Inhaltsverzeichnis

1 Training for your profession

Activity 1

Label the following GHS pictograms with the words from the box.

GOGGLES must be worn ■ EXPLOSIVES ■ CORROSIVE ■ FIRST AID ■ FLAMMABLE ■ COMPRESSED GAS ■ OXIDIZING ■ HEALTH HAZARD

1 

2 

3 

4 

5 

6 

7 

8 

Activity 2

Complete the sentences below with the words from the box.

gloves ■ answering machine ■ goggles ■ first aid room ■ [lab]oratory assistant ■ fire extinguisher ■ [lab]oratory coat ■ skilled chemical worker ■ union ■ meeting ■ appointment ■ safety data sheet ■ date

1. You must wear ..... , a ..... and ..... when you dilute acids in a laboratory.

2. Signs will give you important information, e.g. where there is a ..... .
3. A ..... is required, e.g. in chemical factories, schools etc., to help injured people.
4. Leave a clear and efficient message on an ..... .
5. A ..... can be involved in the physical and chemical testing of raw and finished products.
6. A ..... may inspect, maintains and cleans the plant and coordinates the chemical process.
7. When you are training for a job you are not required to join an ..... if you don't want to.
8. ..... are used wherever chemicals are used.
9. You and your colleague must travel to London for ..... with the English branch of your company.
10. After work you will have a ..... with your girlfriend.

Activity 3

Translate into German.

The emergency call should contain the following information:

1. Where did it happen? (town, street, house number, building, room)

.....

2. What happened?

.....

3. How many injured people?

.....

4. What kind of injuries?

.....

5. Wait for questions!

.....

2 Introducing yourself and others

Activity 1

Translate the following dialogue into English. The information in the box may help you.

Formal Conversation (when you are at work)

Good morning	=	Guten Morgen
How are you?	=	Wie geht es Ihnen?
Fine, thank you	=	Danke, gut
My name is …	=	Ich heiße …
I'd like to introduce myself. I'm …	=	Ich möchte mich gerne vorstellen. Ich bin …
I don't believe we've meet before,	=	Ich glaube nicht, dass wir uns schon einmal gesehen haben,
my name is …	=	mein Name ist …
Mrs. Smith, I'd like to introduce you to …	=	Frau Smith, ich möchte Sie gerne … vorstellen
Pleased to meet you	=	Schön, Sie kennen zu lernen
Likewise!	=	Ebenfalls!
How do you do?	=	ist keine Frage, sondern bedeutet nur 'Hallo'
Have a good day	=	Ich wünsche Ihnen einen schönenTag

James: I just wanted to introduce myself, my name is James Baxter.

Richard: Hello! I'm Richard Smith. Nice to meet you, Mr. Baxter.

James: Likewise. I'd like to introduce you to Mr. Chapman.

Lewis: How do you do?

Richard: How do you do?

Activity 2

Translate the following dialogue into German. The information in the box may help you.

Informal Conversation (when you go out with friends)

Hey/Hi	=	Hallo
How are things?	=	Wie geht's?
What's going on?	=	Was ist los?
Charles, this is …	=	Charles, das ist …
Hi. My name is …	=	Hallo. Mein Name ist …
I'm …	=	Ich bin …
Nice meeting you.	=	Freut mich, dich kennen zu lernen.
You too	=	Gleichfalls
So long	=	Bis dann
Bye	=	Auf Wiedersehen

John: Hallo, mein Name ist John.

Jim: Ich bin Jim. Schön, dich kennen zu lernen. John, das ist Kate, meine Freundin.

Kate: Hallo John. Schön, dich kennen zu lernen.

John: You too.

Activity 3

Introduce your classmates to each other in a formal way as well as in an informal way. Change your roles.

5 Telephone Conversation 1

Activity 1

Spell out your name. Your partner has to write down the information.
The information in the box may help you.

