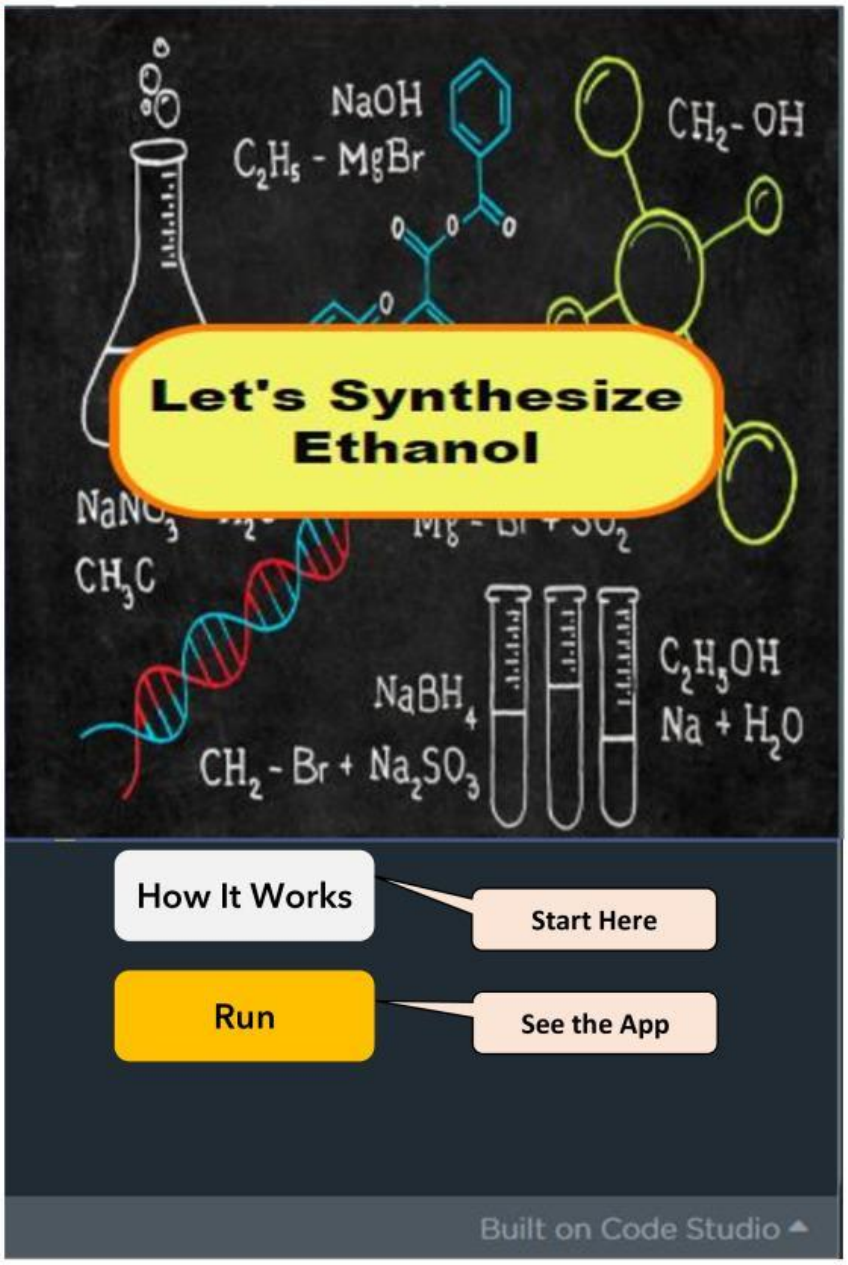
Project 82

DP EDUCATION

Coding School



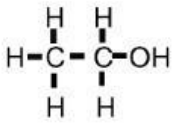
- Let's create an app to study ethanol synthesis. (This app is an improvement of 81 Homework itself. The 81 project is also included in this document.)

  - Before creating this app, it is essential to have a proper understanding of the chemistry part used here.

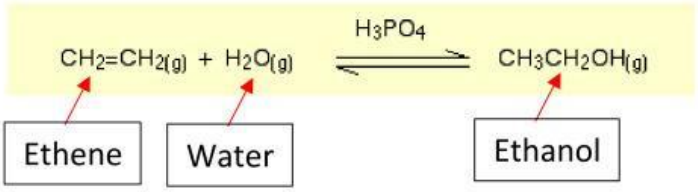
  - First let's understand about ethanol. Ethanol is an organic compound. Ethanol consists of the elements carbon (C), hydrogen (H) and oxygen (O).

