



Schmidt-Schule Jerusalem

Schulcurriculum
Chemie
Klassenstufen 7 – 8
(English Version)

Stand Februar 2014



The curriculum at hand is based on the "Lehrplan des Landes Thüringen."¹

Learning at Schmidt School

Schmidt's College for Girls, Jerusalem is a place that offers a special learning experience in many ways.

As a purely Palestinian girls' school under the auspices of the Catholic Church, it offers education to students coming from different religious, family and social backgrounds from preschool to graduation after the 12th grade.

From the 7th grade on, it is possible to opt for either the Palestinian Tawjihi or the German DIAP branch.

Schmidt School considers it an essential educational goal to combine specialist and interdisciplinary work with experiences from the personal environment of the students. Holistic learning and education for tolerance are promoted. Solidarity and intercultural competence are taught in order to strengthen the individuality and independence of children and adolescents.

In order to secure this basic education, the development of learning skills is in focus. Learning to learn has an integrative function.

The following capabilities are of paramount importance to be able to study effectively:

- development of the ability and willingness to communicate and cooperate.
- development of an independent problem-solving behavior.
- promoting creativity and imagination
- development of self-confidence and self-discipline, motivation and the ability to concentrate.
- developing the ability to a systematic and logical critical thinking as well as to judgments.

The overall concept of pedagogical action at Schmidt-School is to promote the individual development of the personality and to reflect this individuality. In this context, the following aspects are essential guidelines that need to be taken into account while teaching each subject:

- The mental, social and physical conditions of the individual student should be taken into consideration (internal differentiation *Binnendifferenzierung*)
- A close cooperation with families, social workers, volunteers and the entire school staff is vital to ensure that each student's individual needs are catered to.

To ensure this, education at Schmidt's is oriented towards a teaching that comprises the student's actual life circumstances by:

¹ Thüringer Ministerium für Bildung, Wissenschaft und Kultur (2012): Lehrplan für den Erwerb der allgemeinen Hochschulreife, Chemie.



- building on the experiences of the students,
- bearing reference to actual circumstances and events,
- bearing reference to historical circumstances, events and traditions,
- including diverse student activities,
- striving for a cross-disciplinary, problem-oriented work
- promoting individual and group learning in various work- and social forms
- promoting communication and a critical reception of information and media
- creating events and opportunities for intercultural learning

A future-oriented teaching, which aims to prepare children and adolescents to take on responsibilities in their respective families, the state and the society they live in, needs to incorporate perspectives which reflect the complexity of life and the environment.

The present curriculum therefore encourages the cooperation of teachers throughout different subjects. (Interdisciplinary teaching - *Fächerübergreifender Unterricht*). This can be done through interdisciplinary teaching itself or by teachers simply giving reference to other subjects in their teaching. It requires a good synchronization between the teachers involved. Schmidt School commitment to interdisciplinary work is reflected in the curriculum where reference subjects are mentioned. This does not exclude the possibility for further cooperation.

Schmidt's education towards knowledge, values and personality development is included in a concept of basic education which strives to enable the students to responsibly live in international communities. The basic education aims to develop the ability to reason and encourages freedom of thought, judgment and action, whenever consistent with the self-determination of other people.

It is a goal to enable all students to take an active role in school life. They should participate with their rights and obligations and be able to later on study and work in an international, community of humanistic values.

Language sequence at Schmidt School - the prerequisite for a multilingual education

In a world, in which social and scientific discourse, as well as economic relations, run increasingly on an international level, the training in several languages is of particular importance. The ability to use language skills in the context of technical and substantive expertise is one of the foundations of an education that aims to provide tools for a self-determined, responsible and reflected life at a national and international level. The particular social and political situation and the student's daily encounter with the Israeli / Palestinian conflict make these skills even more important.

In addition to their mother tongue of Arabic, German as a Foreign Language (*DAF*) is taught starting first grade, followed by English which is introduced in 2nd grade. This early start ensures the students' advanced competence in the languages and access to all internationally oriented schools and post-school education paths.



From the 7th grade on, the students also receive tuition in Hebrew. This provides them with the necessary linguistic skills to participate in the process of regional development as well as being able to keep track of the regional discourse in a confident and autonomous manner.

Chemistry in Schmidt-Schule

The subject of Chemistry contributes in many areas to help promote the character of Schmidt-School as a meeting ground for people of different languages, religions, nationalities and personal backgrounds.

