

California Open Online Library for Education & Accessibility

COOL4Ed (the California Open Online Library for Education) was created so that faculty can easily find, adopt, utilize, review and/or modify free and open etextbooks for little or no cost. The COOL4Ed accessibility open textbook evaluations can inform faculty, staff, and students how the free and open etextbooks meet 15 accessibility "checkpoints" that could impact the learning of learners with a range of disabilities.

SUMMARY OF ACCESSIBILITY EVALUATION:

Textbook:	Analytical Chemistry 2.0
Format of Textbook:	PDF

Assistive Technology (AT) Evaluation Score: Overall	7.4 (Maximum score = 10)
Assistive Technologies (AT) Evaluations applies specialized tools and software in the accessibility evaluation process. These specialized assistive technologies, see list below, are typically not used or available by the general public into the accessibility evaluation process.	
 Accessibility features of desktop operating systems (e.g. high-contrast display themes, settings from the Keyboard and Mouse control panels) Accessibility-related software included with desktop operating systems (e.g. VoiceOver, Microsoft Narrator) Third-party accessibility software and hardware: Screen readers (e.g. JAWS, Window Eyes) Magnification software (e.g. ZoomText Magnifier/Reader, MAGIC Pro with Speech) Reading software for users with learning disabilities (e.g. Read and Write Gold, Kurzweil 3000) Refreshable Braille displays 	
Non- Assistive Technology (NAT) Evaluation Score: Overall	7.9 (Maximum score =10)
Non-Assistive Technologies (NAT) Evaluations applies only native or basic tools and software such as the keyboard and Narrator in the accessibility evaluation process. These non-assistive technologies are readily available and used by the general public.	



COOL4Ed Accessibility Evaluation Methods:

The California State University <u>Accessible Technology Initiative</u> and <u>MERLOT</u> (Multimedia Educational Resources for Learning and Online Teaching) developed the rubric or "checkpoints" for the accessibility evaluation. <u>CAST</u>, a nationally recognized organization with expertise in accessibility and UDL, reviewed and affirmed the appropriateness and value of the accessibility evaluation rubric and contributed the references and support resources to help people learn how best to design, evaluate, and remediate the learning materials to maximize the accessibility of the learning resources for all. The "checkpoints" have been built upon the Section 508 technical standards and has been organized and tailored to the typical characteristics of digital resources used in higher education courses.

The accessibility evaluations were performed by the <u>Center for Usability in Design and Accessibility</u> at California State University, Long Beach; faculty and graduate students with expertise in human factors, usability, and accessibility performed the evaluations of over 150 free and open etextbooks. COOL4ed.org has published the accessibility evaluation rubric and provides a detailed description of the methodology used to evaluate the accessibility of the etextbooks in COOL4ed.

LOOKING FOR DETAILED ACCESSIBILITY REPORTS?

See Detailed Accessibility Evaluation Report using Assistive Technologies

See Detailed Accessibility Evaluation Report using Non-Assistive Technologies



DETAILED ACCESSIBILITY EVALUATION REPORT using Assistive Technologies

Assistive Technologies (AT) Evaluations applies specialized tools and software in the accessibility evaluation process. These specialized assistive technologies, such as Kurzweil and NVDA, are typically not used or available by the general public into the accessibility evaluation process.

1. Accessibility Documentation

A. The organization providing the online materials has a formal accessibility policy.	Fail
Additional Information:	Could not find this information.
B. The organization providing the online materials has an accessibility statement.	Fail
Additional Information:	Could not find this information.
C. An Accessibility Evaluation Report is available from an external organization.	Fail
Additional Information:	Could not find this information.

2. Text Access

A. The text of the digital resource is available to assistive technology that allows the user to enable text-to-speech (TTS) functionality.	Pass
Additional Information:	NVDA read all the text on pages 25-29. However, the pace was very fast and sometimes difficult to understand. NVDA also read all the page footers which was disruptive to the flow of text.

