



**The Breaking Brothers**

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# Deliverable 1







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# Project Ideas

Team Member	Project Ideas	Description
Marco	Chess Calculator	<ul style="list-style-type: none"><li>• Program will be given any chess game, live or not</li><li>• It will calculate the next best chess move based on all possible combinations of the next ~15 moves</li></ul>
Daniel	Chemistry Calculator	<ul style="list-style-type: none"><li>• Stoichiometry</li><li>• Thermodynamics</li><li>• Neutralization of acids and bases</li><li>• Visualization of molecules in 3D</li><li>• Speed of reaction</li><li>• Ideal and real gas calculator</li></ul>
Amir	Poker and Blackjack Odds Calculator	<ul style="list-style-type: none"><li>• In blackjack, suggest to hit, stand, double down or split</li><li>• In poker, suggest to bet, call, check or raise</li><li>• Display information on next possible cards</li></ul>
Sahon	Graphing Calculator	<ul style="list-style-type: none"><li>• User inserts equations</li><li>• Program transforms equation into a graph</li><li>• User can enter a x or y values, program will return the opposite value.</li><li>• Plot the graph, program returns an equation</li></ul>
Selected Project	Chemistry Calculator	



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# Concepts and Aspects

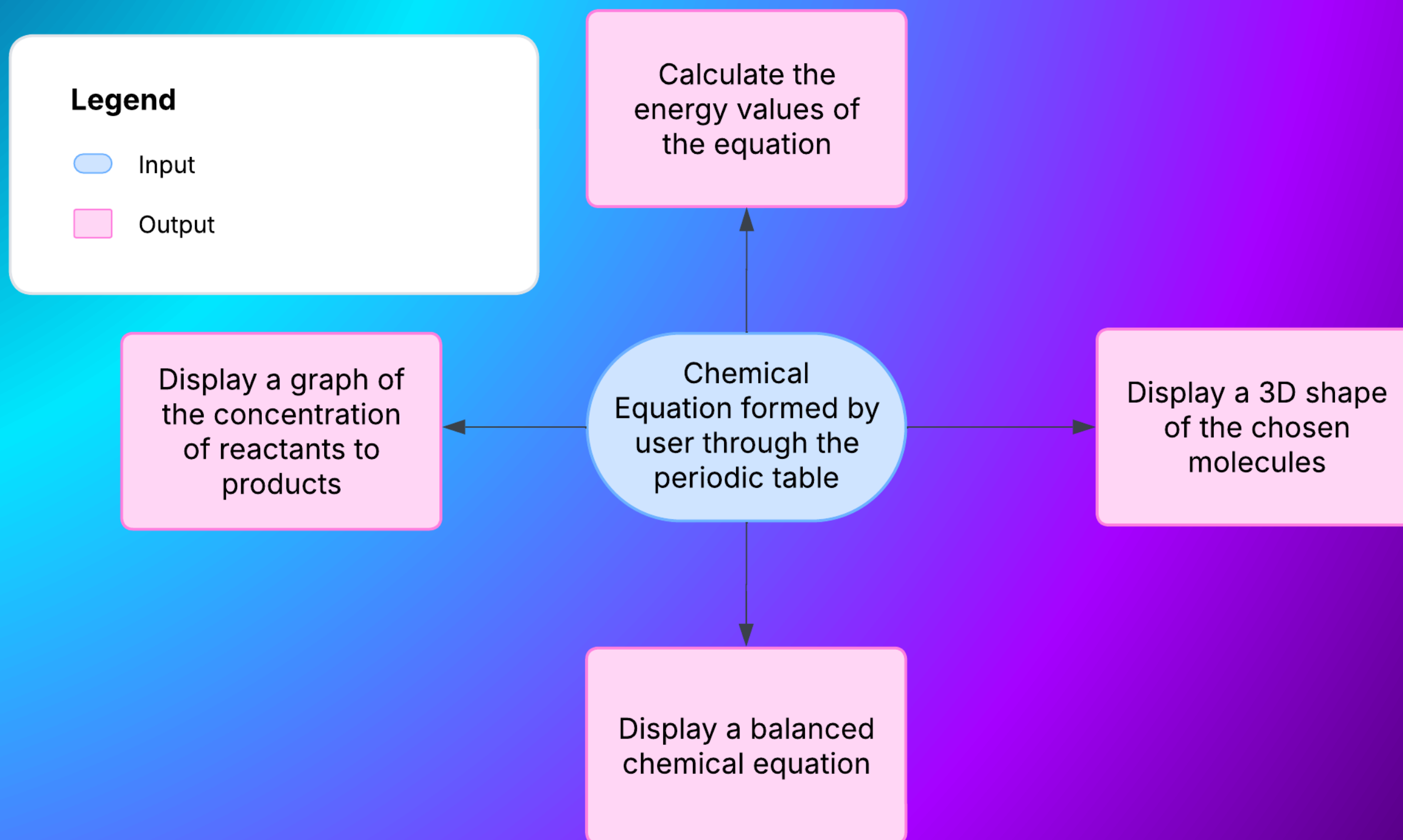


- Stoichiometry = Balancing Chemical Equations
  - Atoms chosen, coefficients
- Thermochemistry = Calculating heat of endothermic and exothermic reactions
  - Chemical Equations
- Acid-Base Neutralization
  - Chemical Equations
- Graph showing rate of change in concentration of reactants vs products
  - Equilibrium constant graph
- pH and pOH calculator using logarithm
  - Concentration of reactants
- 3D molecule viewer
  - Based on the Molecule
- Periodic table viewer
  - Sorted by atomic radius, electronegativity, ionization energy



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# Input and Output







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# Components

- **Sliders, Buttons, BootstrapFX, Subscene, shapes 3D, (JavaFX 3D graphics API)**

# Feasibility

- Equal share of distribution
- Challenges
  - Login system, database
  - 3D visualizer
  - Algorithm for Equation Balancer





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# Daniel's Part

- Thermodynamics:
  - Calculate the dispersion of energy in a system containing a body with higher temperature than the other based of the materials used, the type of system(open/closed/isolated)