  - Ethanol is also used in the production of hand sanitizer, some types of fuel.

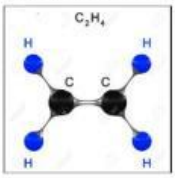
  - Its molecular structure can be shown in this way. It has 2 carbon molecules, 6 hydrogen molecules and one oxygen molecule each.



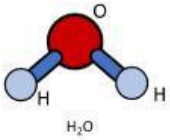
  - A compound called ethene and water are used for the synthesis of ethanol. The reaction can be described as follows..



  - Here H_3PO_4 is phosphoric acid. It is used as a catalyst in this reaction.
  - Looking at the formula for the above reaction, you will understand that one molecule of ethanol is synthesized by reacting with one molecule of ethene and one molecule of water.



ethene



water

  - C, H, O in an ethanol molecule come from ethene and water molecules. A molecule of ethanol is synthesized by 2 C molecules, 4 hydrogen molecules in ethene molecule and 2 H molecules and O molecule in water molecule.

- This knowledge is important when coding the app in the future

- Now let's see what a mole is. To explain it, taking carbon molecule as an example, the molecular mass of carbon molecule is $12.01 gmol^{-1}$. 12.01g of carbon is one mole of carbon.

- The molar mass of H is 1.01 $gmol^{-1}$. 1.01g of hydrogen is one mole of H.

- The molar mass of O is 16.00 $gmol^{-1}$. 16g of O is one mole of O.

- Ethanol is a molecule made up of a combination of the above elements, so it has a molecular mass. The molecular mass of ethanol is 46.08 $gmol^{-1}$. That is, 46.08g of ethanol molecules are required for one mole of ethanol molecules.

- Let's use this chemistry knowledge to create an app about ethanol synthesis.
- All the screen and design required for creating the app has been given to you.
- At the beginning of coding, let's create the variables and arrays that are needed in the app creation.
- Let's define two arrays to store the molar masses of C, H, O in one mole of ethene and water molecules.

```
var ethene = [24.02,4.04,0.00] ← →;
var water = [0.00,2.02,16.00] ← →;
```

- The two arrays contain the molar masses of C, H, and O respectively.

- Then create 3 variables as below to store the amount of C, H, O contained in water and ethene added to the beaker for synthesis.

```
var carbon = 0;
var hydrogen = 0;
var oxygen = 0;
```

- Finally, create two more variables to store the molar amount of ethene and water added to the beaker.

```
var ethenMoleculs =0;
var waterMoleculs =0;
```

- Now let's create the App from the beginning. When you click on the button on the first screen, apply the following blocks to switch to the Required elements screen.

```
onEvent("btnStart", "click", function() {
  setScreen("RecuiredElements");
});
```

- Create the same as above to switch to the mixing screen when the Let's make id "btnLetsMake" button on that screen is clicked.
- When you come to the mixing screen, let's create a label that shows the description of the ethene and H_2O molecules.

```
onEvent("imgEthene", "mouseover", function() {
  showElement("labelEtheneDesc");
});
```

- In this way, create a label named "labelWaterDesc" so that it becomes visible when the mouseover is done on the water molecule.
- The label shown in this way should hide again when the mouse is removed from the image. For that, code for both images as below.

```
onEvent("imgEthene", "mouseout", function() {
  hideElement("labelEtheneDesc");
});
```

- Now, when you click on the two images with the two molecules, let's create to show that one mole of each of them has been added to the beaker.
- When you click on the Ethene molecule, code as follows.

```
onEvent("imgEthene", "click", function() {
  ethenMoleculs = ethenMoleculs+1;
  setText("labelEthene", ethenMoleculs + "\tEthene");
});
```

When clicked once, the value of the variable "ethenMoleculs" created above will increase by one.

❖ At the same time, set the text of the Ethene label on the beaker to show the moles of added ethene. This block is used for that.

```
setText("labelEthene", ethenMolecule + "\tEthene");
```

❖ Similarly, when you click on the water molecule, create it to show that one mole of it is added to the beaker. Another label is designed as “labelWater” to show the amount of moles of water added on the beaker.

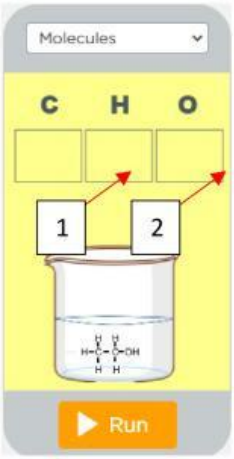
❖ Finally, when you click on the Mix button, create to move to the "Molecules" screen.

