

Präsentation / Presentation

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World Education Leadership Symposium Online Conference (WELSONline)

Initiator und Leiter / Initiator and Organizer:

Prof. Dr. Stephan Gerhard Huber

Veranstalter WELSONline 2020 (seit 2009) / Host WELSONline 2020 (since 2009):

Institut für Bildungsmanagement und Bildungsökonomie (IBB) / Institute for the Management and Economics of Education (IBB)
Pädagogische Hochschule Zug (PH Zug) / University of Teacher Education Zug (PH Zug)

Kooperationspartner / Cooperation Partners:

Schulleitungs- und Lehrerverbände, Ministerien und Behörden sowie weitere Hochschulen und Partner / Association of school leaders and teachers, ministries and authorities as well as further universities and partners

Evaluation of an online course on organic chemistry during the COVID-19-crisis

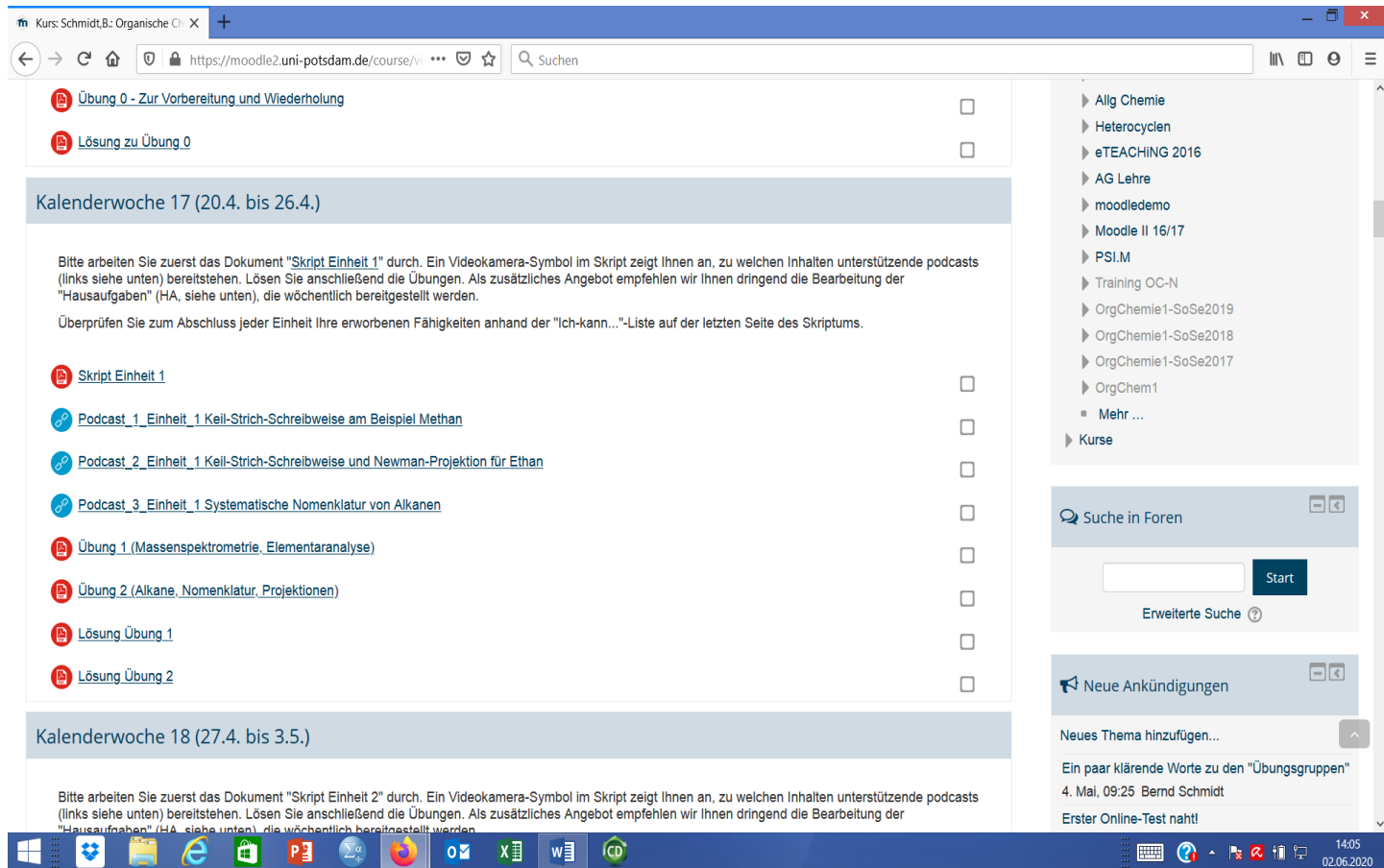
Dr. Jolanda Hermanns

Centre for teacher education and educational research
and
Department of Chemistry
University of Potsdam
Germany

Table 1: Comparison of the course „Organic chemistry for non-major chemistry students“: classroom vs. online

Classroom course	Online course
Lecture (3 h / week)	Weekly script with contents of the lecture (partly in a new structure) and the seminars*
	Podcasts*
Seminar (2 h / week) with preparatory tasks; tasks and solutions on the Moodle platform	Tasks for each week; QR-Codes for task navigators (also new task navigators)*
Power point slides of the lecture on the Moodle platform	Use of the forum of the Moodle platform for discussions and answering questions*
Mechanism script on the Moodle platform	Mechanism script on the Moodle platform
Online tests (obligatory)	Online tests (obligatory)
Homework sheets with QR-Codes ^[4] (facultative) on the Moodle platform	Homework sheets with QR-Codes (facultative) on the Moodle platform
Laboratory (1 week)	Depends on the situation with COVID 19; online replacement*
