25 and 25 cm that absorbs all the radiation. Find the force exerted on the card by the radiation.

b) Find the force exerted by the same wave if the card reflects all incident radiation.



8.23 The first four stationary states, or allowed f the Bohr hydrogen atom drawn to scale.

TABLE 38.2 Radii, speeds, and energies for the first five states of the Bohr hydrogen atom

n	r_n (nm)	v_n (m/s)	E_n (eV)
1	0.053	2.19×10^6	−13.60
2	0.212	1.09×10^6	−3.40
3	0.476	0.73×10^6	−1.51
4	0.846	0.55×10^6	−0.85
5	1.322	0.44×10^6	−0.54

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Problem 2

What is the smallest wavelength in the absorption spectrum of hydrogen?

Problem 3: Atomic physics - Bohr's atomic model

The allowed energies of a simple atom are 0.0eV, 2eV and 4,5eV.

a) Draw the atom's energy-level diagram. Label each level with the energy and the quantum number.
b) What wavelengths appear in the atom's emission spectrum?
c) What wavelengths appear in the atom's absorption spectrum?

Problem 4 (quantum physics - electron configuration)

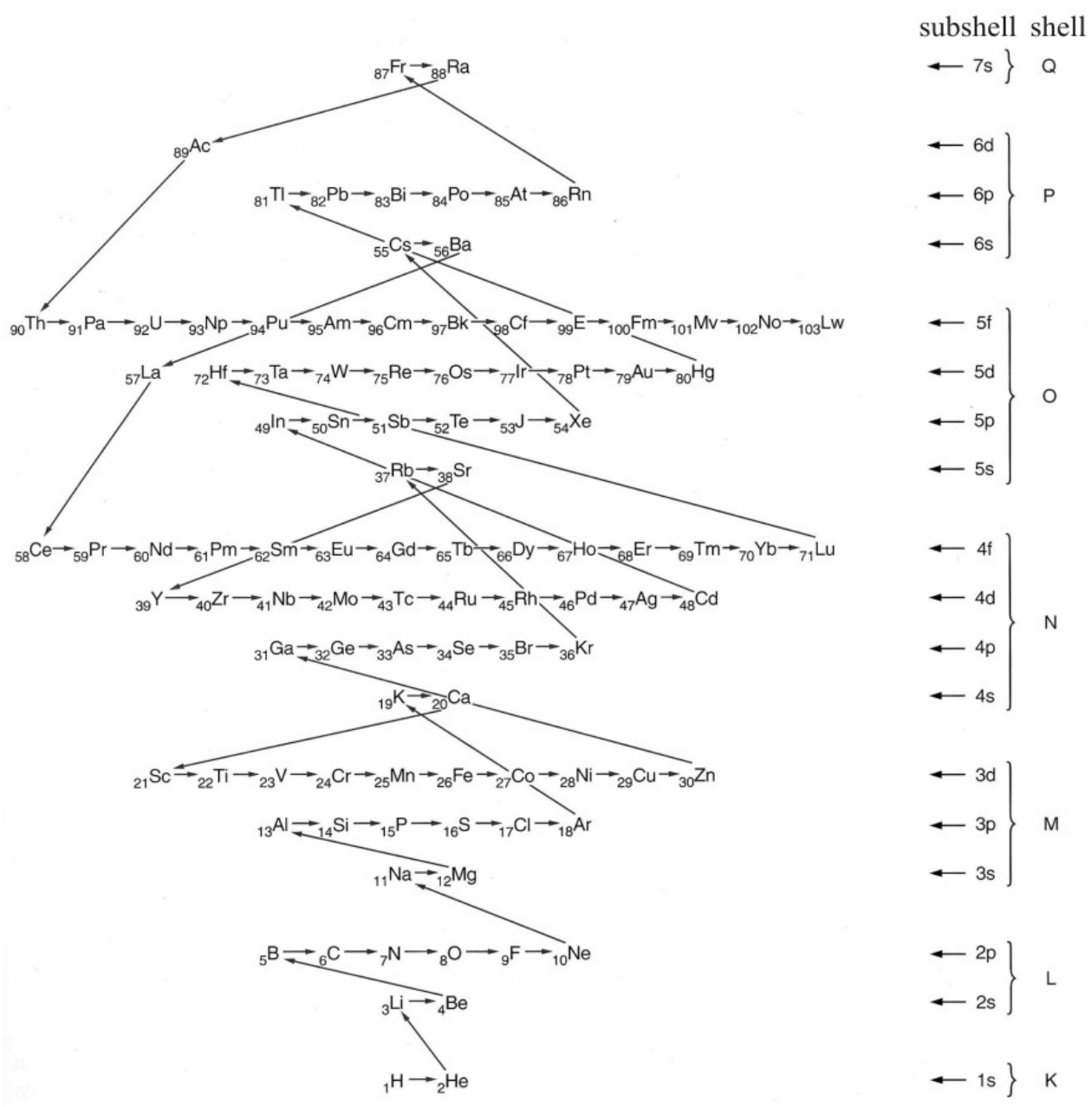
Use attached drawing to solve the problem

(a) Identify the element for each of the following electron configurations. Then determine whether it is the ground state or an excited state.

- $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$
- $1s^2\ 2s^2\ 2p^4 3\,d^1$

(b) Predict the ground-state electron configuration of Ge (Germanium).

(c) Draw the electronic configuration with all energy-levels and quantum numbers for K (Potassium).



Electron configuration

Problem 5:

What is the binding energy of the $^{56}_{26}Fe$ nucleus?

Problem 6:

For the principle quantum number n=3, what are the possible values of the quantum numbers l end m?

Problem 7:

Write down the electron configuration of carbon and oxygen.

Problem 8:

Write down the electron configuration of aluminium and chromium.

This may help you to find the electron configurations: