



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: Fundamentals of Chemistry
Format of Textbook: PDF

Assistive Technology (AT) Evaluation Score: Overall	8.5 (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: <ul style="list-style-type: none"> • 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	5.3 (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:	No accessibility documentation was found.
B. The organization providing the online materials has an accessibility statement.	Fail
Additional Information:	No accessibility documentation was found.
C. An Accessibility Evaluation Report is available from an external organization.	Fail
Additional Information:	No accessibility documentation was 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:	5/5 pages pass.

3. Text Adjustment

A. Text is compatible with assistive technology.	Pass
Additional Information:	5/5 pages pass.
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:	5/5 pages pass.
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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:	5/5 pages pass.
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 technology.	Pass
Additional Information:	5/5 pages pass.

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:	0/7 pages pass.
B. The text of the digital resource includes markup for bullets and numbered lists that is	Pass



compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	
Additional Information:	10/10 lists pass.
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 reader application.

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).	Pass
Additional Information:	9/9 tables found pass.

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.	Pass
Additional Information:	30/30 links pass.
B. Live hyperlinks take you to any website or webpages external to the book.	Pass
Additional Information:	2/2 subsections passed.



C. Live links take you to the correct webpage that is functioning properly.	Pass
Additional Information:	20/20 links pass.
D. Live links are descriptive enough for the users to know where it should take them.	Pass
Additional Information:	15/20 links pass.

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.	Fail
Additional Information:	0/7 pages pass.
B. Information is conveyed from the sub-categories for contrast.	Pass
Additional Information:	7/7 pages pass.
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	Pass
Additional Information:	7/7 pages pass.
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	Pass
Additional Information:	7/7 pages pass.
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	N/A
Additional Information:	No simple images found.

10. Language

A. The text of the digital resource includes markup that declares the language of the	Fail
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content in a manner that is compatible with assistive technology.	
Additional Information:	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.	N/A
Additional Information:	No passages in foreign language.

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
Additional Information:	7/7 images found pass.
B. Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.	Pass
Additional Information:	5/5 images found pass.
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:	3/3 images found pass.

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 was found.



B. A transcript is provided with all audio content.	N/A
Additional Information:	No multimedia was 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 was 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 was found.

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 pass.
B. STEM graphs have appropriate markup that indicates that the image is a graph.	Fail
Additional Information:	0/10 pass.
C. STEM equations have appropriate markup that indicates that the image is an equation.	Fail
Additional Information:	0/10 pass.
D. STEM tables have appropriate markup that indicates the image is a table.	Fail
Additional Information:	0/9 tables pass.
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Pass



Additional Information:	10/10 pass.
F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Pass
Additional Information:	10/10 pass.
G. STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Pass
Additional Information:	10/10 pass.
H. Assistive technology used can access the content from the STEM tables.	Fail
Additional Information:	0/9 tables pass.

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:	No interactive elements were found.
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:	No interactive elements were 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 were 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:	No Accessibility Policy documents found.
B. The organization providing the online materials has an accessibility statement.	Fail
Additional Information:	No Accessibility Policy documents found.
C. An Accessibility Evaluation Report is available from an external organization.	Fail
Additional Information:	No Accessibility Policy documents 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:	5/5 Pages passed text to speech check. Checked pages 4-8. Adobe Acrobat Pro XI was used.

3. Text Adjustment

A. Text is compatible with assistive technology.	Pass
Additional Information:	5/5 Pages passed compatible size check. Pages 1-5 checked. Adobe Acrobat Pro XI was used.
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,	Fail



media player, or reader) that offers this functionality).	
Additional Information:	3/5 Pages passed adjust font and colors check. Pages 1-5 checked. Page 1 is an image in its entirety and on page 3, the background color changed to black but no text was visible. Adobe Acrobat Pro XI was used.

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).	Fail
Additional Information:	0/5 pages passed reflow check. Horizontal bar appeared when zooming in. Pages 1-5 checked. Adobe Acrobat Pro XI was used.
B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.	Pass
Additional Information:	5/5 page numbers matched printed material. Pages 7-11 checked. Adobe Acrobat Pro XI was used.

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.	Pass
Additional Information:	5/5 Pages read in correct order. All pages being reading with header, which may be redundant. Pages 12-15 checked. Adobe Acrobat Pro XI was used.



