

# AR Chemistry Game Application Instructions

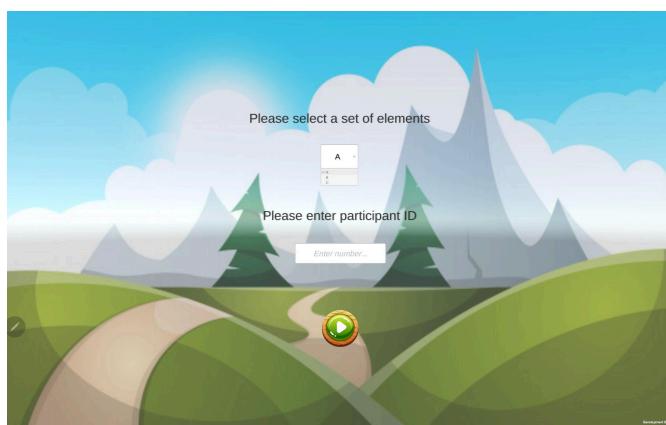
Welcome to the applications guide! Follow these instructions carefully to ensure a smooth and successful process.

## There are 3 platforms of application

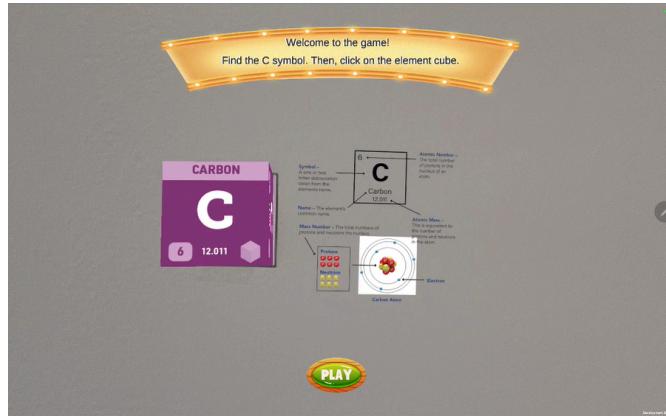
1. **Mobile platform** (for Android only)
2. **Desktop Computer platform**
3. **Head-Mounted Display platform** (HoloLens2 device is recommended)

### 1. Mobile platform (for Android only)

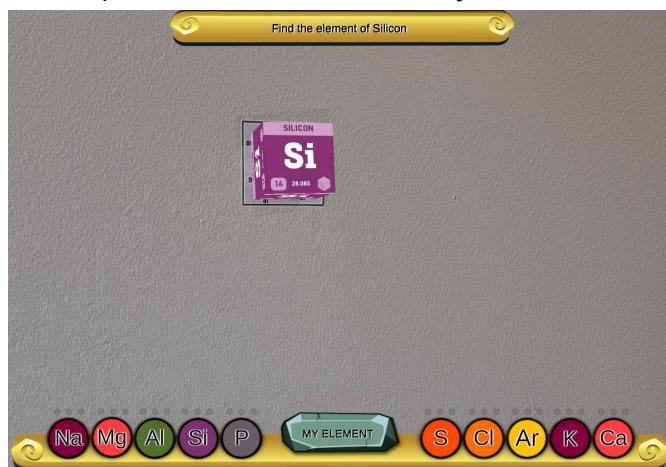
- **Set up:**
  - Print **Target Symbol.pdf** file on the paper with Letter size.
  - Cut paper each symbol into square pieces, the total of 31 element symbols.
  - Attach paper 31 squares symbols with the clear tape to the wall in the desired area to be used with the application later.
  - Ensure each square symbol is at least 15 inches apart.
- **Install:**
  - Open **ARChemistryGame-Mobile.apk** file on mobile/tablet device.
  - Tap the “Install” button and wait for the application to successfully install.
  - Tap the “Launch” button to open the application.
- **Launch:**
  - Ensure your mobile/tablet device allows “Landscape” mode and “Camera” feature.
  - Once installed, tap the “ARChemistryGame” application icon to launch.
  - Select the desired set of elements from the dropdown list and enter ID number.
    - Set “A”: elements of atomic number 11-20
    - Set “B”: elements of atomic number 21-30
    - Set “C”: elements of atomic number 31-40



- Tap the start button located on the bottom center to start the game.
- Start the game with element Carbon, by having the camera detect the “C” symbol (attached to the wall from the set up step).
- Then tap the purple 3D object on the screen to display the atomic element detail.



- Tap the “Play” button when ready to start the game mission.
- There are 3 mission in the game:
  - Matching element's name with symbol
  - Matching element's symbol with atomic number
  - Indicate atomic number with element's name
- In the game, you will see a yellow bar at the top of the tablet screen that will give you instructions to follow. To interact with the game, you will have to hold up the Tablet and have the camera in the game detecting the element markers on the wall. Tap/Touch screen to select objects.