Die nützlichste Buchstabierhilfe ist das internationale Buchstabieralphabet der ICAO (International Civil Aviation Organisation).

Hinweis: Amerikaner sagen: ‚A as in alpha' (‚A wie in alpha'); für Z = zee
Engländer sagen: ‚A for alpha' (‚A für alpha'); für Z = zed

Alphabet:

A – Alpha	**F** – Foxtrot	**K** – Kilo	**P** – Papa	**U** – Uniform
B – Bravo	**G** – Golf	**L** – Lima	**Q** – Quebec	**V** – Victor
C – Charlie	**H** – Hotel	**M** – Mike	**R** – Romeo	**W** – Whisky
D – Delta	**I** – India	**N** – November	**S** – Sierra	**X** – X-ray
E – Echo	**J** – Juliet	**O** – Oscar	**T** – Tango	**Y** – Yankee
				Z – Zulu

Name: .....

Activity 2

Your teacher will read out some telephone numbers, dates, times, email addresses and order numbers, and you should enter these into a table like the one given here.
The information in the box may help you.

Telephone no.	.....	.....	.....
Date	....	....	....
Order no.	.....	.....	.....
Time	.....	.....	.....
E-mail address	.....	.....	.....

- Die Zahl Null wird entweder als ‚zero' oder als ‚ouh' ausgesprochen
- Zahlendoppelungen, z. B. 66, können als ‚double six' vermittelt werden
- An die Uhrzeiten werden die Zusätze
  ‚a. m.' (lat.: ‚ante meridiem' = vor Mittag) oder
  ‚p. m.' (lat.: ‚post meridiem' = nach Mittag) angehängt,
  z. B. 11 Uhr 15 = 11.15 a. m. oder 13 Uhr 30 = 1.30 p. m.
- . = dot
- @ = at
- _ = underscore
- - = hyphen

Activity 3

Spell out your name, your address, your email address and your telephone number. Your partner has to write down the information.

1. Name: .....
2. City: .....
3. Postcode, (postal code): .....
4. Street: .....
5. Date of birth: .....
6. Email: .....
7. Country code: ..... area code: ..... phone no.: .....

Activity 4

Simulate another telephone call with your classmates and write down the important information.

.....

.....

.....

.....

8 Basic mathematical operations 1

Activity 1

Read out the following equations and write them down in words.

These information may help you:		
sign	**example**	**in words**
+	+ 3	plus three
–	– 3	minus three
∗, ×, ·	∗3, ×3, · 3	times three / multiplied by three
:, /, —	:3, /3, $\frac{}{3}$	divided by (over) three
	3.5	three point five
	3,500	three thousand five hundred
$\sqrt{x}$	$\sqrt[2]{3}$	second (square) root of three
$\sqrt[n]{x}$	$\sqrt[n\text{-th}]{3}$	n-th root of three
a^x	10^4	ten to the power of four
%	3 %	three per cent, (BE) / percent, (AE)
	=	equal

1. 3 + 3 = 6

. . . . . .

2. 5,200 – 3,000 = 2,200

. . . . . .

. . . . . .

3. 4 ∗ 3 = 12, 4 × 3 = 12, 4 · 3 = 12

. . . . . .

4. $6.6 : 3.0 = 2.2$, $6.6 / 3.0 = 2.2$, $\frac{6.6}{3.0} = 2.2$

5. $\sqrt[4]{16} = 2$

6. $3^3 = 27$

Activity 2

Practise reading and write down the following expressions:

These information may help you:		
sign	**example**	**in words**
( )	(3 + 2)	in brackets three plus two / open bracket three plus two close bracket
[ ]	[5 – 2]	in square brackets five minus two / open square bracket five minus two close square bracket
fractions		**in words**
1/2		one half / a half
1/3		one third / a third
3/4		three quarters
4/5		four fifths

1. $[4.4 - (-4.1 + \sqrt{4.0})] = 6.5$

10 Laboratory ware

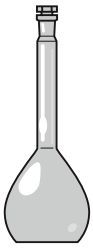
Activity 1

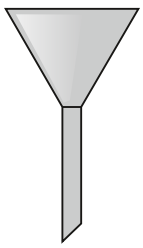
Ten laboratory items are hidden in the following chart. Find the words and translate them into German.

