



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: Chemistry (Boundless)

Format of Textbook: HTML

Assistive Technology (AT) Evaluation Score: Overall	6.4 (Maximum score = 10)
<p>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.</p> <ul style="list-style-type: none"> • 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	7.7 (Maximum score =10)
<p>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.</p>	



COOL4Ed Accessibility Evaluation Methods:

The California State University [Accessible Technology Initiative](#) and [MERLOT](#) (Multimedia Educational Resources for Learning and Online Teaching) developed the rubric or “checkpoints” for the accessibility evaluation. [CAST](#), 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 [Center for Usability in Design and Accessibility](#) 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:	Did not find any information about Merlot's Formal Accessibility Policy.
B. The organization providing the online materials has an accessibility statement.	Fail
Additional Information:	Did not find any information about Merlot's Accessibility Statement.
C. An Accessibility Evaluation Report is available from an external organization.	Fail
Additional Information:	Did not find any information about Merlot's Accessibility Evaluation Report.

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:	4/4 Chapters passed. While all contents within the book were successfully translated to audio, it would randomly pause when putting some information in audio. Images in chapters 4,12,22, and 25 were translated in a way that was not easy to understand and nodetail was given. Equations in chapters 4,12,22, and 25 were not translated in a logical way, NVDA would stop everytime an equation was presented. The reader would not be able to understand the mathmatical content within the book.



3. Text Adjustment

A. Text is compatible with assistive technology.	Pass
Additional Information:	4/4 chapters passed. Regular text and images were easily zoomed in (to 200%) and out (to 33%) with out any disruptive alteration to either text or images (Chapters evaluated 3,6,12,19).
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:	4/4 chapters passed. Using Care for Your Eyes on Google Chrome, font and background did change color when nightmode was selected (Chapters evaluated 3,6,12,19).

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:	30/30 pages passed for reflow of text. Chapers 3, 4, 9, and 12 checked.
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 alternative version of textbook found.

5. Reading Order

A. The reading order for digital resource content logically corresponds to the visual layout of	Pass
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<p>the page when rendered by assistive technology.</p>	
<p>Additional Information:</p>	<p>4/4 Chapters passed. While all contents within the book were successfully translated to audio, it would randomly pause when putting some information in audio. Images in chapters 4,12,22, and 25 were translated in a way that was not easy to understand and nodetail was given. Equations in chapters 4,12,22, and 25 were not translated in a logical way, NVDA would stop everytime an equation was presented. The reader would not be able to understand the mathematical content within the book.</p>

6. Structural Markup/Navigation

<p>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).</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>0/4 chapters passed. You were not able to navigate through the text, among headers, lists, links, and tables, by using the NVDA hotkeys. When attempting to use a NVDA hotkey it would simply state the buttons you were pressing on the keyboard. Chapters checked (5, 7, 11, 16).</p>
<p>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 browser, media player, or reader that offers this functionality).</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>0/10 lists passed. Lists were not recognized by NVDA as lists. Furthermore, you were not able to navigate through the lists by using the NVDA hotkeys, however, the lists were not conveyed in a logical</p>



	manner, it did not read lists as a coder would. Chapters checked 7 (0/10 lists).
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
Additional Information:	Not using eReader application in this evaluation.

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).	N/A
Additional Information:	No tables found.

8. Hyperlinks

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.	N/A
Additional Information:	
B. Live hyperlinks take you to any website or webpages external to the book.	Pass
Additional Information:	20/20 live hyperlinks functioned properly and took the reader to the expected websites on the internet and/or to figures, examples, and solutions within the textbook Chapter 7, 20/20 links functioned properly. 20/20 live hyperlinks worked and had a proper descriptions of the hyperlinks. (Chps. 7 (20/20 links had proper description).



C. Live links take you to the correct webpage that is functioning properly.	Pass
Additional Information:	20/20 live hyperlinks functioned properly and took the reader to the expected websites on the internet and/or to figures, examples, and solutions within the textbook Chapter 7, 20/20 links functioned properly.
D. Live links are descriptive enough for the users to know where it should take them.	Pass
Additional Information:	20/20 live hyperlinks worked and had a proper descriptions of the hyperlinks. (Chps. 7 (20/20 links had proper description)).