3. Text Adjustment

A. Text is compatible with assistive technology.	Pass
Additional Information:	Used Adobe Reader XI and the text size was adjustable on pages 25-29.
B. The resource allows the user to adjust the font size and font/background color (or is rendered by an application such as a browser,	Pass



media player, or reader) that offers this functionality).	
Additional Information:	Used Adobe Reader XI to adjust the font and
	background colors. The colors were adjustable on
	pages 25-29.

4. Reading Layout

A. Text of the digital resource is compatible with assistive technology that allows the user to reflow the text by specifying the margins and line spacing (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	Pass
Additional Information:	Used Adobe Reader XI and the text reflowed on pages 25-29.
 B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material. 	N/A
Additional Information:	No printed version.

5. Reading Order

 A. The reading order for digital resource content logically corresponds to the visual layout of the page when rendered by assistive 	Pass
technology.	
Additional Information:	Used NVDA and checked the digitial resource layout on pages 26, 28, 29, 30, and 32. The reading order logically corresponds to the page layout.

6. Structural Markup/Navigation

Α.	The text of the digital resource includes	Fail
	markup (e.g. tags or styles) that allows for	
	navigation by key structural elements	
	(chapters, headings, pages) using assistive	
	technology (or is rendered by an application	



Additic	onal Information:	Not using reader application.
C.	If the text of the digital resource is delivered within an ebook reader application, a method is provided that allows users to bypass the reader interface and move directly to the text content that is compatible with assistive technology.	N/A
Additic	onal Information:	Used NVDA and checked lists on pages 25, 37, 65, 87, 177, 233, 309, 379, 435, and 567. No lists were found. "No next list."
В.	The text of the digital resource includes markup for bullets and numbered lists that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	were found. "No next heading." Fail
Additic	onal Information:	Used NVDA and checked pages 25-82. No headings
	such as a browser, media player, or reader that offers this functionality).	

7. Tables

 A. Data tables include markup (e.g. tags or styles) that identifies row and column headers in a manner that is compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader 	Pass
that offers this functionality). Additional Information:	Used NVDA to check table markup. 9/10 tables were detected. Checked tables on pages 38, 39, 43, 88, 94, 95, 96, 97, 99, and 100.

8. Hyperlinks

Α.	In-book links take you to a location within the	Pass
	textbook. For example, the table of contents	
	would be considered in-book links and	



embedded links take you to the correct	
location in the book.	
Additional Information:	30/30 in book links functioned. Checked in book links on pages 3, 5, 6, 25, 29, 30, 31, 501, 504, 506, 509, 511, 519, 524, 526, 529, 534, 1000, 1001, 1003, 1017, 1018, 1019, 1022, 1025, 1026, and 1027.
 B. Live hyperlinks take you to any website or webpages external to the book. 	Fail
Additional Information:	19/20 live links function and 5/20 live links had an acceptable description. Checked live links on pages 2, 23, 57, 66, 116, 202, 209, 1062, 1093, 1097, and 1157.
C. Live links take you to the correct webpage that is functioning properly.	Pass
Additional Information:	19/20 live links functioned. Checked live links on pages 2, 23, 57, 66, 116, 202, 209, 1062, 1093, 1097, and 1157.
 D. Live links are descriptive enough for the users to know where it should take them. 	Fail
Additional Information:	5/20 live links had an acceptable description. Checked live links on pages 2, 23, 57, 66, 116, 202, 209, 1062, 1093, 1097, and 1157.