Written exam (90 min.)	Written exam (90 min.)
Evaluation of the lecture and the seminar: PEP-evaluation (online evaluation instrument of the university of Potsdam)	Evaluation of the online course; own instrument*

Online *new



Kurs: Schmidt, B.: Organische Chemie

https://moodle2.uni-potsdam.de/course/view.php?id=...

Übung 0 - Zur Vorbereitung und Wiederholung	<input type="checkbox"/>
Lösung zu Übung 0	<input type="checkbox"/>

Kalenderwoche 17 (20.4. bis 26.4.)

Bitte arbeiten Sie zuerst das Dokument "Skript Einheit 1" durch. Ein Videokamera-Symbol im Skript zeigt Ihnen an, zu welchen Inhalten unterstützende podcasts (links siehe unten) bereitstehen. Lösen Sie anschließend die Übungen. Als zusätzliches Angebot empfehlen wir Ihnen dringend die Bearbeitung der "Hausaufgaben" (HA, siehe unten), die wöchentlich bereitgestellt werden.

Überprüfen Sie zum Abschluss jeder Einheit Ihre erworbenen Fähigkeiten anhand der "Ich-kann..."-Liste auf der letzten Seite des Skriptums.

Skript Einheit 1	<input type="checkbox"/>
Podcast_1_Einheit_1 Keil-Strich-Schreibweise am Beispiel Methan	<input type="checkbox"/>
Podcast_2_Einheit_1 Keil-Strich-Schreibweise und Newman-Projektion für Ethan	<input type="checkbox"/>
Podcast_3_Einheit_1 Systematische Nomenklatur von Alkanen	<input type="checkbox"/>
Übung 1 (Massenspektrometrie, Elementaranalyse)	<input type="checkbox"/>
Übung 2 (Alkane, Nomenklatur, Projektionen)	<input type="checkbox"/>
Lösung Übung 1	<input type="checkbox"/>
Lösung Übung 2	<input type="checkbox"/>

Kalenderwoche 18 (27.4. bis 3.5.)

Bitte arbeiten Sie zuerst das Dokument "Skript Einheit 2" durch. Ein Videokamera-Symbol im Skript zeigt Ihnen an, zu welchen Inhalten unterstützende podcasts (links siehe unten) bereitstehen. Lösen Sie anschließend die Übungen. Als zusätzliches Angebot empfehlen wir Ihnen dringend die Bearbeitung der "Hausaufgaben" (HA, siehe unten), die wöchentlich bereitgestellt werden.