- **Apps Data:**
  - Connect the mobile/tablet to the computer via USB.
  - Go to *This PC\yourdevicename\Internal storage\Android\data\com.DefaultCompany.ARChemistryGame\files\Participants*
  - You should see the list of log files (xxxxx.csv) under the filename associated with the users/participants' ID.
  - Each file captures the user's activity while playing the game; times, scores,etc.

## 2. Desktop Computer platform

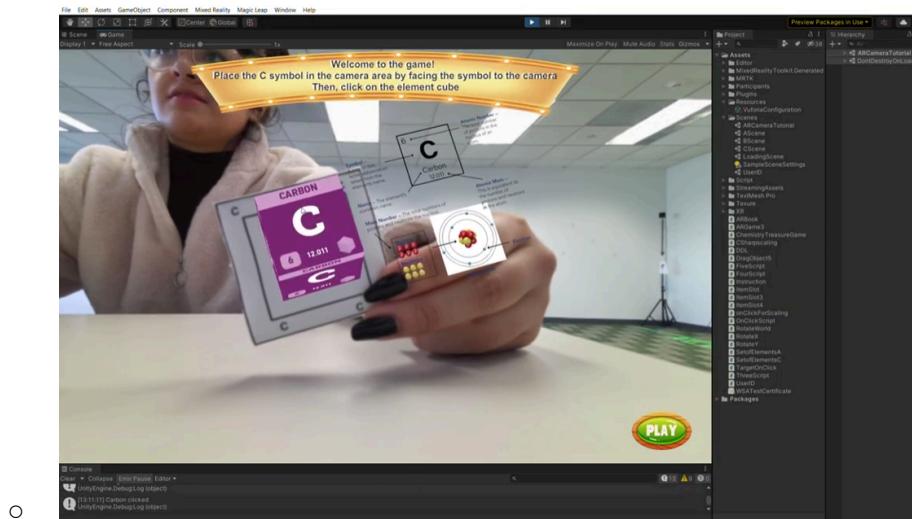
- **Set up:**
  - Print **Target Symbol.pdf** file on the paper with Letter size.
  - Cut paper each symbol into square pieces, the total of 31 element symbols to be used with the application later.
- **Launch:**
  - Make sure your computer device has the camera enabled and located in the reachable area.



- Unzip **ARChemistryGame-Desktop.rar** on your computer.
- Launch Unity Hub  program
- Open “ARGame” folder on Unity program with 2020.3.20f1 (or any2020) version.
- Open the “UserID” scene
- Play the UserID scene
- Select the desired set of elements from the dropdown list and enter ID number.
  - Set “A”: elements of atomic number 11-20
  - Set “B”: elements of atomic number 21-30
  - Set “C”: elements of atomic number 31-40
- Click the start button located on the bottom center to start the game.



- Start game with element Carbon, by placing “C” symbol in front of the camera.
- Then click on the purple 3D object to display the atomic element detail.



- Click the “Play” button when ready to start the game mission.
- There are 3 mission in the game:
  - Matching element’s name with symbol
  - Matching element’s symbol with atomic number
  - Indicate atomic number with element’s name
- The yellow bar on top of the screen displays the mission instructions.
- To interact, hold the symbol paper facing the camera with the distance that the camera can detect.

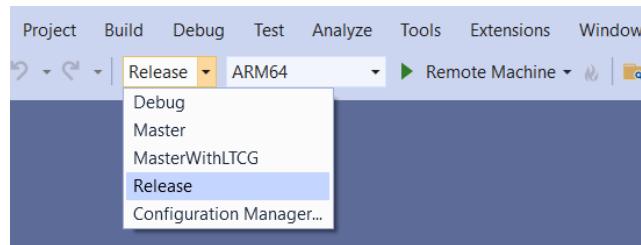


- To select, click on the 3D element object on the screen using the mouse.
- **Apps Data:**
  - Go to the drive where the ARGame project is located (e.g. D:\, C:\).
  - Go to \ARGame\Assets\Participants
  - You should see the list of log files (xxxxx.csv) under the filename associated with the users/participants’ ID
  - Each file captures the user's activity while playing the game; times, scores,etc.