9. Color and Contrast

A. All information within the material that is conveyed using color is also available in a manner that is compatible with those that do not perceive color, and information conveyed by color is also conveyed in other ways.	Pass
Additional Information:	When color is used to indicate something is a link it is also underlined, therefore showing color redundancy. Checked pages 25-82.
 B. Information is conveyed from the sub- categories for contrast. 	Pass
Additional Information:	Used Adobe Acrobat XI and Colour Contrast Analyzer to check the headers, text, and simple images for



	color contrast requirements. All headers pass the color contrast requirements. Most of the text passed. However, whenever red text was used it did not pass. Most simple images did pass. Simple images on pages 27 and 28 did not pass. Checked pages 25-82.
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	Pass
Additional Information:	Used Adobe Acrobat XI and Colour Contrast Analyzer to check the headers and all headers pass the color contrast requirements. Checked pages 25-82.
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	Pass
Additional Information:	Used Adobe Acrobat XI and Colour Contrast Analyzer to check text and most of the text passed. However whenever red text was used it did not pass. Checked pages 25-82.
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	Pass
Additional Information:	Used Adobe Acrobat XI and Colour Contrast Analyzer to check simple images and most simple images did pass. Simple images on pages 27 and 28 did not pass. Checked pages 25-82.

10.Language

A. The text of the digital resource includes markup that declares the language of the content in a manner that is compatible with assistive technology.	N/A
Additional Information:	Cannot check this because do not have Adobe Acrobat Pro.
B. If the digital resource includes passages in a foreign language, these passages include markup that declares the language in a manner that is compatible with assistive technology.	N/A



Additional Information:	Cannot check this because do not have Adobe
	Acrobat Pro.

11.Images

	-
A. Non-decorative images have alternative text	Fail
that is compatible with assistive technology	
(or is rendered by an application such as a	
browser, media player, or reader that offers	
this functionality).	
Additional Information:	NVDA did not detect non-decorative images, there
	was no alternative text and the descriptions were
	not descriptive enough. Additionally NVDA always
	read the image source/credit information which
	disrupted the flow. Checked pages 25-140.
B. Decorative images are marked with null	N/A
alternate text or contain markup that allows	
them to be ignored by assistive technology.	
Additional Information:	No decorative images found.
C. Complex images, charts, and graphs have	Fail
longer text descriptions that are compatible	
with assistive technology (or are rendered by	
an application such as a browser, media	
player, or reader) that offers this	
functionality).	
Additional Information:	NVDA did not detect complex images, there was no
	alternative text and the descriptions were not
	descriptive enough. Additionally NVDA always read
	the image source/credit information which disrupted
	the flow. Checked pages 25-140.
	the norm encercu pages 23-140.

12.Multimedia

A. A synchronized text track (e.g. open or closed captions) is provided with all video content.	N/A
Additional Information:	No multimedia found.
B. A transcript is provided with all audio content.	N/A



Additional Information:	No multimedia found.
C. Audio/video content is delivered via a media player that is compatible with assistive technology. This includes support for all criteria listed in Section 15 below.	N/A
Additional Information:	No multimedia found.

13.Flickering

A. The digital resource content does not contain anything that flashes more than three times in any one-second period.	Pass
Additional Information:	No flickering found.

14.Science, Technology, Engineering, and Math (STEM)

 A. STEM figures have appropriate markup that indicates that the image is a figure. 	Pass
Additional Information:	10/10 figures had labels. Checked figures on pages 27, 28, 30, 40, 67, 68, 70, 80, 88, and 93.
 B. STEM graphs have appropriate markup that indicates that the image is a graph. 	Pass
Additional Information:	10/10 graphs had labels. Checked graphs on pages 46, 75, 78, 96, 98, 110, 111, 112, 113, and 118.
C. STEM equations have appropriate markup that indicates that the image is an equation.	Fail
Additional Information:	0/10 equations had labels. Checked equations pages 38, 41, 42, 45, 46, 48, 68, 69, 71, and 72.
D. STEM tables have appropriate markup that indicates the image is a table.	Fail
Additional Information:	0/10 tables had labels. Checked tables on pages 38, 39, 43, 88, 94, 95, 96, 97, 99, and 100.
E. STEM figures have appropriate notation markup that conveys both the notation	Fail



