MICHIGAN STATE UNIVERSITY | Usability/Accessibility Research and Consulting

To: Robert Van Rennes, Big Ten Academic Alliance
From: Grey L. Pierce, MSU Usability/Accessibility Research and Consulting
CC: Heidi Schroeder, MSU Libraries
Subject: SciFinder^n High-Level Accessibility Evaluation for the Library Accessibility Alliance
Date: May 21, 2020

MSU Usability/Accessibility Research and Consulting (MSU UARC) conducted a high-level accessibility evaluation of the SciFinder^n platform to evaluate its conformance with WCAG 2.1 AA Criteria. This evaluation did not include all functionality or content of the site or all WCAG 2.1 AA Success Criteria.

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

Keyboard users, including screen reader users and users with dexterity impairments, will find it impossible to access or use critical site content. A variety of content throughout the site cannot be reached or operated via keyboard, making it impossible to use for those that rely on keyboard access. Focus order is incorrect in some places, increasing the difficulty of using the site with a keyboard. Many interactive elements lack a sufficiently visible focus indicator, making it difficult for many keyboard-only users to effectively use them, as they cannot determine when they have reached the correct element.

Individuals with visual impairments, including those that rely on screen readers, will also have problems using the site. Some content is not read out correctly and structural information (particularly headings, lists, and tables) is not appropriately conveyed to users, making it difficult or impossible to understand content and organization in places. Some form inputs are not appropriately labeled, 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 to understand and use. Most images have inappropriate or missing 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 insufficient color contrast for text and meaningful visual elements, session time limits that cannot be extended, content being obscured when the viewport or text size is changed, text not reflowing when the viewport or text size is changed, problems bypassing repeated navigation, inappropriate page titles, and undeclared changes in language.

To improve access for users with disabilities, MSU UARC recommends a full WCAG 2.1 AA evaluation and that the problems discovered be remediated.

Note: Results for "71-43-2 " were used as an example of an All Answer Types, Substance Detail, and References page, and "Chalcogen Bonding and Hydrophobic Effects Force Molecules into Small Spaces" was used as an example of a Reference Detail page.

For reference, a screenshot of the Home page at the time this evaluation was completed has been included at the end of this memo.

High-Level Findings

Document Structure

- Headings are not appropriately structured throughout the site. [WCAG 2.1 SC 1.3.1]
  - On the Home page, "SciFinder^n" at top of page should be tagged as a heading (h1)
  - On the Home page, "Search" should be tagged as an h2, not an h1
  - On the Home page, "Recent Search History" should be tagged as an h2, not an h4
  - On the Home page, dates under "Recent Search History" (e.g., "May 19, 2020") should be tagged as headings (h3s)
  - On the All Answer Types page, "Show only" should be tagged as an h2, not an h4
  - On the All Answer Types page, "Expand Scheme"/"Collapse Scheme" shouldn't be tagged as headings
  - On the Substance Detail page, "Sources" in the Experimental Properties section should be tagged as a heading (h4)
  - On the Substance Detail page, headings within the "Additional Details" section (e.g., "Document Types", "Source of Registration") should be tagged as headings (h4s)
  - On the References page, "Filter by" should be tagged as an h2, not an h4
  - On the References page, headings within the "Filter by" section (e.g., "Document Type", "Substance Role", etc.) should be tagged as h3s, not h4s
  - On the References page, result headings (e.g., "Hematotoxicity in workers exposed to low levels of benzene.") should be tagged as h2s, not h3s
  - On the Reference Detail page, "Journal" should be tagged as an h2, not an h3
  - On the Reference Detail page, "Source", "Database Information", "Company/Organization", "Publisher", and "Language" should be tagged as headings (h3s)
- "Help", "Contact Us", and "Legal" in page footer are not coded into a programmatic list. [WCAG 2.1 SC 1.3.1]
- On the Home page, lists in the "Recent Search History" section (e.g., "Substances: (3)", "Reactions: (2)", etc.) are not coded into programmatic lists. [WCAG 2.1 SC 1.3.1]
- On the All Answer Types page, the list under "Show only" is not coded as a programmatic list. [WCAG 2.1 SC 1.3.1]
- On the References page, "Filter by" is incorrectly contained in a one-item list. [WCAG 2.1 SC 1.3.1]
- On the Reference Detail page, lists in the "Journal" sidebar (e.g., list under "Source") and lists in the "Concepts" and "Substances" sections are not coded as programmatic lists. [WCAG 2.1 SC 1.3.1]
- On the Home page, content in the "Recent Search History" section is inappropriately coded as a table. [WCAG 2.1 SC 1.3.1]
- On the All Answer Types page, content in "Scheme" sections is inappropriately coded as a table. [WCAG 2.1 SC 1.3.1]
- On the All Answer Types page, tabular content in Suppliers section should be coded as a table. [WCAG 2.1 SC 1.3.1]

