

To: Robert Van Rennes, Big Ten Academic Alliance
From: Graham L. Pierce, MSU Usability/Accessibility Research and Consulting
Subject: Chemical Abstracts SciFinder High-Level Accessibility Evaluation
Date: May 3, 2019

MSU Usability/Accessibility Research and Consulting (MSU UARC) conducted a high-level accessibility evaluation of the Chemical Abstracts SciFinder website to evaluate its conformance with WCAG 2.0 AA Criteria. This evaluation did not include all functionality or content of the site or all WCAG 2.0 AA Success Criteria.

During this evaluation, a number of issues were found that will make the site and its content impossible to use for many individuals with disabilities, and difficult to use for most others.

Keyboard users, including screen reader users and users with dexterity impairments, will be unable to access a wide variety of site functionality. Many interactive elements (including menus and dropdowns) cannot be reached or opened via keyboard. Many interactive elements that can be reached lack a sufficiently visible focus indicator, making it difficult or impossible for many keyboard-only users to effectively use them, as they cannot determine when they have reached the correct element. Focus order is also incorrect in places, further increasing the difficulty of using the site with a keyboard.

Individuals with visual impairments, including those that rely on screen readers, will have additional problems. Some content is read out incorrectly, and structural information (including heading and table structure) is not appropriately conveyed to users, making it difficult to understand content organization. Some form inputs are not appropriately labeled and form instructions are not associated with inputs, making those inputs difficult or impossible to use for those that rely on screen readers. Custom elements do not correctly announce themselves to screen readers, making them difficult or impossible to understand and use. Many images lack appropriate alternative text, significantly impacting users with visual impairments.

Other issues were found that will make it difficult for users with a variety of disabilities to effectively use the system, including missing page language declarations, use of color alone to distinguish content, insufficient color contrast, and inappropriate page titles.

To improve access for users with disabilities, UARC recommends a full WCAG 2.0 AA evaluation and that the problems discovered be remediated.

Note: For the purposes of this high-level review; results for "greenhouse gases" were used as examples of Search Results, References, and Substances pages; "Electro- and Solar-Driven Fuel Synthesis with First Row Transition Metal Complexes" was used as an example of a Quick View lightbox; and "Assessing the impact of future greenhouse gas emissions from natural gas production" was used as an example of an Article page.

High-Level Findings

Document Structure

- Headings are not correctly used to organize content. [[WCAG 2.0 SC 1.3.1](#)]
 - "SciFinder" at top of all pages (except Home page) should be an h2, not an h1
 - Visual headings within navigation bar dropdowns should be tagged as headings ("References", "Substances", "Reactions")
 - On the Home page, "Saved Answer Sets" and "Keep Me Posted" should be h2s, not h3s
 - In lightboxes on the References page, the primary heading (e.g., "Display Options", "Get Substances") should be an h1, not an h3
 - In the Display Options lightbox on the References page, "Answers per Page" and "Layout Options" should be h2s, not h3s
 - On the Article page, the title of the article should be an h1, not an h2
 - On the Article page, all headings beneath the article title should be one level higher (i.e., all h4s should be h3s)
 - On the Article page, "Quick Links", "Source", etc. should be h2s, not h3s
- On the References page, "Analyze" content is inappropriately coded into a table. [[WCAG 2.0 SC 1.3.1](#)]
- Invisible content is incorrectly read out at the end of pages. [[WCAG 2.0 SC 1.3.2](#)]
- The human language (e.g., English) of pages is not defined. [[WCAG 2.0 SC 3.1.1](#)]

Keyboard Support

- A variety of interactive content cannot be reached via keyboard. [[WCAG 2.0 SC 2.1.1](#)]
 - "CAS Solutions" and "SciFinder Help" dropdowns at top of pages
 - Main navigation items/dropdowns ("Explore", "Saved Searches", "SciPlanner")
 - Breadcrumbs (e.g., "Research Topic "greenhouse gases"", "references (23116)")
 - "Advanced Search" expander on Home page
 - Structure Editor links (to bring up Non-Java Editor, etc.) on Home page
 - "Tags", "Markush", "Substance Identifier", and "Import" links on Home page
 - All buttons and interactive content in Non-Java Structure Editor on Home page, with the exception of radio buttons, text input, and "Cancel" button
 - "Analyze" and "Refine" tabs on References page
 - "Get Substances", "Get Reactions", etc. on References page
 - "Select All"/"Keep Selected" dropdown on References page
 - Image links (e.g., chemical structures) on Substances page
 - "Reference Images" and "Substance Images" tabs in the Quick View lightbox on the References page
 - "Get Substances", "Get Related Citations", "Send to SciPlanner", etc. on Article page
- On the Home page, cannot activate left sidebar links (under "References", "Substances", "Reactions") via keyboard unless screen reader is in use. [[WCAG 2.0 SC 2.1.1](#)]