Chemistry lessons of grade 7 and 8 provide a basic education of the subject. They promote the independence of the students and encourage them to practice methods of acquiring knowledge following scientific methods.

Chemistry at Schmidt-Schule is taught in the English language starting from grade 7 using the books "Complete Chemistry"², "A New Certificate Chemistry"³ and "GCSE Chemistry Complete Revision & Practise"⁴.

Syllabus aims and objectives

A: Knowledge with understanding

Students should be able to demonstrate knowledge and understanding in relation to:

- Scientific phenomena, facts, laws, definitions, concepts and theories.
- Scientific vocabulary, terminology and conventions (including symbols, quantities and units).
- Scientific instruments and apparatuses, including techniques of operation and aspects of safety.
- Scientific quantities and their determination.
- Scientific and technological applications with their social, economic and environmental implications.

B: Handling information and problem solving

Students should be able to use written forms of presentation (i.e. symbolic, graphical and numerical) to:

- Locate, select, organise and present information from a variety of sources.
- Translate information from one form to another.

² Gallagher, R.; Ingram, P. (): *Complete Chemistry*. Oxford: Oxford University Press.

³ Holderness, A. and others (1986): *A New Certificate*. London: Heinemann Educational Books.

⁴ Parsons, R.; Shepperson, A.: *GCSE Chemistry Complete Revision & Practise*. Cambridge: Coordination Group Publications Limited.



- Manipulate numerical and other data.
- Use information to identify patterns, report trends and draw conclusions.
- Present reasoned explanations for phenomena, patterns and relationships.
- Make predictions and draw up hypotheses.
- Solve problems, including some of a quantitative nature.

C: Experimental skills and investigations

Students should be able to:

- Know how to use techniques, apparatuses and materials (following a sequences of instructions where appropriate).
- Make and record observations, measurements and estimates.
- Interpret and evaluate experimental observations and data.
- Plan investigations, evaluate methods and suggest possible improvements (including the selection of techniques, apparatuses and materials).

Some possibilities for internal differentiation (*Binnendifferenzierung*) are specified in the curriculum. In addition, the teacher provides extra material for internal differentiation according to the topics and materials that are offered. In order to improve the self-organization of doing their homework, it could be given to the students in the form of weekly tasks.

The assessment of prior knowledge can be given either orally or in a written form according to the needs.

Assessment

It is the teacher's duty to prepare the lessons in a way that he/she can observe, monitor and evaluate the learning and working behavior as well as the progress of the pupils. The final mark consists to 50% of written exams (generally 2-4 written exams per school year) which refer to previous lessons. The remaining 50 % of the final mark are subject to other ways of assessment, namely oral participation (30%) and quizzes (20%). Quizzes should not exceed the length of 10 min (max) and only cover contents of the previous lesson. Mistakes in grammar, spelling, etc. do not affect the results of an exam as long as it does not interfere with the proper understanding. (Exception: vocabulary tests)

The assessment should take educational and professional principles into account. It should be balanced with regard to the content, the number and ways of assessment and the levels of competences.



Three levels of requirements must be taken into consideration when assessing pupils' learning behavior during the lesson and with written and oral tests:

Level of Requirements I (reproduction)

includes the reproduction of chemical facts learned in context and a description and use of techniques and procedures.

Level of Requirements II (reconstruction/transfer)

includes the independent handling of known chemical topics and issues as well as the independent transfer to comparable issues.

Level of Requirements III (creative redesign)

includes methods of problem solving with critical interpretation of the results.

In each of the three levels of requirements, methods learning and social and personal skills should be taken into consideration. In addition, daily exercises, homework, short lectures, results of group work, results from project work, minutes of experiments, etc. should be assessed. As stated before, assessment should not be reduced to just giving "marks".

Instead, the teacher evaluates the students by studying the strong and weak points in each individual. The overall development of students should be monitored and evaluated on a regular basis. The teacher gives extra worksheets or assignments to high achievers and hands over responsibility to some stronger students who are willing to help weaker ones. These additional tasks should be included in the general assessment.

In some cases, when a problem is noticed among a group of students, there is the possibility to give an extra tutorial lesson after school or on a weekend to help weaker students.