- On the All Answer Types page, the "Show only" section is incorrectly read before the "All Answer Types" h1. [WCAG 2.1 SC 1.3.2]
- On the All Answer Types page, contents of "Scheme" sections are read out of order. [WCAG 2.1 SC 1.3.2]
- On the References page, the "Filter by" section is incorrectly read before the "References" h1. [WCAG 2.1 SC 1.3.2]
- On the References page, checkboxes are incorrectly read before the result headings (e.g., "Hematotoxicity in workers exposed to low levels of benzene.") that they refer to. [WCAG 2.1 SC 1.3.2]
- Changes in language (e.g., Chinese text in page footer) are not programmatically declared. [WCAG 2.1 SC 3.1.2]

Keyboard Support

- A variety of interactive content cannot be reached via keyboard. [WCAG 2.1 SC 2.1.1]
  - Expanders throughout the site (e.g., "Other Names", "Experimental Properties", etc. on the Substance Detail page; "Document Type", "Substance Role", "View All", "View Larger", "View More", etc. on the References page; "Concepts", "Substances", "Citations", etc. on the Reference Detail page)
  - "x" in search bar
  - Contents of search bar dropdown (e.g., "All", "Substances", "Reactions", etc.) on all pages except the Home page
  - Tabs under "Search" (e.g., "All", "Substances", "Reactions", etc.) on the Home page
  - "View COVID-19 related literature" link on the Home page
  - All interactive elements other than "CAS Draw" button, close button, two text entry inputs, zoom slider, and "Cancel" button in the CAS Draw lightbox on the Home page
  - Contents of the "CAS Draw" dropdown in the CAS Draw lightbox on the Home page
  - "Expand Scheme" buttons on the All Answer Types page
  - Substance number links in the "Suppliers" table on the All Answer Types page
  - Thumbs up and thumbs down buttons in the "Suppliers" section on the All Answer Types page
  - "Expand All" and "Collapse All" links on the Substance Detail and Reference Detail pages
  - Chemical structure diagram on the Substance Detail page (cannot reach the CAS RN lightbox)
  - Contents of the "Download Details" dropdown on the Substance Detail page
  - Contents of the menu button dropdown in the CAS RN lightbox on the Substance Detail page
  - "Substances", "Reactions", and "Cited By" on the References page
  - Contents of the "Sort" and "View" dropdowns on the References page
  - Page navigation controls (e.g., "1", "2", "Next") in the "Substances" section on the Reference Detail page
- Keyboard focus does not move to the top of the page when the Back to Top button is activated. [WCAG 2.1 SC 2.4.3]

- On the Home page, focus incorrectly goes to the page behind the CAS Draw lightbox when it is open. [WCAG 2.1 SC 2.4.3]
- On the References page, checkboxes incorrectly receive focus before the result headings (e.g., "Hematotoxicity in workers exposed to low levels of benzene.") that they refer to. [WCAG 2.1 SC 2.4.3]
- On the References page, keyboard focus jumps to the end of the page when Filters are added. [WCAG 2.1 SC 2.4.3]
- Focus is not sufficiently visible for a variety of interactive content. [WCAG 2.1 SC 2.4.7]
  - "SciFinder^n" graphic at top-left corner of page
  - "Saved", "History", and "Account" buttons at top-right corner of page
  - Back to Top button
  - Search, "Draw", "Rerun Search", and "Edit Search" buttons on the Home page
  - "References", "Reactions", "Suppliers", "Full Text", "Substance", "Cited By", and "Citation Map" buttons on the All Answer Types page
  - "Substances", "Reactions", and "Suppliers" heading links on the All Answer Types page
  - "References", "Reactions", and "Suppliers", buttons on the Substance Detail page
  - Download Detail, Email Detail Link, and "Save" buttons on the Substance Detail, References, and Reference Detail pages
  - "Sort" and "View" dropdowns on the References page
  - "Apply" Publication Year button on the References page
  - "References", "Reactions", bell icon, "Citation Map", "Full Text", and "Substances" buttons on the Reference Detail page
  - "Save" and "Cancel" buttons in the Save Result lightbox on the Reference Detail page

Navigation

- Page titles (e.g., Substance Detail and Reference Details pages) are not specific to page contents. [WCAG 2.1 SC 2.4.2]
- On the All Answer Types and References pages, incorrect h1 placement interferes with the ability to bypass repeated content (unique page content is skipped). [WCAG 2.1 SC 2.4.1]

Forms and Data Submission

- On the References page, Publication Year text inputs are not programmatically labeled. [WCAG 2.1 SC 3.3.2]
- On the References page, the Select All checkbox and the checkboxes to select individual results are not programmatically labeled. [WCAG 2.1 SC 3.3.2]
- In the Save Result lightbox on the Reference Detail page, text inputs are not programmatically labeled. [WCAG 2.1 SC 3.3.2]

