Inorganic Chemistry 1 QUANTUM THEORY BOHR THEORY

PSEUDO-HYDROGEN ATOM / ONE-ELECTRON SYSTEM CATION (HYDROGEN-LIKE ATOM)

Problem-solving Example 17

Given atoms of He (Z=2); Li (Z=3); Be (Z=4); B (Z=5) and C (Z=6). How many electron(s) must be removed so that the cation has only one electron (one-electron system – pseudo hidrogen atom). Write the process and the cations.

Solution



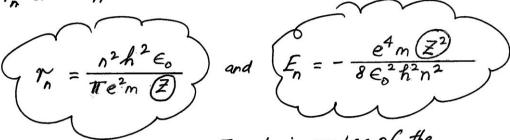
Solution:

He
$$(Z=2)$$
: Ze^{-} He \longrightarrow He $^{+}$ + e^{-}
 $Z=2$
 $Z=2$
 $Z=3$
 $Z=3$

* So Bohr Theory can be applied to these pseudo-hydrogen atoms (one-electron system) ie. Het, Li2+, Be3+, B4+ and C5+.

atoms (one-electron system) ie. Het, Li2+, Be3+, B4+ and C5+.

Due to the number of protons in these cations are different (ie. Het: 2 protons; Li2+3 protons; Be3+, 4 protons; different (ie. Het: 2 protons; Li2+3 protons; Be3+, 4 protons; B4+, 5 protons and C5+, 6 protons), the two formulas for many and En has to be modified as follows:



I = atomic number of the one-electron system cation.

* Both these formulas can be used for any cation @ hydrogen atom which has a single electron.

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