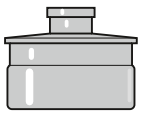
k	l	c	u	m	o	p	s	u	v	w	y	a	c
s	c	e	d	o	r	a	c	k	w	t	a	p	r
t	r	g	e	p	a	c	d	h	k	j	m	t	s
o	u	j	s	t	h	i	o	f	u	n	n	e	l
p	c	l	i	v	j	k	v	c	d	l	r	b	e
c	i	r	c	s	i	a	h	g	r	t	b	m	l
o	b	o	c	k	b	e	a	k	e	r	e	b	a
c	l	r	a	h	i	z	u	o	l	s	a	u	c
k	e	w	t	e	d	i	b	u	r	e	y	r	e
k	a	c	o	b	f	i	l	t	e	r	c	e	s
c	w	b	r	s	n	k	m	z	v	w	b	t	a
k	a	k	s	c	k	u	m	i	d	w	v	t	n
w	t	h	e	r	m	o	s	t	a	t	e	e	t
a	i	a	m	b	k	r	g	b	s	n	a	h	a

Activity 2

Name the objects shown in the pictures and explain what you would do with them!

1 

2 

3 

4 

5 

1 .....

.....

2 .....

.....

3 .....

.....

4 .....

.....

5 .....

.....

Activity 3

Finish the sentences

1. A test tube is a thin glass tube closed at one end and .....

   .....

2. A beaker is a cylindical flat-bottomed vessel usually .....

   .....

3. A crucible is .....

   .....

4. A thermostat is .....

5. A burette is a .....

   .....

Activity 4

Vocab-check – chemistry equipment

English	German	English	German
	Analysenwaage		Rundkolben
	Dreihalskolben		Saugflasche
	Filtertiegel		Scheidetrichter
	Kristallisierschale		Schlauchanschluss
	Kühlschlange		Uhrglas

