

# 1. Exercise General Chemistry

28.10.2022

## WS 2022/23

### 1.1

How many electrons can be in the shell with the main quantum number  $n = 6$ ? What atomic number would an element have, in which all shells up to and including  $n = 6$  are fully occupied and there are no electrons in higher shells? Give reasons why such an element does not exist.

### 1.2

Naturally occurring boron is a mixture of the two isotopes with the mass numbers 10 (mass of atom  $m = 1.6624 \cdot 10^{-23}$  g) and 11 ( $m = 1.8279 \cdot 10^{-23}$  g), whereby the particle fraction of the first isotope is 19.78 %. Calculate the average atomic mass of the naturally occurring boron.

### 1.3

Write down the electronic states of the following ions:

$\text{Br}^-$ ,  $\text{K}^+$ ,  $\text{S}^{2-}$  und  $\text{Ga}^{3+}$

### 1.4

Complete the following table:

Element	$Z$	$MZ$	$Np$	$Nn$	$Ne$
	31	69			31
	53	127			54
$\text{Ba}^{2+}$		138			
			13	14	10
Cl				18	

$Z$ : atomic (ordinal) number,  $MZ$ : mass number,  $Np$ : number of protons,  $Nn$ : n. o. neutrons,  $Ne$ : n. o. electrons

### 1.5

Gold crystallizes in a face-centered cubic lattice with the edge length  $4.070 \text{ \AA}$ . The density is  $19.3 \text{ g/cm}^3$ . Calculate the mass of a gold atom from this information