(presentation) and meaning (semantics) of the STEM content.	
Additional Information:	0/10 figures had acceptable descriptions and the reader skips over the images. Checked figures on pages 27, 28, 30, 40, 67, 68, 70, 80, 88, and 93.
 F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content. 	Fail
Additional Information:	0/10 graphs had acceptable descriptions and the reader skips over the graph. Checked graphs on pages 46, 75, 78, 96, 98, 110, 111, 112, 113, and 118.
 G. STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content. 	Fail
Additional Information:	0/10 equations had descriptions and reader read the equations incorrectly. Checked equations on pages 38, 41, 42, 45, 46, 48, 68, 69, 71, and 72.
 H. Assistive technology used can access the content from the STEM tables. 	Pass
Additional Information:	9/10 tables were detected. Checked tables on pages 38, 39, 43, 88, 94, 95, 96, 97, 99, and 100.

15.Interactive Elements

	Each interactive element (e.g. menu, hyperlink, button) and function (e.g. annotations) allows keyboard-only operation both with and without assistive technology.	N/A
Additior	nal Information:	No interactive elements found.
	Each interactive element conveys information to assistive technology regarding the element's name, type, and status (e.g. "Play, button, selected").	N/A
Addition	nal Information:	No interactive elements found.



C. All instructions, prompts, and error messages necessary to complete forms are conveyed as text to assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	N/A
Additional Information:	No interactive elements found.

DETAILED ACCESSIBILITY EVALUATION REPORT using Non-Assistive Technologies

Non-Assistive Technologies (NAT) Evaluations applies only native or basic tools and software such as the keyboard and Narrator in the accessibility evaluation process. These non-assistive technologies are readily available and used by the general public.

1. Accessibility Documentation

A. The organization providing the online	Fail
materials has a formal accessibility policy.	
Additional Information:	No Content Found
B. The organization providing the online	Fail
materials has an accessibility statement.	
Additional Information:	No Content Found
C. An Accessibility Evaluation Report is available	Fail
from an external organization.	
Additional Information:	No Content Found

2. Text Access

Pass



Additional Information:	Pgs 1-5 were checked. The text is not available to
	assisstive technology. The reader said "Warning,
	Empty page."
	Empty page."

3. Text Adjustment

A. Text is compatible with assistive technology.	Pass
Additional Information:	Pgs 1-5 were checked. When the window page chaged in size, no horizontal bar appeared. The font size of all pages checked could be adjusted.
B. The resource allows the user to adjust the font size and font/background color (or is rendered by an application such as a browser, media player, or reader) that offers this functionality).	Pass
Additional Information:	Pgs 1-5 were checked. When changing the font/background color to green text on black, the background color changed to black, and the font color changed to green.

4. Reading Layout

0 5	
A. Text of the digital resource is compatible with assistive technology that allows the user to reflow the text by specifying the margins and line spacing (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	Pass
Additional Information:	Pgs 5-10 were checked. I was able to reflow the text and the reader read the text out loud.
 B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material. 	N/A
Additional Information:	Need additional information. We do not have printed material to compare it too.



5. Reading Order

 A. The reading order for digital resource content logically corresponds to the visual layout of the page when rendered by assistive technology. 	Fail
Additional Information:	Pgs 70-75 were checked. The reading order was not logical on all five pages. The tables were read at the end of reading the rest of the text even if the tables were first on the page.

6. Structural Markup/Navigation

 A. The text of the digital resource includes markup (e.g. tags or styles) that allows for navigation by key structural elements (chapters, headings, pages) using assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality). 	Fail
Additional Information:	No method provided that allows user to bypass sections of text. The Title and Bookmarks and Headings failed using the accessbiility checker. The tagged PDF passed using the accessibility checker.
B. The text of the digital resource includes markup for bullets and numbered lists that is compatible with assistive technology (or is rendered by an application such as a browse media player, or reader that offers this functionality).	
Additional Information:	No markups found. The Title and Bookmarks and Headings failed using the accessbiility checker. The Tagged PDF passed.
C. If the text of the digital resource is delivered within an ebook reader application, a metho is provided that allows users to bypass the reader interface and move directly to the tex content that is compatible with assistive technology.	