Schulcurriculum Chemie DIAP

Fach	Chemistry DIAP
Klassenstufe	Grade 7

Kompetenzen Die Schüler können...	Inhalte	Methodenkompetenz	Sonstiges (z.B: extracurriculare Aktivitäten, fächerverbindender Unterricht)	Operatoren
Particles in Chemistry – Chapter 1 „Complete Chemistry“ (ca. 13 weeks)				
Using the theory of particles, students are able to explain how particles are arranged in solids, liquids, gases. Explain how gases diffuse.	A gas has no fixed shape or volume, but always spreads out to fill any container There are greater forces of attraction between particles in liquids compared to gases In solids, particles are too strongly held together The lighter the particles of a gas, the faster the gas will diffuse	Draw diagrams of particles in solid, liquid, gas states. Operate a cooker. Write a lab report. Experiment for diffusion of gases: - cotton soaked with ammonia and another soaked with hydrochloric acid in an open-sided tube, the distance of the white smoke is measured	group work water cycle in nature  Biology experiment: melt ice, melt sugar ->create candy presentation about smells as a gas particles sent to the brain  Biology 7/8 diffusion of gases	explain measure



<p>Students should be able to differentiate between types of mixtures</p> <ul style="list-style-type: none">- use different techniques in the lab to separate mixtures- explain the relationship between temperature and solubility of gases and solids- understand the principle of combustion converting fuel into heat- understand that water consists of hydrogen and oxygen in a fixed ratio 2:1 in a chemical reaction	<p>A solution is a clear mixture made of two or more substances seen as one layer</p> <p>An immiscible mixture is when two solvents don't mix.</p> <p>Students learn to differentiate between water as a compound, and air as a mixture.</p> $2H^2 + O^2 \rightarrow 2H^2O$ <p>(Oxidation)</p>	<p>Use different techniques in the lab to separate mixtures:</p> <ul style="list-style-type: none">- distillation of copper-sulphate-solution- Chromatography for dyes- fractional distillation- filtration <p>→ students experiment:</p> <ol style="list-style-type: none">1) separating salt, sand, water2) iron fillings - sulphur	<p>short presentation about solubility of carbon dioxide in fizzy drinks (effect of temperature)</p> <ol style="list-style-type: none">1) purification of water using simple distillation for getting pure water from sea water2) to purify sewage water (hotels, hospitals)	<p>differentiate</p> <p>deduce</p>
<p>Students are able to find the state, melting point and boiling point using a heating curve</p>	<p>No two substances have the same melting, boiling point</p> <p>→ are used to identify a substance</p> <p>- Impurities change melting and boiling point</p>	<ul style="list-style-type: none">- experiment to identify different solvents from their boiling and melting point- test the purity of known substances from their melting and boiling point experimentally	<p>research about the importance of checking the purity of substances</p>	<p>identify</p>



<p>Students know properties of hydrogen and how to test for it</p> <p>Students are able to use electrolysis apparatus to split water into hydrogen and oxygen</p> <p>Students are aware of the possibility of using hydrogen as a future fuel</p>	<p>→ they are used to say whether a substance is pure or not.</p> <p>Hydrogen mixed with air causes an explosion. (<i>Knallgasprobe</i>)</p>	<ul style="list-style-type: none"> - experiment with hydrogen and oxygen - operate electrolysis apparatus - write reports and discuss the results after each experiment 	<p>safety hazards and fire protecting measures at Schmidt-Schule</p>	
<p>DIAGNOSE/TESTUNG (1-2 tests can be given within this unit)</p>				

Atoms, Elements, Compounds - Chapter 2 „Complete Chemistry“ (ca. 7 weeks)