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:	Throughout the text, headers were consistently a blue color against a white background, as were hyperlinks were underlined in a blue color against a white background, and normal text was consistently black against a white background. In regards to size, headers were always larger than normal body text, and hyperlinks were always underlined. (Checked chapters and subchapters 2,7,13,22). All text passes the AA standard.
B. Information is conveyed from the sub-categories for contrast.	Pass
Additional Information:	Section heading, sub heading, and text passed (Chapters and subchapters checked 2,7,13,22).
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	Pass
Additional Information:	Section heading passed (Chapters and subchapters checked 2,7,13,22).



D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	Pass
Additional Information:	All text passed (Chapters and subchapters checked 2,7,13,22).
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	N/A
Additional Information:	All images within the text are complex.

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:	"lang="en-us" code NOT found.
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:	No passages found in foreign languages.

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).	Fail
Additional Information:	0/4 chapters had non-decorative images that were read properly by NVDA. When NVDA encountered images it simply stated the image address (i.e. (https://)). When searching for image alt"" in the code, alternative names and captions were not given. Chapters 1, 3, 8, 16.



B. Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.	N/A
Additional Information:	There were no decorative images found. Chapters and subchapters checked 6.2 (no decorative images), 10.2 (no decorative images), 12.4 (no decorative images), 26.4 (no decorative images) 31.6 (no decorative images).
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
Additional Information:	0/4 chapters had complex images that were read properly by NVDA. When NVDA encountered images it simply stated the image address (i.e. (https://)). When searching for image alt"" in the code, alternative names and captions were not given. Chapters 1, 3, 8, 16.

12. Multimedia

A. A synchronized text track (e.g. open or closed captions) is provided with all video content.	Pass
Additional Information:	3/3 videos pass and have text captioning that matches with the audio. Chapters checked (chapter 2, 3/3 videos pass).
B. A transcript is provided with all audio content.	Fail
Additional Information:	0/3 videos pass, there is no transcript available. Chapters checked (2, 0/3 videos pass).
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:	Not using Assistive Player.



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 content.

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

A. STEM figures have appropriate markup that indicates that the image is a figure.	Fail
Additional Information:	0/10 figures pass and were properly marked as figures. NVDA did not read each figure with detail and clarity. The reader would not be able to decipher what the figure was just by listening to the NVDA translations. Chapter 11 checked.
B. STEM graphs have appropriate markup that indicates that the image is a graph.	Fail
Additional Information:	0/10 graphs pass. Chapter 6 (0/10 graphs have a description that convey notion and meaning). Each graph was not properly marked as a graph and when NVDA encountered each graph, it did not give any description.
C. STEM equations have appropriate markup that indicates that the image is an equation.	Fail
Additional Information:	0/10 equations pass. Equations were not properly marked as equations and when NVDA encountered any type of equation it simply stopped working. Chapter 6, 0/10 equations pass.
D. STEM tables have appropriate markup that indicates the image is a table.	N/A
Additional Information:	No tables found within text.
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Fail



Additional Information:	0/10 figures pass and were properly marked as figures. NVDA did not read each figure with detail and clarity. The reader would not be able to decipher what the figure was just by listening to the NVDA translations. Chapter 11 checked.
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 pass. Chapter 6 (0/10 graphs have a description that convey notion and meaning). Each graph was not properly marked as a graph and when NVDA encountered each graph, it did not give any description.
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 pass. Equations were not properly marked as equations and when NVDA encountered any type of equation it simply stopped working. Chapter 6, 0/10 equations pass.
H. Assistive technology used can access the content from the STEM tables.	N/A
Additional Information:	No tables found within text.

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:	Successfully navigated through 4 chapters and subsections (1,5,17,24) by using the TAB and ENTER keys on the keyboard.
B. Each interactive element conveys information to assistive technology regarding the	



element's name, type, and status (e.g. "Play, button, selected").	
Additional Information:	No markup 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).	
Additional Information:	No text 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 materials has a formal accessibility policy.	Fail
Additional Information:	Not found
B. The organization providing the online materials has an accessibility statement.	Fail
Additional Information:	Not found
C. An Accessibility Evaluation Report is available from an external organization.	Fail
Additional Information:	Not found



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:	4/4 chapters pass. Chapters 2, 8, 12 and 24 were checked.

3. Text Adjustment

A. Text is compatible with assistive technology.	Pass
Additional Information:	4/4 chapters pass. Chapters 2, 8, 12 and 24 were checked.
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:	4/4 chapters pass. Chapters 2, 8, 12 and 24 were checked.