Additional Information:	No additional eReader used.

7. Tables

A. Data tables include markup (e.g. tags or styles) that identifies row and column headers in a manner that is compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	Fail
Additional Information:	Tables on pages 14, 15 (2 images), 19, 64 were checked manually. The text to speech function skipped the tables when they appeared first on the page. This means that it did not read out loud the content on the tables until it finished reading the text on the page. Using the accessibility checker, the rows, TH and TD, and regularity all passed. The headers failed.

8. Hyperlinks

of hypermins	
A. In-book links take you to a location within the textbook. For example, the table of contents would be considered in-book links and embedded links take you to the correct location in the book.	Pass
Additional Information:	30/30 total in-book links worked. All links appeared to be links and functioned as links. A> (Beginning) Pg V was checked=(10/10) hyperlinks worked> (Middle) Pg 411, and 543 was checked= (10/10) hyperlinks worked> (End) Pg 1071 was checked= (10/10) hyperlinks worked> Using the accessibiility checker, navigation links need manual check.
 B. Live hyperlinks take you to any website or webpages external to the book. 	Fail
Additional Information:	8/20 live links worked. Pgs 33 (2 links), 42, 64, 70, 73, 124, 178, 185, 211, 254, 393, 547, 1024 (2 links), 1027



	(2 links), 1028, 1029 (2 links) were checked. However all did not include descriptions and a majority of the links did not function.
C. Live links take you to the correct webpage that is functioning properly.	Fail
Additional Information:	8/20 live links worked. Pgs 33 (2 links), 42, 64, 70, 73, 124, 178, 185, 211, 254, 393, 547, 1024 (2 links), 1027 (2 links), 1028, 1029 (2 links)were checked. Links on pages 73, 124, 178, 185, 211, 254, 393, 547, 1024, 1027, 1028, and 1029 did not function.
D. Live links are descriptive enough for the users to know where it should take them.	Fail
Additional Information:	0/20 live links had descriptions. Pgs 33 (2 links), 42, 64, 70, 73, 124, 178, 185, 211, 254, 393, 547, 1024 (2 links), 1027 (2 links), 1028, 1029 (2 links) were checked. However all did not include descriptions. Descriptions did not inform on where the link would take you. They were all in html (URL) form.

9. Color and Contrast

A. All information within the material that is conveyed using color is also available in a manner that is compatible with those that do not perceive color, and information conveyed by color is also conveyed in other ways.	Pass
Additional Information:	Pgs 1-59 were checked. Information not conveyed by color alone. Size of font, and type of font (Bold versus Non-Bold font) were used. The chapter headings were in black font, bold font, and the size was larger than the rest of the text. There was text on the side of each page in blue and the size of this text was smaller than the rest.
 B. Information is conveyed from the sub- categories for contrast. 	Pass
Additional Information:	Pgs 1-59 were checked. Most pages had the contrast ratio of 4.51:1 and above (16.3:1). Chapter headings



	passed with a ratio of 16.3:1. The blue text had a ratio of 7.42:1.
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	Pass
Additional Information:	Pgs 1-59 were checked. Chapter headings passed with a ratio of 16.3:1.
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	Pass
Additional Information:	Pgs 1-59 were checked. Most of the text was avove the ratio 4.51:1 (16.3:1). Blue text had a ratio of 7.42:1.
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	Pass
Additional Information:	Pgs 16-74 were checked. Simple images passed with a ratio of 4.51:1 and above (Example: page 16 ratio of 15.91:1).

10.Language

A. The text of the digital resource includes markup that declares the language of the content in a manner that is compatible with assistive technology.	Fail
Additional Information:	Using the accessiblity checker the primary language failed.
B. If the digital resource includes passages in a foreign language, these passages include markup that declares the language in a manner that is compatible with assistive technology.	Fail
Additional Information:	Using the accessiblity checker the primary language failed.