- ▶ Allg Chemie
- ▶ Heterocyclen
- ▶ eTEACHING 2016
- ▶ AG Lehre
- ▶ moodledemo
- ▶ Moodle II 16/17
- ▶ PSI.M
- ▶ Training OC-N
- ▶ OrgChemie1-SoSe2019
- ▶ OrgChemie1-SoSe2018
- ▶ OrgChemie1-SoSe2017
- ▶ OrgChem1
- ▶ Mehr ...
- ▶ Kurse

Suche in Foren

Start

Erweiterte Suche

Neue Ankündigungen

Neues Thema hinzufügen...

Ein paar klärende Worte zu den "Übungsgruppen"

4. Mai, 09:25 Bernd Schmidt

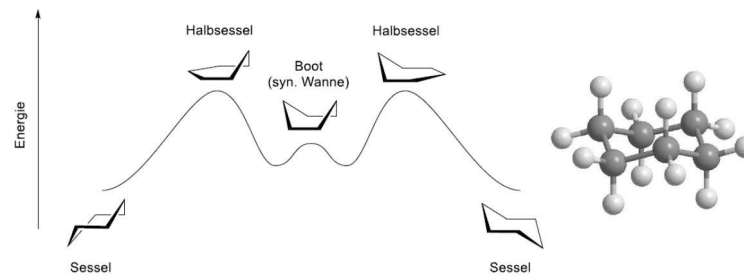
Erster Online-Test naht!

Windows Taskbar: 14:05, 02.06.2020

Die Struktur des Cyclohexanmoleküls ist nicht starr, sondern geht aufgrund der Wärmebewegung permanent **Konformationsänderungen** ein (siehe Abschnitt 2.3 für den Begriff der „Konformation“):

Folie 2.5-e

Die Konformere des Cyclohexans und ihre relativen Energien im Verlauf der Überführung der einen Sesselkonformation in die andere:



[Podcast_2_Einheit_2: Struktur des Cyclohexanmoleküls und Konformationsänderungen](#)

Im Falle von Cyclohexan sind die beiden Sesselkonformationen energetisch gleichwertig. An jedem C-Atom sind zwei Wasserstoffatome gebunden, von denen eines eine **axiale Position** einnimmt, und das andere eine **equatoriale Position**. Bei der Konformationsänderung von einer Sesselkonformation in die andere (die über die energiereicheren Halbsessel- und Wannenkongformationen verläuft) wechseln die H-Atome von einer axialen in eine equatoriale Position bzw. umgekehrt:

Table 2: List of podcasts and download numbers

Podcast	Downloads week 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Wedge-dash notation of methane	189	227	247	257	264	265	265	268	269	269	271	271	272	272
Wedge-dash notation and Newman projection of ethane	124	160	179	187	192	193	194	195	195	195	196	196	196	196
Nomenclature of alkanes	125	160	182	191	201	203	203	204	205	206	206	206	206	206
Angular and torsional stress of cycloalkanes		119	158	166	178	180	181	183	183	183	185	185	185	185
Structure of cyclohexane and changes in conformation		111	156	170	193	198	200	202	202	202	202	202	202	202
Axial and equatorial positions in methylcyclohexane		98	144	155	169	171	172	173	173	173	173	173	173	173
Introduction of reaction mechanisms		101	133	142	147	150	153	155	155	155	155	155	155	156
Mechanism of the radical substitution reaction		92	120	129	133	137	141	143	143	143	143	143	143	144
E/Z-configuration and nomenclature of alkenes			88	128	159	164	173	176	177	177	178	178	178	178
The catalytic hydration of alkenes			81	115	125	128	146	149	150	151	153	153	153	154
The electrophilic addition of hydrogen halides			75	104	114	116	131	134	136	136	138	138	138	139
Determination of the absolute configuration at a stereo center			75	101	112	118	123	125	140	143	143	144	144	145
Mechanism of the electrophilic addition of bromine to cyclohexene				78	97	107	117	119	126	126	128	129	129	129
R-, S-nomenclature for the example of two stereoisomers of 1,2-dibromocyclohexane				81	96	107	117	117	136	136	136	136	136	137
Mechanism of the radical addition of hydrogen halides to alkenes				75	88	98	114	115	119	119	119	119	119	119
The rule of Hückel				15	76	83	94	101	133	135	138	138	138	138