11 The Bohr Atom[ic] Model

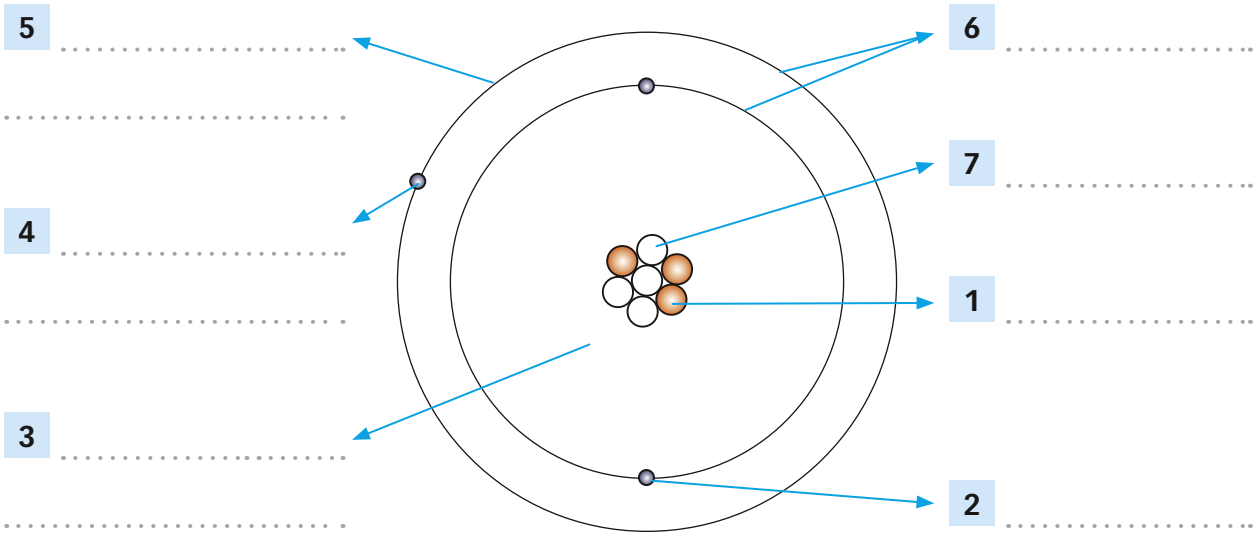
Activity 1

Translate into German.

Niels Bohr, a Danish physicist, proposed his model in 1913. In his Bohr (atom) model the neutrons and protons occupy the nucleus (core) and the electrons orbit the nucleus like planets the sun. Electrons can make transitions between the orbit (shells) by absorbing or emitting exactly the energy difference between the orbits. The energy level an electron normally occupies is called ground state. By absorbing energy it can move to a higher energy level, which is called the electron's excited state. The shells are numbered from 1 to 7 (also K to Q) starting from the inner shell next to the core. The number of electrons in the shells are limited. A shell can only accomodate a maximum of $2 * n^2$ electrons (n = shell number). Bohr's theory was able to explain why atoms emitted light in fixed wavelengths. The simplest example of the Bohr model is for the hydrogen atom but it makes poor predictions regarding the spectra of larger atoms. Although the Bohr model is still used today, most of all in elementary textbooks. A more sophisticated model, the quantum mechanical model, is used much more frequently.

Activity 2

Fill in the English term to the numbers 1–7 in the atom.



Activity 3

Draw an atom and match the ground state and the excited state.

21 Acids

Activity 1

Complete the table below with words from the box.

hydrofluoric acid ■ nitric acid ■ hydrochloric acid ■ acetic acid ■ phosphoric acid ■ sulfuric (sulphuric) acid ■ sulfurous (sulphurous) acid ■ carbonic acid

formula	name
HCl	.....
H_2SO_4	.....
H_2SO_3	.....
HNO_3	.....
H_3PO_4	.....
HF	.....
CH_3COOH	.....
H_2CO_3	.....

Activity 2

Translate into German:

An acid is a compound whose aqueous solutions turn litmus and universal indicator red. If a solution has a pH below 7, it is acidic. Arrhenius defined all substances that increase the hydronium ion $(H_3O)^+$ concentration in aqueous solutions as acids, e.g. HCl gas dissolves in water and forms H_3O^+ ions. Brönsted and Lowry characterized an acid as a substance that is able to release protons. HCl gas is a Brönsted acid because it can act as a proton donor, even in a gaseous state e.g. gaseous HCl and NH_3 combine to a solid. A Lewis acid can accept

a pair of electrons to form a covalent bond, e.g. all metal cations are Lewis acids.

All three definitions for acids are still valid.

Activity 3

Fill in the missing words.

1. An acid is a substance which turns universal indicator .....
2. An acid has an pH number .....
3. When a solution has a pH number under 7 it is called .....
4. Name three definitions of acids: .....
5. Which acid is present in the stomach for breaking down large and complex food molecules? .....
6. Which two acids are ingredients of cola drinks? .....
7. Which acid is used in everyday life as vinegar? .....
8. Acids react in ..... reactions to produce salts.
9. An acid is a proton .....
10. Monoprotonic acids donate ..... proton per molecule. Diprotic acids donate ..... protons per molecule and triprotic acids donate ..... protons per molecule.

29 Alkanes, Alkenes and Alkynes

Activity 1

Translate into German.