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:	30/30 web pages reflow when making web browser smaller or zooming to 200%. Chapters 2, 8, 12 and 24 were checked (chapters have more pages within chapter).
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 pdf or printed version found.



5. Reading Order

<p>A. The reading order for digital resource content logically corresponds to the visual layout of the page when rendered by assistive technology.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>Non AT tech only.</p>

6. Structural Markup/Navigation

<p>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).</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>Non AT tech only.</p>
<p>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 browser, media player, or reader that offers this functionality).</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>Non AT tech only.</p>
<p>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.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>Non AT tech only.</p>

7. Tables

<p>A. Data tables include markup (e.g. tags or styles) that identifies row and column headers in a manner that is compatible with assistive</p>	<p>N/A</p>
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technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	
Additional Information:	Non AT tech only.

8. *Hyperlinks*

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.	N/A
Additional Information:	No within book links HTML.
B. Live hyperlinks take you to any website or webpages external to the book.	Pass
Additional Information:	Average score
C. Live links take you to the correct webpage that is functioning properly.	Pass
Additional Information:	20/20 links are functional. Links around found table of contents and within chapters.
D. Live links are descriptive enough for the users to know where it should take them.	Pass
Additional Information:	20/20 links pass. Links have proper description. Links around found table of contents and within chapters.

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:	The main table of contents lead to chapters. This table of contents displays proper color redundancy. Each link has an arrow to show it is a chapter. Also within each chapter there is another table of

	<p>contents. This table of contents also display proper color redundancy in the same manner (arrows to demonstrate it's a link). This table of content leads to actual content. Within this content there is also proper color redundancy. When a word is highlighted it is also underlined.</p>
B. Information is conveyed from the sub-categories for contrast.	Pass
Additional Information:	Average score
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	Pass
Additional Information:	Headings are blue with a light bakground.
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	Pass
Additional Information:	Text is black with a light background.
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	Pass
Additional Information:	Images have a light bakground and dark foreground of vice versa.

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:	0/4 chapters have a language declaration.
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:	No other language found.



11.Images

<p>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).</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>0/4 chapter have images that missing alt tags. Missing alt tags are found within chapter table of contents (e.g. chapter 1 table of contents) and within the contents of each chapter. No alt tags are found in the main table of contents.</p>
<p>B. Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>0/4 chapter have images that missing alt tags. Missing alt tags are found within chapter table of contents (e.g. chapter 1 table of contents) and within the contents of each chapter. No alt tags are found in the main table of contents.</p>
<p>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).</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>0/4 chapters pass. Complex images are missing alt tags. Chapters 2, 8, 12 and 24 were checked.</p>

12.Multimedia

<p>A. A synchronized text track (e.g. open or closed captions) is provided with all video content.</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>3/3 videos have text to tracks. All videos were found in chapter 2.</p>
<p>B. A transcript is provided with all audio content.</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>0/3 videos have a transcript. All videos were found in chapter 2.</p>



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:	Non AT tech only.

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. Chapters 2, 8, 12 and 24 were checked.

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

A. STEM figures have appropriate markup that indicates that the image is a figure.	Pass
Additional Information:	7/10 figures have proper mark up.
B. STEM graphs have appropriate markup that indicates that the image is a graph.	Pass
Additional Information:	7/10 graphs have proper mark up.
C. STEM equations have appropriate markup that indicates that the image is an equation.	Fail
Additional Information:	6/10 equations have proper mark up.
D. STEM tables have appropriate markup that indicates the image is a table.	Fail
Additional Information:	6/10 tables have proper mark up.
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Fail
Additional Information:	No notations were found.
F. STEM graphs have appropriate notation markup that conveys both the notation	Fail



(presentation) and meaning (semantics) of the STEM content.	
Additional Information:	No notations were found.
G. STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Fail
Additional Information:	No notations were found.
H. Assistive technology used can access the content from the STEM tables.	Fail
Additional Information:	No notations were found.

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.	N/A
Additional Information:	Non-Assistive Technologies only.
B. Each interactive element conveys information to assistive technology regarding the element's name, type, and status (e.g. "Play, button, selected").	N/A
Additional Information:	Non-Assistive Technologies only.
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:	Non-Assistive Technologies only.



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