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Last podcast in unit 14: 13 downloads

Moodle-Forum:

First 6 weeks: 40 questions by 21 students

During the whole course: 63 question by 23 students

Evaluation of the online course with the use of a questionnaire (online):

1. round:

week 4/5

Two parts: items on the longtime learning behavior (STePS and LIST)
 items on the online learning (own design)

2. round:

Week 11/12

One part: items on the online learning

Evaluation of the teachers who participated with the use of a questionnaire (online):

At the end of the term: items on the online teaching (own design)

Evaluation of the longtime learning behavior (N = 71)

Item	Arithmetic mean	Standard deviation
Overall, I am satisfied with the specialist courses in this subject ¹	3.92	.952
I learn a lot in the specialist courses in this subject ¹	4.03	.985
This subject is important to me personally ¹	3.44	1.065
I am enthusiastic about this subject ¹	3.24	1.035
I find this subject exciting ¹	3.55	.983
I have doubts whether this specialist study is really the right thing for me ¹	1.92	.996
I go through my notes while learning and make an outline with the most important points ²	3.35	1.135
I compile short summaries of the main ideas from transcript, script or literature ²	3.82	1.187
If I have set myself a certain amount of work to learn, I try to make it work ²	4.21	.735
I try hard even when I don't like the material at all ²	3.96	.901
I do not give up, even if the material is very difficult or complex ²	3.66	.970
I also study late at night and on weekends if I have to ²	4.18	.961
It usually takes a long time before I decide to start learning ^{2*}	2.58	1.023
I take more time to study than most of my fellow students ²	3.07	.946
I work until I'm sure I can pass the exam well ²	3.80	.888
When I study, I adhere to a certain schedule ²	3.08	1.168
I set certain times when I learn ²	3.15	1.215
My workplace is designed so that I can find everything quickly ²	4.17	1.055
I have the most important documents at my workplace at hand ²	4.46	.673
If there's something I don't know, I'll ask a fellow student for advice ²	3.82	1.199
I look for missing information from various sources (copies, books, etc.) ²	4.07	.961
Before learning, I think about how I want to learn ²	3.20	1.037
I don't plan my approach to learning ^{2*}	2.70	1.113
I don't worry about my goals in learning ^{2*}	2.41	1.063
After individual sections, I pause to check what I have learned ²	3.07	1.060
If there are questions or tests in the course material, I use them to check myself ²	4.14	.903
I change my curricula when I realize they can't be implemented ²	3.75	.952
I learn in the order in which the learning material is predetermined ²	4.58	.710
When I realize that my approach to learning is not successful, I change it ²	3.76	.948
When I realize that I have misunderstood something, I repeat this part ²	4.20	.768

Five items Likert scale with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

1: From the STEP questionnaire /2: From the LIST questionnaire /*: negatively formulated item (inverted for statistical analysis)

Evaluation of the online course (N = 71)

Item	Arithmetic mean	Standard deviation
The materials provided were helpful for the elaboration of the content	4.10	.928
The tasks in the material and their objectives were clearly understandable	4.15	.980
The objectives of the task were clear to me	4.14	.946
In addition to the materials provided online, I have also used other sources	3.28	1.375
The online course was technically easily available and practicable for me	4.51	.826
I spent as much time preparing and following up on online teaching as I did on classroom courses	2.55	1.156
I have created a schedule for the online learning time	3.44	1.317
I prefer online teaching to teaching in a classroom environment, because this way I can better allocate my time	3.56	1.509
I prefer online teaching over classroom teaching because I can use my own tempo when working on it	3.96	1.419
It was difficult for me to manage the workload I had set myself for online teaching*	2.93	1.211
I prefer classroom teaching because I work more continuously through the fixed date	3.06	1.403
I prefer classroom teaching because the teacher's explanations are very important to me	3.68	1.204
Online teaching has encouraged me to use several sources for the development of content in parallel, rather than as classroom courses	3.18	1.324
I feel as well prepared for exams as I do for classroom courses	2.94	1.068
I feel better prepared for exams as with classroom courses	2.82	1.187
I formed a digital learning group with my fellow students	2.83	1.630
The online tests have motivated me to work continuously on the content of the course	3.72	1.031
The videos provided were helpful	4.25	1.105
For the future, I would like to see a combination of online teaching and classroom teaching	4.04	1.303
Communication with the teacher was easily possible	3.69	1.008
The workload of online teaching (work content and work on tasks) is appropriate	3.72	1.017
Online teaching enables me to coordinate my private interests	4.06	1.068
Online teaching enables me to coordinate my learning time with my student employment	3.61	.978
I am satisfied with my time spent learning in online teaching	3.49	1.182
In online teaching, I work more understanding-oriented than in classroom teaching	3.72	1.197
In online teaching, I pay more attention to basic concepts than in classroom teaching	3.35	1.135
I miss the exchange in a learning group in online teaching	3.42	1.574
I am satisfied with my increase in learning in online teaching	3.76	1.035
It's hard for me to concentrate well on online teaching *	2.72	1.344
I look at online lectures several times in order to better understand the contents	3.48	1.263