<p>Students are able to differentiate between metals and non-metals and:</p> <p>metals and non- metal-oxides</p> <p>Students are able to calculate relative atomic</p>	<p>An element is a substance that is made of only one kind of atom.</p> <p>All metals conduct electricity and heat and can be bent into shapes, but each of them has special properties.</p> <p>Isotopes are atoms of the same element with the same number of protons, but different</p>	<p>Study the elements available in the lab and compare their physical properties</p> <p>Transition metals: are characterized by high density, high tensile strength, good heat and electrical conductors. The metals and their compounds have good catalytic properties, and form coloured complex</p>	<p>presentation about uses of transition metals:</p> <ul style="list-style-type: none"> - Iridium - Platinum - Osmium - Zirconium <p>extra worksheet for weak students about isotopes</p> <p>research about uses of radioactive elements in medicine</p>	<p>differentiate compare</p> <p>calculate</p>
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masses for isotopes	number of neutrons			
Students are able to find the number of electrons, protons and neutrons. They are able to draw them. <i>(Bohr'sches Atommodell)</i> Students are able to predict chemical properties of elements in the periodic table i.e. reactivity also physical properties such as boiling or melting point	Number of protons (atomic number) is used to identify the element. The mass number equals the number of protons + number of neutrons in an atom. Elements in the same group behave alike, as they have the same number of electrons in their outer shell If you know the properties of an element, you can predict the properties of other elements in that group.	Draw a sketch of neutral and charged atoms of the first 20 elements of the periodic table. experiment1: comparing reactivity of metals in group 1 and group 2 with water. write a report and discuss the results	presentation about some elements in our daily life - Chlorine as disinfectant - Iodine as antiseptic - Sulphur, Nickel and Copper as fungicides	draw predict compare
	Aspartame is a compound used in many products such as cakes and breakfast cereals, in order to give sweet taste		presentations about naturally occurring compounds that are used to sweeten the taste of food	
DIAGNOSE/TESTUNG				

Atoms combining – Why compounds are formed.
Chapter 3 „Complete Chemistry“ (ca. 8 weeks)



<p>Students are able to explain how and why compounds are formed (ionic bonding, covalent bonding)</p> <p>Students are able to write formulas of given compounds and vice versa (law of conservation of mass)</p>	<p>Elements react with each other in order to obtain a full outer shell and so, become stable.</p> <p>The valency of an atom is its numerical capacity to combine with other atoms</p> <p>Compounds must have no overall charge</p>	<p>Working with models, graphs and diagrams.</p> <p>Draw covalent bonding between halogens, oxygens and nitrogens.</p>	<p>Extra worksheet for naming compounds is given to weaker students.</p>	<p>explain</p> <p>draw</p>
<p>Students are able to show by drawing how covalent bonds are formed.</p> <p>They can compare the properties of ionic and molecular compounds.</p>	<p>When two non-metals react, both of them need to gain; their shells overlap in order to share electrons.</p> <p>Ionic compounds have high melting points. This is why they are used as refractory materials.</p> <p>Molecular compounds have boiling points, they can be used as solid air-fresheners.</p>	<p>Study models of available compounds in the lab: H_2, Cl_2, O_2, H_2O, NH_3, CH_4</p>	<p>higher level worksheet for good students about covalent compounds</p> <p>research about uses of ionic and molecular compounds</p>	<p>draw</p> <p>compare</p>
<p>Distinguish the allotropes of Carbon: Diamond and Carbon</p>	<p>Graphite has a porous structure, it is slippery black, solid, used in pencils</p>	<p>Draw the structure of diamond and graphite.</p>		<p>distinguish</p> <p>draw</p>



Diamond: has very high melting point, it is a colourless crystal. This crystal refracts light strongly. It is used in Jewellery and cutting tools.

compare

DIAGNOSE / TESTUNG



<p>charges on ions present</p> <p>3.) calculate Empirical formula and Molecular formula</p> <ul style="list-style-type: none"> - percentage mass of elements in compounds - stoichiometric masses and volumes of solution concentration expressed in g/dm^3 mol/dm^3 	<p>One mole of atoms or molecules of any substance in grams, is a RAM or RMM.</p> <p>Isotopes are different atomic forms of the same element which have the same number of protons but different number of neutrons.</p>	<p>Experiment -1- to find the empirical formula of Magnesium Oxide</p> <p>Experiment -2- to prepare solutions of different molarities</p> <p>- writing a report after each experiment</p>	<p>- additional papers for weak students about calculations</p> <p>- extra worksheet for strong students about limiting reactants and percentage yield</p>	<p>calculate</p> <p>construct</p>
<p>DIAGNOSE / TESTUNG (1-2 tests will be written on these topics)</p>				
<p>Physical and Chemical Change (ca. 9 weeks)</p> <p><i>Chapter -5- 'Complete Chemistry'</i></p>				
<p>Students are able</p> <p>1.) to define Chemical Change and Physical Change.</p> <p>2.) to explain signs of</p>	<p>When no new chemical substance is formed, a change is called a Physical Change</p> <p>- heat is given in or out in a Chemical Change</p>	<p>Experiment -1- Rusting (iron nail) in Hydrochloric acid</p> <p>Experiment -2- Decomposition of Calcium Carbonate to</p>	<p>Worksheets to differentiate between Physical and Chemical Change</p> <p> Biology: presentation of Metabolism - food in the body is digested</p>	<p>define</p> <p>explain in own words</p>