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>Accessibility checking tool failed Tagged PDF, Title, and Headings. Adobe Acrobat Pro XI was used.</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>Accessibility checking tool failed list check. Adobe Acrobat Pro XI was used.</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>No eReader application used.</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 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>0/5 tables passed markup check. Pages 26, 27, 28, 60 checked. None of the tables had proper markup.</p>



	Accessibility checker tool failed tables check. Adobe Acrobat Pro XI was used.
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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.	Pass
Additional Information:	30/30 links passed hyperlink check. Only the table of contents contains links for navigating through the book. Pages 4-10 checked. Accessibility checker tool passed navigation links check. Adobe Acrobat Pro XI was used.
B. Live hyperlinks take you to any website or webpages external to the book.	Fail
Additional Information:	Average of functionality and description.
C. Live links take you to the correct webpage that is functioning properly.	Pass
Additional Information:	20/20 live links passed functionality check. Pages 4-9, 16, 18(2), 19, 22, 25, 28, 30, 31, 35, 38, 41, 44, 56 checked. Adobe Acrobat Pro XI was used.
D. Live links are descriptive enough for the users to know where it should take them.	Fail
Additional Information:	0/20 live links passed description check. The reader is able to read information on the images, however, some images are not detected by the reader. Image descriptions are not adequate. Pages 4-9, 16, 18(2), 19, 22, 25, 28, 30, 31, 35, 38, 41, 44, 56 checked. Images on pages 8, 16, 19, 22, 31, 35 were not detected by the reader. Pages 18 and 30 links are described as URLs. Adobe Acrobat Pro XI was used.



9. Color and Contrast

<p>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.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>No text with a color other than black had a specific purpose within the text. Almost all text within book is black.</p>
<p>B. Information is conveyed from the sub-categories for contrast.</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>Average of Header, simple images, and text.</p>
<p>C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>7/7 pages passed header contrast check. Pages 31-37 checked. Text is black on white background. Adobe Acrobat Pro XI and Colour Contrast Analyzer tool was used.</p>
<p>D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>7/7 pages passed the text color contrast check. Pages 31-33 checked. All text is black on a white background. Adobe Acrobat Pro XI and Colour Contrast Analyzer tool was used.</p>
<p>E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).</p>	<p>Pass</p>
<p>Additional Information:</p>	<p>6/7 pages passed simple image color contrast check. Pages 13, 15, 17, 43, 44, 54, 56, 57 checked. Page 43 image failed color contrast check. Adobe Acrobat Pro XI and Colour Contrast Analyzer tool were used.</p>



10. Language

<p>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.</p>	<p>Fail</p>
<p>Additional Information:</p>	<p>Accessibility checker failed primary language check. Adobe Acrobat Pro XI was used.</p>
<p>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.</p>	<p>N/A</p>
<p>Additional Information:</p>	<p>No foreign language found within the entire text.</p>

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>1/10 pages passed non-decorative image check. Accessibility checker tool failed figures alternate text check. Pages 13, 15, 17, 43, 44, 54, 56, 57, 59, 60, checked. Only page 13 had adequate image description. Adobe Acrobat Pro XI was used.</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>N/A</p>
<p>Additional Information:</p>	<p>No decorative image found within entire text.</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>



Additional Information:	0/10 complex images failed complex image check. None of the images checked had a description. Pages 12, 30, 31, 52, 58, 62, 78, 81(3) checked. Adobe Acrobat Pro XI was used.
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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 within the entire text.
B. A transcript is provided with all audio content.	N/A
Additional Information:	No multimedia found within the entire text.
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 within the entire text.

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 within the document.

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 passed markup check. Pages 68, 73, 78-85 checked. None of the figures have a description. Adobe Acrobat Pro XI was used.
B. STEM graphs have appropriate markup that indicates that the image is a graph.	Fail



Additional Information:	0/10 graphs passed markup check. Pages 32(2), 33(2), 109, 114, 117 checked. Only 7 graphs in entire text. None of the graphs had a description. Adobe Acrobat Pro XI was used.
C. STEM equations have appropriate markup that indicates that the image is an equation.	Fail
Additional Information:	0/10 equations passed markup check. Pages 51, 52, 53, 61, 67, 72, 73, 75, 76, 77 checked. When an equation has an exponent or a symbol is used instead of digits/letters the reader does not recognize it. Adobe Acrobat Pro XI was used.
D. STEM tables have appropriate markup that indicates the image is a table.	Fail
Additional Information:	0/10 tables passed markup check. Pages 26, 27, 28, 60, 61, 63, 64, 77, 82, 96 checked. None of the tables had markup to describe the information displayed. Adobe Acrobat Pro XI was used.
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 passed notation markup check. Pages 68, 73, 78-85 checked. Adobe Acrobat Pro XI was used.
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 passed markup check. Pages 32(2), 33(2), 109, 114, 117 checked. Only 7 graphs in entire text. Adobe Acrobat Pro XI was used.
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 passed markup check. Pages 51, 52, 53, 61, 67, 72, 73, 75, 76, 77 checked. Adobe Acrobat Pro XI was used.
H. Assistive technology used can access the content from the STEM tables.	Fail
Additional Information:	0/10 tables passed markup check. Pages 26, 27, 28, 60, 61, 63, 64, 77, 82, 96 checked. Tables do not have markup notation within entire text. Adobe Acrobat Pro XI was used.

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:	No interactive elements found within the entire text.
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:	No interactive elements found within the entire text.
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 within the entire text.



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