Five items Likert scale with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. / *: negatively formulated item (inverted for statistical analysis)

Results of the evaluation (First round):

Correlation analyses (Spearman) / Factor analysis

Students' personal characteristics are relevant for the factors

- Appreciation material
- Preference online
- Preference classroom
- Time management online learning

Results of the evaluation (First round, N = 71):

- Students' appreciation of the online material:
significant correlation with interest in the subject they study ($r_s = 0.53$, $p = 0.000$)
- Doubts about students' decision for studying this subject:
Negative correlation with the appreciation of the online material
($r_s = -0.318$, $p = 0.007$)
- Students' subject interest correlates with their preference of online learning
($r_s = 0.25$, $p = 0.034$)
- The scales representing students' preference for online learning and for classroom teaching correlates negatively ($r_s = -0.74$, $p = 0.000$)
- Students who prefer online learning, feel better prepared to their exam ($r_s = 0.675$, $p = 0.000$) by learning online, students who prefer classroom teaching do not ($r_s = -0.59$, $p = 0.000$)
- The group preferring classroom teaching does not want a combination of online and classroom teaching in the future ($r_s = -0.622$, $p = 0.000$).

Results of the evaluation (Second round, N = 28):

- The workload of the online teaching was rated significantly less positively: the students found it more difficult to manage the workload (Cohen's $d = 0.389$) and rated the workload as less adequate than in the first round (Cohen's $d = 0.868$)
- The students found it harder to concentrate well on online teaching (Cohen's $d = 0.486$)
- The students still miss the exchange in a learning group (arithmetic means: 3.60 vs. 3.55 in the first round)
- The item „the online tests have motivated me to work continuously on the content of the course“ was rated with 3.60 (Cohen's $d = 0.273$)

Conclusion: The students who prefer online teaching want a combination of online and classroom teaching ($r_s = .639^{**}$); the students who prefer classroom teaching don't want this combination ($r_s = -.591^{**}$).

Literature:

The STEPS evaluation instrument: <https://www.qualitaetsoffensive-lehrerbildung.uni-kiel.de/de/dateien-upload/steps-2018-skalenhandbuch> (accessed 2020-06-02)

Boerner, S., Seeber, G., Keller, H., Beinborn, P. „Lernstrategien und Lernerfolg im Studium: Zur Validierung des LIST bei berufstätigen Studierenden“ [[Learning strategies and success in the course of studies: to validate LIST for working students](#)], *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*, **2005**, 37 (1), 17-26.

The LIST-questionnaire: https://kops.uni-konstanz.de/bitstream/handle/123456789/4064/Lernstrategien_und_Lernerfolg_im_Studium.pdf?sequence=1&isAllowed=y (assessed 2020-06-02)

J. Hermanns*, B. Schmidt, I. Glowinski, D. Keller: Online teaching in the course "organic chemistry" for non-major chemistry students: from necessity to opportunity, *J. Chem. Educ.* 2020, DOI: 10.1021/acs.jchemed.0c00658. Online available since 06.08.2020: <https://pubs.acs.org/doi/pdf/10.1021/acs.jchemed.0c00658>

Thanks!

Prof. Bernd Schmidt
Dr. Ingrid Glowinski
B. Ed. David Keller

Thank you for your attention!