

Organic Chemistry - Exercise 1

Distribution: September 25 2025

Help: October 2 2025

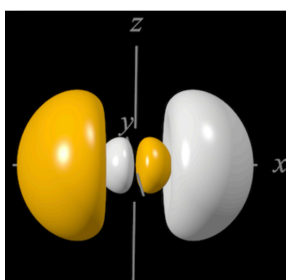
Return until: October 4 2025

1. The Schrödinger equation is a central element to describe quantum-mechanical systems.
 - a. Paraphrase briefly in your own words what the Schrödinger equation is and what it describes!

- b. What is an atomic orbital and how is it graphically represented?

2. The image below shows an atomic orbital at time $t = t_0$.

- a. What is the name of the orbital that is shown, if you have the additional information that this orbital contains at least one electron in a chlorine atom?



- b. Draw schematically how this orbital would look at time $t = t_0 + 2$ s.
- c. Give the two sets of all four quantum numbers for the two electrons that could possibly occupy in this orbital in a chlorine atom.
- d. What is the value of the wavefunction ψ in the point of intersection of all three axes in this case ($x = y = z = 0$) and what is the physical meaning of that?
3. The electron configuration of an atom describes the distribution of electrons onto atomic orbitals.
- a. What are the electronic configurations of carbon, nitrogen, oxygen, phosphorus and argon in their respective ground state?

- b. Schematically draw the starting atomic orbitals and the final hybridized orbitals.

Reading Suggestions:

Clayden, Greeves, Warren, Wothers, *Oxford University Press*, **2001**.

Organic Chemistry, John McMurry, *Thomson Brooks/Cole*, **2008**.

Chimie Organique, Les Grands Principes, John McMurry, *Dunod Editeur*, **2009**.

Chimie Organique, Paul Arnaud, *Dunod Editeur*, **2009**.