<p>Chemical Change</p> <p>3.) to write word equations and transfer them into balanced equations.</p> <p>4.) to do calculations from equations.</p> <p>5.) to understand redox reactions as losing or gaining electrons</p> <p>6.) to understand the importance and use of alloys</p>	<p>Chemical Change is usually difficult to reverse.</p> <p>- number of atoms are the same on both sides of the equation</p> <p>The law of Conservation of Mass states that the total mass remains unchanged during a chemical reaction.</p> <p>Any chemical equation shows the overall Chemical Change.</p> <p>OIL = oxidation is losing electrons</p> <p>RIG = reduction is gaining electrons</p> <p>steel is made from 70% iron, 20% chromium and 10% nickel</p>	<p>find the volume of Carbon Dioxide using syringe method and to compare it to the theoretical one</p> $\text{CaCO}_3(s) \xrightarrow{\Delta} \text{CaO}(s) + \text{CO}_2(g)$ <p>Reports are written after each experiment</p>	<p>sugar (especially, digesting with amylase (saliva))</p> <p>Models are used to show how atoms are rearranged during a reaction.</p>	<p>calculate</p>
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DIAGNOSE / TESTUNG (A test will be written on these topics)



Acids and Alkalis (ca. 7 weeks)

Chapter -9- 'Complete Chemistry'

<p>Students are able</p> <p>1.) to define acids and alkali compounds</p> <p>2.) to write the formula of some acid und alkali compounds and naming them</p> <p>3.) to distinguish between weak and strong acid and alkalis (ARRHENIUS – Theory)</p> <p>4.) to compare reactivity of metals by reacting them with diluted acids and compare their results with the theoretical one</p>	<p>-an acid solution has a PH less than 7</p> <p>- an alkaline solution has a PH greater than 7</p> <p>- a neutral solution has a PH exactly 7</p> <p>-acids and alkalis neutralize each other</p> <p>-PH rises rapidly when neutralization is complete</p> <p>- Conductivity reaches its lowest</p> <p>- neutralization is a thermic reaction</p> <p>weak acids and alkalis ionize partially in water</p> <p>- the more reactive the metal, the faster the reaction with acid will go</p> <p>- Hydrogen gas is confirmed by the burning</p>	<p>Experiment -1-</p> <p>Measure PH of substances from the environment: tea, coffee, milk, soap, shampoo, oil... and classify them as acids or alkalis</p> <p>Experiment -2-</p> <p>Tracking neutralization of Hydrochloric acid and Sodium Hydroxide by:</p> <p>- PH</p> <p>-conductivity</p> <p>-temperature</p> <p>$\text{HCl}_{(aq)} + \text{NaOH}_{(aq)} \rightarrow \text{NaCl} + \text{H}_2\text{O}$</p> <p>$\rightarrow \text{H}_{(aq)} + \text{OH}^- \rightarrow \text{H}_2\text{O}$</p> <p>Experiment -3-</p> <p>Diluted acid reacting with</p>	<p>Impact of acid rain on old / antique buildings in Jerusalem</p> <p>Group work about treating factory wastes</p> <p> Biology: presentations about problems of indigestion</p>	<p>define</p> <p>identify</p> <p>classify</p> <p>name</p> <p>distinguish</p> <p>compare</p>
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5.) to know how nitric acids are manufactured and about their importance as e.g. fertilizers – Ammonium Nitrate (Ostwald Process)	splint test - $2\text{HCl}_{(aq)} + \text{Mg}_{(s)} \rightarrow \text{MgCl}_{2(aq)} + \text{H}_{2(g)}$ - $\text{H}_2\text{SO}_{4(aq)} + \text{Zn} \rightarrow \text{ZnSO}_{4(aq)} + \text{H}_{2(g)}$ -copper does not react with diluted acid at all	different metals / metal hydroxides/ metal oxides Writing reports after each experiment and discussing the results	Project about curing different kinds of stings: wasp, ant, bee, nettle... (neutralization) Field trip to salt factory (Jericho, Dead Sea) Worksheet for strong girls about making salts	discuss
DIAGNOSE / TESTUNG (A test will be written on these topics)				