

Exercises 3

- 1 An electron orbital ...*
 - a) ... indicates the shape of an electron in a given atom or molecule
 - b) ... indicates the geometry of the area where an electron will be found with a given probability
 - c) ... is part of the atomic nucleus.

- 2 Which of the following statements belong to the essential theorems of the orbital model for atoms?*
 - a) electrons run in circles around the atomic nucleus
 - b) electrons obey to the Schroedinger equation
 - c) electrons occupy electronic orbitals which are characterized by quantum numbers
 - d) each set of four quantum numbers n, l, m, and s is shared by two electrons

- 3 What are quantum numbers? What do they mean? Name examples.

- 4 The periodic table of elements can be divided in groups (vertical lines in the periodic table) and periods (horizontal lines in the periodic table). Which of both combines elements of common chemical properties? Name an example.

- 5 Which part of the periodic table of elements is dominated by non-metallic elements? Name typical examples for non-metals. Name examples for elements which are on the border line between metals and non-metals.

- 6 Which common property is shared by all elements in group VIIa? How are these elements generally named according to their chemical characteristics?

- 7 Gallium (Ga) is an element of the group IIIa in the periodic table. Would you expect it to behave more like indium (In) or more like calcium (Ca) in terms of chemical properties? Justify your answer.

- 8 Assume you discover a new element which has never been described before. According to which rules would you try to fit it into the periodic table? Which properties of the element would you have to know to do this properly?

* One or several answers may be correct. Please indicate appropriately by repeating the assignments a), b), c), ... followed by the statements "right" or "wrong" on your answer sheet.