



## Chapter 4 & 5: Modern Model of the Atom and Bonding

Supplemental Instruction  
Iowa State University

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Course: Chem 163

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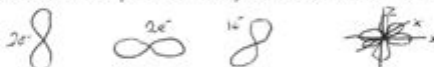
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### Review

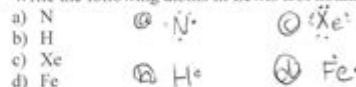
- What is the noble gas configuration of the following atoms and ions?
  - Ar [Ne]  $3s^2 3p^6$  or [Ar]
  - $\text{Na}^+$  [Ne]  $2s^2 2p^6$  [Ne]
  - $\text{C}^{+2}$  [He]  $2s^2 2p^4$
  - $\text{O}^{+2}$  [He]  $2s^2 2p^4$  [Ne]
  - $\text{Ca}^{+2}$  [Ar]  $3s^2 3p^6$  or [Ar]

### New Material

- Define the following terms and answer associated questions.
  - Heisenberg uncertainty principle:** Principle that states that the position and momentum of a subatomic particle cannot be known simultaneously.
  - orbital:** 3D volume in space, cloud like distribution of electrons.
    - What is its maximum capacity?  $2e^-$
  - covalent bond:** Chemical bond where the electrons are shared.
    - What does it represent? The covalent bond represents an energy minimum.
    - Is energy absorbed or released when a covalent bond is formed? Energy is released.
  - bond length:**
    - What causes bond length? the attraction of electrons to the nuclei and repulsion of 2 nuclei.
    - What units is bond length measured in?  $\text{\AA}$  = Angstrom =  $10^{-10} \text{ m}$  = 1m
- How many orbitals are there in any s sublevel? Any p sublevel? Any d sublevel?
  - s = 1 orbital -  $2e^-$
  - p = 3 orbitals -  $6e^-$
  - d = 5 orbitals -  $10e^-$
- Draw the orbitals for the  $2p^5$ . How many electrons are there in each orbital?



- Write the following atoms in Lewis Dot notation.



### Supplemental Instruction

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