

Project Summary: ElementMix – AI-Based Chemical Reaction Simulator

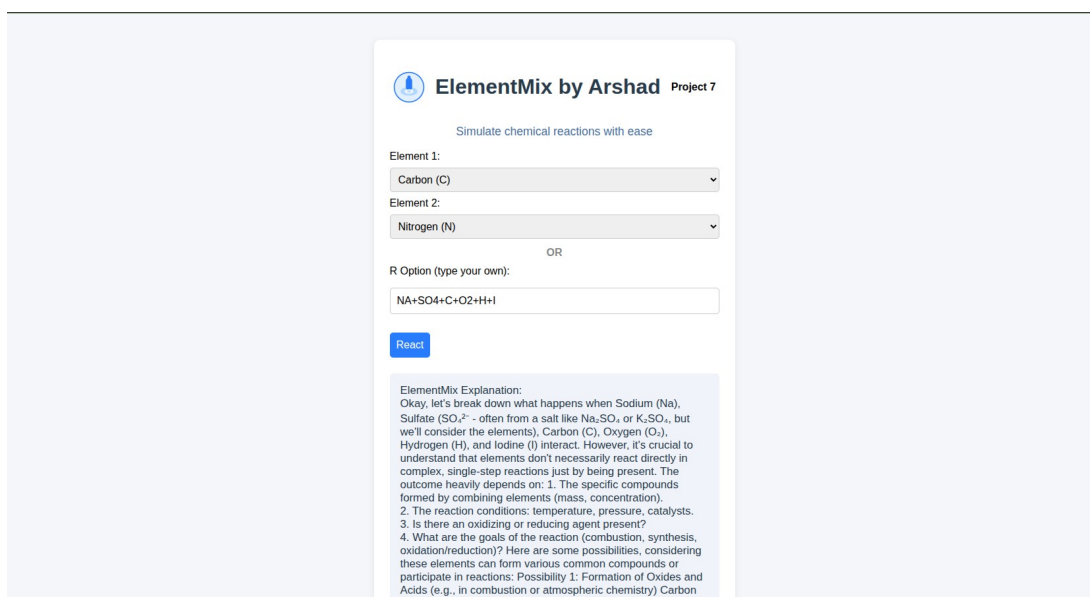
ElementMix is an intelligent and interactive chemical reaction simulator designed to predict the results of combining elements from the **periodic table**. This project was created to make chemistry more engaging, visual, and easier to understand, especially for students and educators.

Users can select any **two elements using dropdown menus** that display both the full name and its symbol (e.g., Sodium (Na), Chlorine (Cl)). **Alternatively, users can type a custom formula** (like $\text{Na} + \text{Cl}$ or $\text{H}_2 + \text{O}_2 + \text{N}_2$) into a flexible input field. The system then analyzes the combination and provides a clean, structured output — including the final product, the balanced chemical equation, and a brief explanation of why the reaction occurs and where it is applied in real life.

If the reaction exists in the predefined database, it is returned instantly. If not, the system intelligently generates a result based on deep research logic built into the backend. The output is filtered and formatted for clarity, with colorful visual styling and structured spacing that enhances readability and learning.

Developed as part of an academic challenge, ElementMix showcases how deep scientific reasoning and smart technology can create powerful, user-friendly educational tools.

 <https://elementmix-isro-project.onrender.com/>



The screenshot shows the web application interface for 'ElementMix by Arshad Project 7'. The header includes the project name and a tagline 'Simulate chemical reactions with ease'. Below this, there are two dropdown menus for 'Element 1' and 'Element 2', with 'Carbon (C)' and 'Nitrogen (N)' selected respectively. An 'OR' option is provided between the dropdowns. Below the dropdowns is a text input field for 'R Option (type your own):' containing the formula 'NA+SO4+C+O2+H+I'. A blue 'React' button is positioned below the input field. The output section, titled 'ElementMix Explanation:', contains a detailed text explanation of the reaction process, including a breakdown of the elements and a list of four points to consider: 1. The specific compounds formed by combining elements (mass, concentration). 2. The reaction conditions: temperature, pressure, catalysts. 3. Is there an oxidizing or reducing agent present? 4. What are the goals of the reaction (combustion, synthesis, oxidation/reduction)? Here are some possibilities, considering these elements can form various common compounds or participate in reactions: Possibility 1: Formation of Oxides and Acids (e.g., in combustion or atmospheric chemistry) Carbon reacts with oxygen: $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ (Carbon Dioxide) Sulfate reacts with hydrogen: $\text{H}_2 + \text{SO}_4 \rightarrow \text{H}_2\text{SO}_4$ (Sulfuric Acid)

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