  - Determine if the reaction is spontaneous or not
- Rate of reaction:
  - Calculate the speed at which the reactants transform into products and when the equilibrium of the reaction is reached(forward and backward reaction rate the same) based of the concentrations of each element.
- Ideal and real gas calculator:
  - Based of the parameters that the user will input, give the desired measure based of the formulas of the ideal gas or if desired based on the real gas but additional inputs will be required



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# Sahon's Part

## Stoichiometry Solver:

- User will be asked to choose which molecules to build an equation.
- User will enter the masses of the molecules of the equation.
- Once the solve button is clicked, the masses, mole and number of atom per molecule will be shown.
- Done using an algorithm that will transform the chemical equation into a Matrix that will then be solved.

## pH and poH Calculator:

- Return pH and poH using their respective formulas



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# Marco's Part

- Login system with database
  - Database to hold user info, previous calculations history
- 3D Molecule viewer using a Chemistry Database API
- Constants for elements of the periodic table retriever with API
- Sound Effects
- Password change in Settings





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# Amir's Part

- Managing User Interaction with the Periodic table
  - Sorting elements by electronegativity, radius, ionization energy, etc.
  - Displaying information over a certain element when hovering over it
- Theme Changer
  - The user will be able to switch from dark mode to bright mode and vice versa and other color schemes
- Creating a user Guide/Help button to guide the user with the application's functionality
- Changing font and text size





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# Prototype

## Login

User Name

Password

Log in

## Build a Molecule



Visualize Molecule

Balance Equation

Neutralize Acids and Bases

Calculate Heat Transfer

Calculate pH and pOH

1 H Hydrogen																	2 He Helium				
3 Li Lithium	4 Be Beryllium															5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium															13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton				
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon				
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium					
87 Fr Francium	88 Ra Radium	89 Ac Actinium	90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium					



Settings





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# Thank You