- On the Home page, keyboard focus incorrectly goes to non-interactive content (e.g., "Research Topic" when already on that page). [[WCAG 2.0 SC 2.1.1](#)]
- On the References page, focus incorrectly goes to inactive/non-interactive content (e.g., previous and first page buttons when on first page, inactive "Categorize" tab). [[WCAG 2.0 SC 2.1.1](#)]
- In the Display Options lightbox on the References page, once focus leaves the "Cancel" button, it cannot return to it. [[WCAG 2.0 SC 2.1.1](#)]
- In the Display Options lightbox on the References page, once focus reaches the radio buttons, it cannot leave them to reach other page content unless the Escape key is used to close the lightbox. [[WCAG 2.0 SC 2.1.1](#)]
- Focus incorrectly starts at "京ICP备13047075号-3" link in page footer. [[WCAG 2.0 SC 2.4.3](#)]
- Focus goes to a large number of invisible elements at the end of pages. [[WCAG 2.0 SC 2.4.3](#)]
- On the References page, focus is not restricted to the Quick View lightbox, and doesn't go to it immediately when opened (only reached at end of page). [[WCAG 2.0 SC 2.4.3](#)]
- On the References page, focus inappropriately goes to all Analyze entries three times in a row (once for name, once for number, once for visual bar). [[WCAG 2.0 SC 2.4.3](#)]
- Focus is not sufficiently visible for a variety of interactive content. [[WCAG 2.0 SC 2.4.7](#)]
 - "京ICP备13047075号-3" link in page footer
 - "Sign Out" button
 - "?" icons throughout site (e.g., next to "References: Research Topic" on Home page)
 - Checkboxes throughout site
 - Text links in left sidebar on Home page
 - "Analyze" bars on References page
 - Previous/next page icons on References page
 - All interactive content on Article page with the exception of the text input

Navigation

- All pages with the exception of the Home page do not have appropriately descriptive titles. [[WCAG 2.0 SC 2.4.2](#)]

Forms and Data Submission

- On the Home page, the search input is not programmatically labeled. [[WCAG 2.0 SC 3.3.2](#)]
- On the Search Results and References pages, checkbox labels are not programmatically associated with inputs. [[WCAG 2.0 SC 3.3.2](#)]
- On the References page, radio button and text input labels are not programmatically associated with inputs. [[WCAG 2.0 SC 3.3.2](#)]
- On the References page, the "Sample Analysis" dropdown label is not programmatically associated with the input. [[WCAG 2.0 SC 3.3.2](#)]
- On the Home page, instructions (e.g., "Examples: ...") are not programmatically associated with inputs. [[WCAG 2.0 SC 3.3.2](#)]

Images

- Appropriate alternative text is not provided for many images. [[WCAG 2.0 SC 1.1.1](#)]
 - "?" icons throughout site
 - On the Home page, icons/buttons in Non-Java Structure Editor
 - On the References page, down arrow (next to "Sort by"), page navigation arrows (next, previous, etc.), and Substances and Citing References icons
 - In the Quick View lightbox on the References page, images in the Reference Images and Substance Images tabs and the close button

Color and Visual Characteristics

- White text on light blue (e.g., "CAS Solutions", "Preferences") has insufficient contrast. [[WCAG 2.0 SC 1.4.3](#)]
- Color alone is used to differentiate link text from non-link text. [[WCAG 2.0 SC 1.4.1](#)]
- On the References and Article pages, color alone is used for search term highlighting. [[WCAG 2.0 SC 1.4.1](#)]

Custom Elements and Dynamic Content

- Roles and values (i.e., that they are menus/expanders and whether they are expanded or collapsed) are not provided for expanders/menus throughout site (e.g., "Explore", "Saved Searches", and "SciPlanner" navigation items and "Advanced Search" on Home page). [[WCAG 2.0 SC 4.1.2](#)]
- Roles and values (i.e., that they are tabs and whether they are selected) are not provided for tabs (e.g., "Analyze", "Refine", and "Categorize" on References page). [[WCAG 2.0 SC 4.1.2](#)]
- Roles (i.e., that they are links) is not provided for some text links (e.g., "124-38-9" in Quick View lightbox on References page). [[WCAG 2.0 SC 4.1.2](#)]

Disclaimer: This high-level evaluation was conducted for the Big Ten Academic Alliance, and represents a good faith effort conducted within a limited time frame. It should not be assumed to be complete or free from error. No warranties or guarantees are implied. UARC is not responsible for direct, indirect, or incidental damages based on this work; its use or interpretation by any individual, group, or organization; or on conditions beyond our control.