WORKSHEET
“Quantum Mechanics”

Give the orbital notation, the electron configuration, the abbreviated electron configuration, and the quantum number set for the following.

<table>
<thead>
<tr>
<th>Element</th>
<th>Orbital Notation</th>
<th>Electron Configuration</th>
<th>Abbreviated Electron Configuration</th>
<th>Quantum Number Set</th>
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<tbody>
<tr>
<td>Copper</td>
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R1. Excess concentrated aqueous ammonia is added to a solution of nickel(II) nitrate. Which of the reactants acts as a Lewis acid?
1. Give the abbreviated electron configuration of the following: (Give both standard and numerical order forms.)
   
   a. K⁺ ___________________________
   b. Ag⁺ ___________________________
   c. Al³⁺ ___________________________
   d. S²⁻ ___________________________
   e. W²⁺ ___________________________
   f. Cr³⁺ ___________________________

2. Classify each of the following atomic electron configurations as (GS) ground state, (ES) excited state, or (FS) forbidden state.
   
   a. 1s²2s²2p⁶3s² _______
   b. 1s²2s²2p⁶3s²3p⁵4p¹ _______
   c. [Kr]4d¹⁰5s³ _______
   d. 1s²2s²2p⁶3s²3p⁶3d⁸4s² _______
   e. 1s²2s²2p⁶3s²3p⁵ _______

AP1. Which of the following conclusions can be drawn from J. J. Thomson’s cathode ray experiments?
   
   a. Atoms contain electrons
   b. Practically all the mass of an atom is contained in its nucleus
   c. Atoms contain protons, neutrons, and electrons
   d. Atoms have a positively charged nucleus surrounded by an electron cloud
   e. No two electrons in one atom can have the same four quantum numbers

AP2. Which of the following represents the ground state electron configuration for the Mn³⁺ ion?
   
   a. 1s²2s²2p⁶3s²3p⁶3d⁴
   b. 1s²2s²2p⁶3s²3p⁶3d³4s²
   c. 1s²2s²2p⁶3s²3p⁶3d⁴4s²
   d. 1s²2s²2p⁶3s²3p⁶3d³4s²
   e. 1s²2s²2p⁶3s²3p⁶3d³4s¹

AP3. 1s²2s²2p⁶3s²3p³

Atoms of an element, X, have the electronic configuration shown above. The compound most likely formed with magnesium, Mg, is

   a. MgX      b. Mg₂X      c. MgX₂      d. MgX₃      e. Mg₃X₂

Use the following choices to answer AP5-AP8 below:

   a. 1s²2s²2p⁵3s²3p⁵
   b. 1s²2s²2p⁵3s²3p⁶
   c. 1s²2s²2p⁵2p⁶2p⁶3s²3p⁶
   d. 1s²2s²2p⁶3s²3p⁶3d⁵
   e. 1s²2s²2p⁵3s²3p⁶3d⁴4s²

AP4. The ground state configuration of a common ion of an alkaline earth element

AP5. The ground-state configuration of a negative ion of a halogen

AP6. An impossible electronic configuration

AP7. The ground-state configuration for the atoms of a transition element