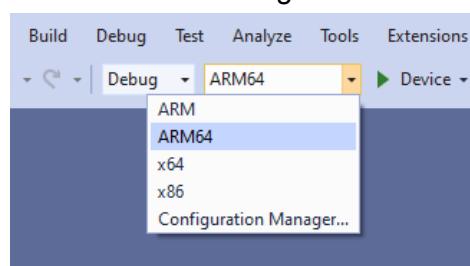
### 3. Head-Mounted Display platform (HoloLens2 device is recommended)

- **Install:**

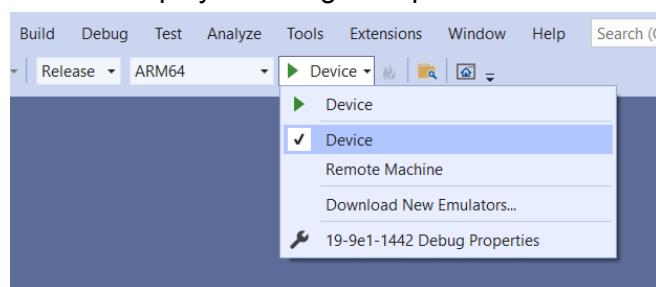
- Unzip **ARChemistryGame-Hololens.rar** on your computer.
- Connect the HMD device to the computer via USB.
- Enable “Developer Mode” on the HMD device so Visual Studio can connect to it.
- Open the “Visual Studio” program, then open the project by selecting the “ARGame.sln” file.
- Click the compilation options drop down and then choose “Release”



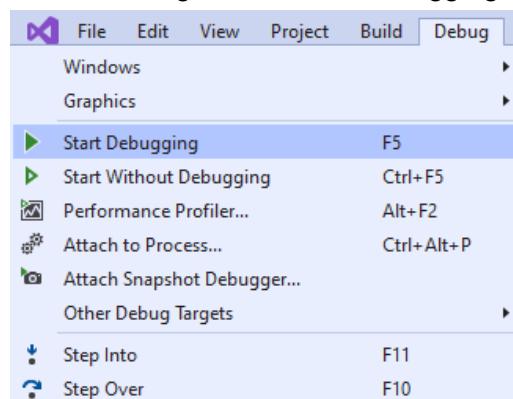
- Select the build configuration "ARM64" option.

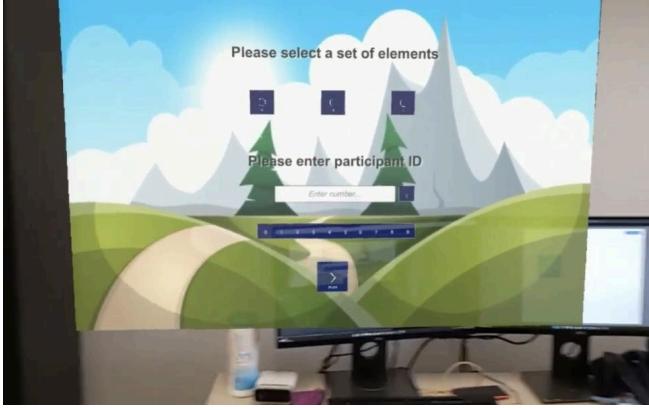


- Click the deployment target drop-down and then select “Device”.



- Select “Debug”, then “Start debugging” to deploy the application.

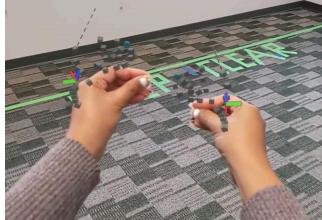


- **Launch:**
    - Once installed, tap the “ARGame” application icon to launch.
    - Select the desired set of elements and enter the ID number.
      - Set “A”: elements of atomic number 11-20
      - Set “B”: elements of atomic number 21-30
      - Set “C”: elements of atomic number 31-40
- 
- Select the > button located on the bottom center to start the game.
  - In the training scene (to properly familiarize yourself with the hololens), follow the instructions in the yellow bar at the top of the screen.



- To *Select*:
    - With your index finger, you will press on your selection.
    - A light tap will not work, press on the object/choice as if it is really there.
- 
- To *Grab/Move*:
    - Using your thumbs and index fingers tap each other at the object and move your hand to move the object.
    - Release your fingers to release the object.
    - Make sure your hands are in view while moving.



- To *Expand*:
  - With both hands, grab/pinch both sides of the object.
  - Pull hands apart to expand the object.
  - Bring hands closer together to minimize the object.
  - Rotate hands if you wish to rotate objects.
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- There are 3 mission in the game:
  - Finding element's name associated with symbol
  - Finding element's symbol associated with atomic number
  - Matching atomic number with element's name
- In the game, you will see a yellow bar at the top of the screen that will give you instructions to follow.



- Apps Data:
  - Connect the HMD device to the computer via USB, and ensure the device is on.
  - Go to Device (HoloLens) Portal > System > File explorer > LocalAppData > ARGame > LocalState > Participants
  - You should see the list of log files (xxxxx.csv) under the filename associated with the users/participants' ID.
  - Each file captures the user's activity while playing the game; times, scores,etc.

## Contact Support

If you need assistance, contact our team:

- Email: kn32@njit.edu | margarita.vinnikov@njit.edu | michael.j.lee@njit.edu
- Online Help: [Visit](#)