- Let's finish the app created in the 81st project in this project.

❖ When the Mix button is clicked, the transition to the "Molecules" screen is done only if one condition is true. The condition is that at least one molecule of ethene or one molecule of water has been added to the beaker.

❖ Create it as below.

```
onEvent("btnMix", "click", function() {
  if(ethenMolecule != 0 && waterMolecule !=0){
    setScreen("Molecules");
```



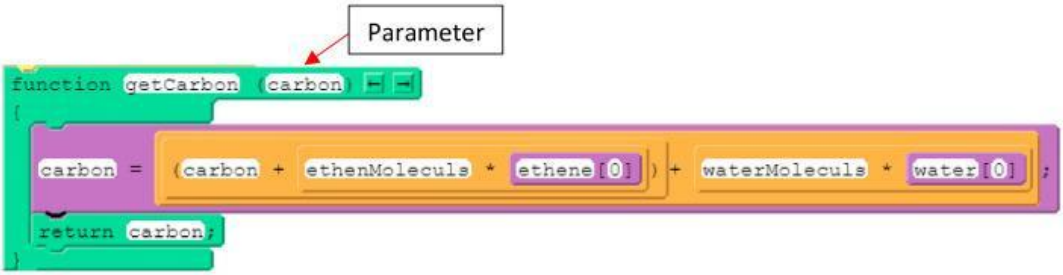
Here 1 shows the molar mass of the carbon molecules contained in the moles of molecules you added in the screen.

2 shows the molar mass of H molecules.

3 shows the molar mass of O molecules.

❖ In order to show that, the quantities contained in them must be calculated.

❖ For that, let's create a function as follows and calculate the mass of each element.



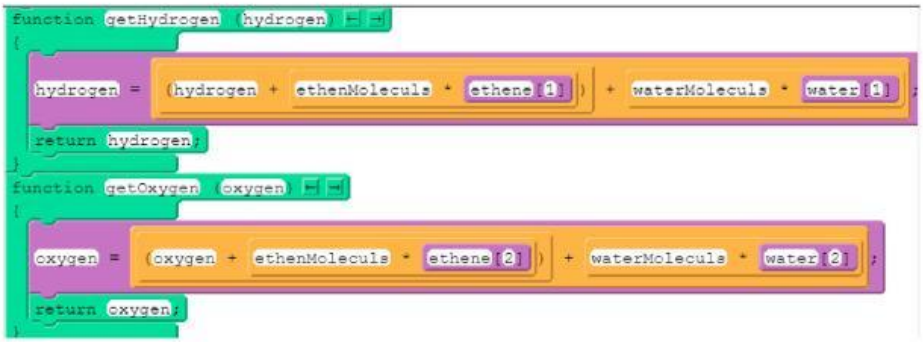
❖ Create a function as getCarban. Give the variable carbon created at the beginning of coding the app as its parameters.

❖ Calculate the amount of C contained in the molecules put in the beaker as above to the variable thus obtained.

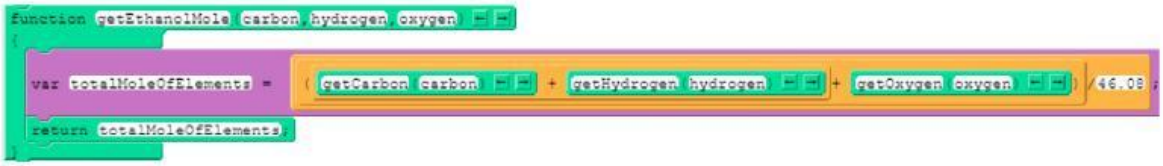
❖ Then return the carbon variable. Returning something through a function means that it can be retrieved when calling that function. `return carbon;` In this case, the carbon variable is returned, so when this function is called, the value in that variable is obtained

❖ Then return the carbon variable. Returning something through a function means that it can be retrieved when calling that function. In this case, the carbon variable is returned, so when this function is called, the value in that variable is obtained.

❖ In this way, let's create a function to calculate the amount of hydrogen and oxygen.



❖ Finally, let's create a function to calculate the amount of ethanol moles that can be synthesized by all the added ethene and water molecules. For that, all the variables like carbon, hydrogen and oxygen are required as parameters.



❖ Call the functions calculated in the following way when the “Molecules” screen is loaded and the mixing button is clicked to be displayed in the relevant labels.