Images

- A variety of images throughout the site do not have appropriate alternative text. [WCAG 2.1 SC 1.1.1]
  - Search button

- Back to Top button
- Chemical structure diagrams throughout the site (e.g., on the All Answer Types, Substance Detail, and Reference Detail pages)
- View Saved Results, View Search History, and Account buttons on all pages except the Home page
- Close button in the CAS Draw lightbox on the Home page
- Download Details and Email Detail Link buttons on the Substance Detail, References, and Reference Detail pages
- Close button in the CAS RN lightbox on the Substance Detail page
- Publication Year chart on the References page
- Bell icon on the Reference Detail page
- "Chalcogen bonding provides a leakproof capsule in water" graphic on the Reference Detail page
- On the Reference Detail page, "Chalcogen bonding provides a leakproof capsule in water" is an image of text, instead of styled text. [WCAG 2.1 SC 1.4.5]

Color and Visual Characteristics
- On the References page, bars in the Publication Year chart have insufficient contrast. [WCAG 2.1 SC 1.4.11]
- Blue text on purple background (e.g., links in the COVID-19 callout on the Home page), blue text on grey (e.g., links in the "Show only" section on the All Answer Types page), blue text on light blue (e.g., highlighted search terms on the All Answer Types and Reference Detail pages), and light grey text on white (e.g., total number of pages of search results at the bottom of the result list on the References page) have insufficient contrast. [WCAG 2.1 SC 1.4.3]
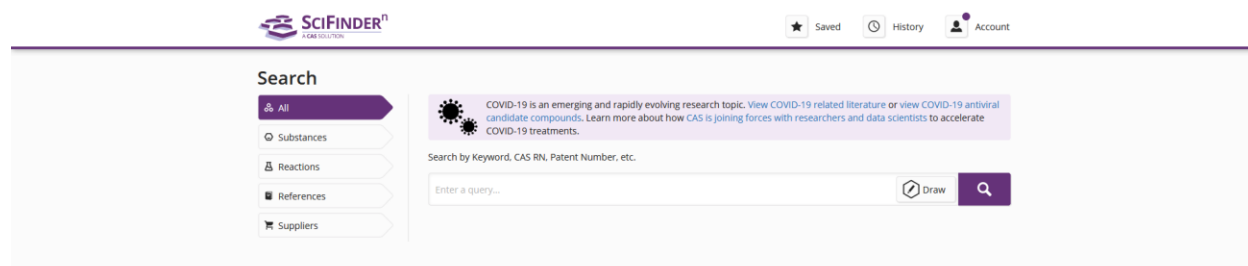
Custom Elements and Dynamic Content
- "Help", "Contact Us", and "Legal" buttons can be obscured by the Back to Top button at some page widths and text sizes. [WCAG 2.1 SC 1.4.4]
- Throughout the site, text does not reflow when the viewport is decreased in size or text is enlarged, requiring users to scroll in two directions to read content. [WCAG 2.1 SC 1.4.10]
- User sessions timeout without providing the opportunity to extend time limits. [WCAG 2.1 SC 2.2.1]
- On the Home page, roles and values (i.e., that they are tabs and whether they are selected) are not provided for tabs under "Search" (e.g., "All", "Substances", "Reactions", etc.). [WCAG 2.1 SC 4.1.2]
- On the Substance Detail page, roles and values (i.e., that they are tabs and whether they are selected) are not provided for tabs in the "Experimental Properties" section (e.g., "Acoustic", "Biological", etc.). [WCAG 2.1 SC 4.1.2]
- In the CAS RN lightbox on the Substance Detail page, programmatic names are not provided for the Edit Structure and Reset buttons.
- In the CAS RN lightbox on the Substance Detail page, screen readers are not notified when +/- zoom buttons are buttons are activated. [WCAG 2.1 SC 4.1.2]

Home Page Screenshot

Large Width

Medium Width

SciFinderⁿ

★ Saved   🕐 History

Search

- 👥 All
- ⊖ Substances
- ⚗ Reactions
- 📖 References
- 🛒 Suppliers

COVID-19 is an emerging and rapidly evolving research topic. View COVID-19 r... candidate compounds. Learn more about how CAS is joining forces with resea... COVID-19 treatments.

Search by Keyword, CAS RN, Patent Number, etc.

Enter a query...

Recent Search History

| May 19, 2020 |

9:59 AM

👥 All   test

Substances: (3)
Reactions: (2)
References: (13.6M)
Suppliers: (2)

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👥 All   test

Substances: (3)
Reactions: (2)
References: (13.6M)
Suppliers: (2)

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Substances: (0)
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References: (12.9M)
Suppliers: (0)

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Substances: (3)
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References: (13.6M)
Suppliers: (2)

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View All Search History

⬆   Help Co...