11.Images

A.	Non-decorative images have alternative text that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	Pass
Additic	onal Information:	10/10 images included descriptions that were compatible with assistive technology. Pgs 3, 4, 6, 16, 22, 26, 27, 28 (2 images), 29 all had images and were checked manually. Overall images did include descriptions that were compatible with assistive technology> Using the accessibility checker, figures alternate text failed.
В.	Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.	N/A
Additic	onal Information:	No Decorative images present.
C.	Complex images, charts, and graphs have longer text descriptions that are compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader) that offers this functionality).	Pass
Additic	onal Information:	10/10 images included descriptions that were compatible with assistive technology. Pgs 14, 15(2images), 19, 64, 70 (2 images), 71 (2 images), 72 all had complex images and were checked.

12.Multimedia

A. A synchronized text track (e.g. open or closed captions) is provided with all video content.	N/A
Additional Information:	No content found
B. A transcript is provided with all audio content.	N/A
Additional Information:	No content found
C. Audio/video content is delivered via a media player that is compatible with assistive	N/A



technology. This includes support for all criteria listed in Section 15 below.	
Additional Information:	No content found

13.Flickering

A. The digital resource content does not contain anything that flashes more than three times in any one-second period.	Pass
Additional Information:	Pgs 1-10 were checked. No flickering content was observed. Using the accessibility checker, screen flicker passed.

14.Science, Technology, Engineering, and Math (STEM)

A. STEM figures have appropriate markup that indicates that the image is a figure.	Pass
Additional Information:	10/10 figure markups did provide enough information to convey meaning. Figures on pages 3, 4, 6, 16, 22, 26, 27, 28 (2 figures), and 29 were checked manually. Overall there were markups present> graphs were identified as figures.
B. STEM graphs have appropriate markup that indicates that the image is a graph.	N/A
Additional Information:	Graphs were identified as figures.
C. STEM equations have appropriate markup that indicates that the image is an equation.	N/A
Additional Information:	No Equations were found.
D. STEM tables have appropriate markup that indicates the image is a table.	Pass
Additional Information:	10/10 table markups did provide enough information to convey meaning. Tables on pages 14, 15 (2 tables), 19, 64, 70 (2 images), 71 (2 images), and 72 were checked manually. Overall there were markups present.



	Τ
E. STEM figures have appropriate notation	Pass
markup that conveys both the notation	
(presentation) and meaning (semantics) of the	
STEM content.	
Additional Information:	10/10 notation markups were sufficient to convey meaning. Pgs 3, 4, 6, 16, 22, 26, 27, 28 (2 figures), and 29 all had figures and were checked. The notation markups were sufficient enought to convey presentation> The graphs were labeled under figures.
F. STEM graphs have appropriate notation	N/A
markup that conveys both the notation	
(presentation) and meaning (semantics) of the	
STEM content.	
Additional Information:	Graphs were identified as figures.
G. STEM equations have appropriate notation	N/A
markup that conveys both the notation	
(presentation) and meaning (semantics) of the	
STEM content.	
Additional Information:	No Equations were found.
H. Assistive technology used can access the	Fail
content from the STEM tables.	
Additional Information:	10/10 notation markups provided good descriptions sufficient enough to convey meaning. Tables on pages 14, 15 (2 tables), 19, 64, 70 (2 images), 71 (2 images), and 72 were checked manually.

15.Interactive Elements

 A. Each interactive element (e.g. menu, hyperlink, button) and function (e.g. annotations) allows keyboard-only operation both with and without assistive technology. 	Pass
Additional Information:	On page V, there are within-book links and I am able to use my tab key and enter key to navigate the book.



 B. Each interactive element conveys information to assistive technology regarding the element's name, type, and status (e.g. "Play, button, selected"). 	Pass
Additional Information:	Markups were sufficient enough to convey meaning on interactive elements within page V.
C. All instructions, prompts, and error messages necessary to complete forms are conveyed as text to assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	N/A
Additional Information:	No text prompts found.

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