The hydrocarbons form a series of compounds containing only the elements hydrogen and carbon. The alkanes form homologous series, that means each member differs from the next by a constant unit, CH_2. The alkanes have the general formula C_nH_{2n+2}, in which n = 1, 2, 3 etc. for successive members of the series. The general formula of the first member methane is CH_4, the second member ethane has the general formula C_2H_6 etc. Alkanes contain single bonds and are considered to be saturated. The physical and chemical properties of the alkanes are similar but change more or less regularly from one member to the next. When the hydrocarbon contain four or more carbon atoms in the molecule, there is a possibility of two or more compounds having the same formula but different structures. This is called isomerism. Alkenes have a molecular formula that may be represented by the general formula C_nH_{2n}. The alkenes contain a double bond between the two carbon atoms. Therefore they are called unsaturated compounds. Alkynes have the general formula C_nH_{2n-2} and contain a triple bond between two carbon atoms. Alkynes are unsaturated compounds like the alkenes.

.....

.....

.....

.....

Activity 2

Find the nine words you need to discover the key word

1										
2										
3										
4										
5										
6										
7										
8										
9										

Key word: ..... .

1. All alkynes contain ..... bonds between two carbon atoms.
2. Alkanes are said to be .....
3. Alkanes are called a ..... series.
4. The first member of the alkanes is called ..... .
5. What is the name of the first member of the alkynes? .....
6. Alkenes are said to be ..... .
7. All alkanes contain ..... bonds between two carbon atoms.
8. Methane, ethane, propane and butane are members of the .....
9. The ..... and boiling points of the alkanes correlate with the molecular mass of the molecules.

34 Contact Process

Activity 1

Build complete sentences with the following phrases.

Contact process ■ manufacture ■ sulfuric acid. ■ first step ■ combustion ■ elemental sulfur ■ sulfur dioxide. ■ sulphur ■ obtained e.g. ■ desulfurization of crude oil. ■ next step ■ catalytic oxidation ■ sulfur dioxide (SO_2) ■ atmospheric oxygen ■ solid catalyst ■ sulfur trioxide (SO_3). ■ sulfur trioxide ■ concentrated sulfuric acid. ■ product ■ fuming sulfuric acid, (oleum). ■ oleum ■ water ■ concentrated sulfuric acid.

Activity 2

Describe the contact process by the chemical equotions:

Activity 3

Hidden in the puzzle are sixteen words. Find the words to complete the sentences below.

s	o	d	i	u	m	c	h	l	o	r	i	d	e
x	c	o	w	i	o	n	i	z	e	s	n	o	r
o	h	v	a	p	o	u	r	h	k	j	m	i	a
l	y	d	i	p	r	o	t	i	c	n	n	n	c
e	d	l	i	v	j	k	v	c	d	l	r	t	t
u	r	r	i	n	d	u	s	t	r	y	b	s	i
m	o	o	h	y	g	r	o	s	c	o	p	i	c
d	g	s	t	i	l	l	a	t	i	o	n	k	n
i	e	a	n	h	y	d	r	i	d	e	m	l	a
r	n	c	o	w	a	l	t	k	l	e	s	e	t
o	x	n	o	n	r	e	a	c	t	i	v	e	e
n	a	b	i	s	u	l	f	a	t	e	s	t	n
w	t	h	s	t	e	e	l	m	a	k	i	n	g
a	i	k	l	s	u	l	f	a	t	e	s	h	a
o	x	y	g	e	n	l	s	u	l	f	u	r	n

1. Sulphuric acid completely ..... in water and therefore a strong acid.
2. Hydrochloric gas can be produced by adding excess concentrated sulphuric acid to .....
3. Fuming concentrated sulfuric acid is called .....
4. Sulfuric acid is a ..... acid.
5. Concentrated sulfuric acid is highly ..... and is therefore used e.g. for drying gases in the laboratory.
6. SO_3 is the ..... of sulfuric acid.
7. Sulfuric acid must be stored carefully in containers made of ..... material, e.g. glass.
8. Sulfuric acid is used in large quantities e.g. by the ..... to remove oxidation (rust).
9. The salts of sulfuric acid are called ..... and .....
10. A molecule of sulfuric acid consists of ....