Teacher Manual for StereoChem

I. How do I set up StereoChem?

1. Download the StereoChem zipped folder.
2. Extract the zipped folder on your computer.
3. Copy APK file to your android mobile.
4. Click on the APK file to open and install the StereoChem app in your mobile.
5. Get printout of all the marker images of molecules.

II. How do I run StereoChem?

1. After the installing StereoChem, open the app in your mobile.
2. Then using StereoChem app, scan the marker image one at a time to visualize 3D molecule.
3. To rotate the molecule along X-axis, use two fingers to swipe on the mobile screen.
4. To rotate the molecule along Y-axis, rotate the marker image horizontally.
5. To zoom in or zoom out of the visualized 3D molecule move the image marker nearer or farther from the mobile screen.
6. It is suggested that learners keep their hands free by placing the mobile or tablet devices on table using mobile holders. This would let learners to use their one hand to rotate the marker while the other to simultaneously write 2D symbolic diagrams by examining molecules in the Stereochem.
7. Photocopies of marker images will work as good as the printed ones.

III. What are the precautions to be considered while using StereoChem?

1. StereoChem may not scan the marker image properly when used directly under the source of light. So use StereoChem a bit away from the direct light source.
2. Do not fold the marker images. If there are lots of folded marks on the marker Image then StereoChem may not scan it properly.

IV. How do I conduct student activities with StereoChem?

Here we will discuss two sample learning activities to showcase the utility of StereoChem app. Fig. 1 and Fig. 2 given below gives us the pictorial description of the Inquiry-based learning activity.

Learning Activity 1: Identifying and distinguishing stereoisomers

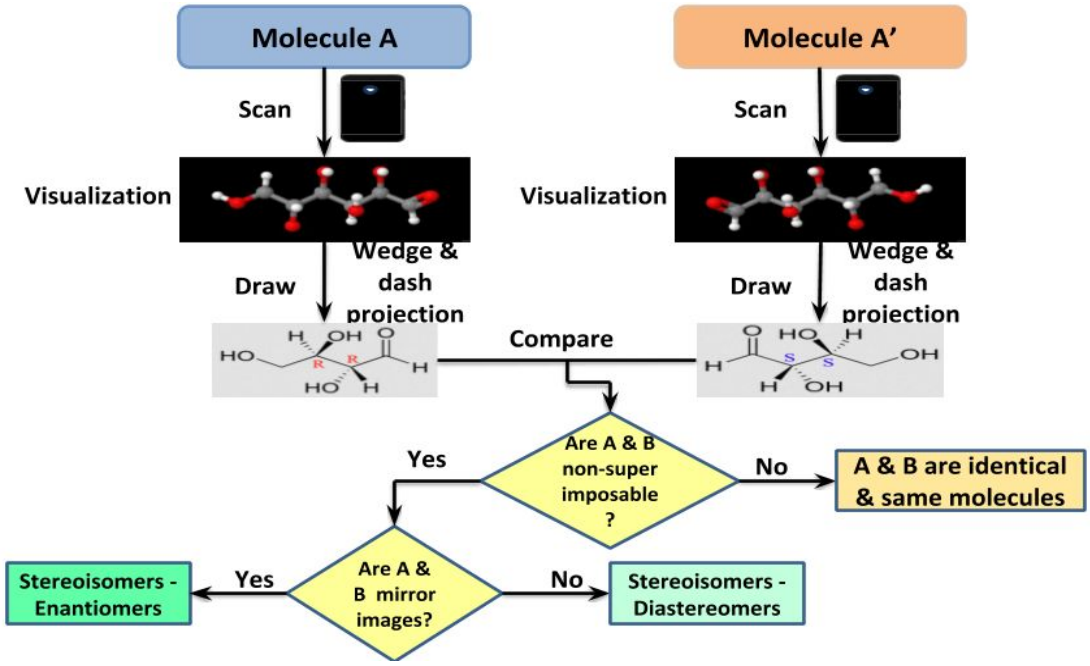

Figure 1: **Learning Activity 1- Identifying and distinguishing stereoisomers**

In the above activity,

1. Teacher gives a worksheet to all students in the classroom with markers of Molecule A and Molecule A' which have same molecular formula but different spatial arrangement.
2. Students use StereoChem app to scan the markers to visualize the augmented reality 3D molecular structures and draw their 2D representations in wedge and dash projection using appropriate rules and conventions.
3. After drawing the 2D representations, students will check whether they accurately account for spatial arrangements in the molecules using StereoChem. Notation of wedge is used for representing atoms in a molecule to indicate as if they are coming out of a plane of paper and dash notations are used to represent atoms as if they are oriented away from the plane of the paper.
4. Students will identify and distinguish a given pair of stereoisomers by performing various visuospatial tasks and draw their 2D representations.
5. Students will use StereoChem to highlight the stereo centre, visualize axes and planes of molecules and then rotate, reflect one molecule with the other to check if they are mirror images or not.
6. If they are mirror images then students have to check whether they can be superimposed or not by dragging one molecule over the other using StereoChem app.

7. The whole task of identifying and distinguishing stereoisomers is aided by StereoChem app with its various features such as visualizing axes, planes and by rotating, reflecting and superimposing one molecule over other.
8. StereoChem all through the activity acts as a scaffold for students to perform visuospatial tasks.

Learning Activity 2: Identifying pairs of enantiomers and diastereomers

Enantiomers and diastereomers are stereoisomers with the same molecular and structural formula but different arrangement/configuration of the atoms that make their structures. Enantiomers are chiral molecules that are mirror images of one another but not superimposable whereas diastereomers are neither mirror images nor superimposable.

This learning activity requires the students to go through the same steps as in the 1st learning activity except for distinguishing stereoisomers based on their definitions. Given below is pictorial representation of the learning activity.

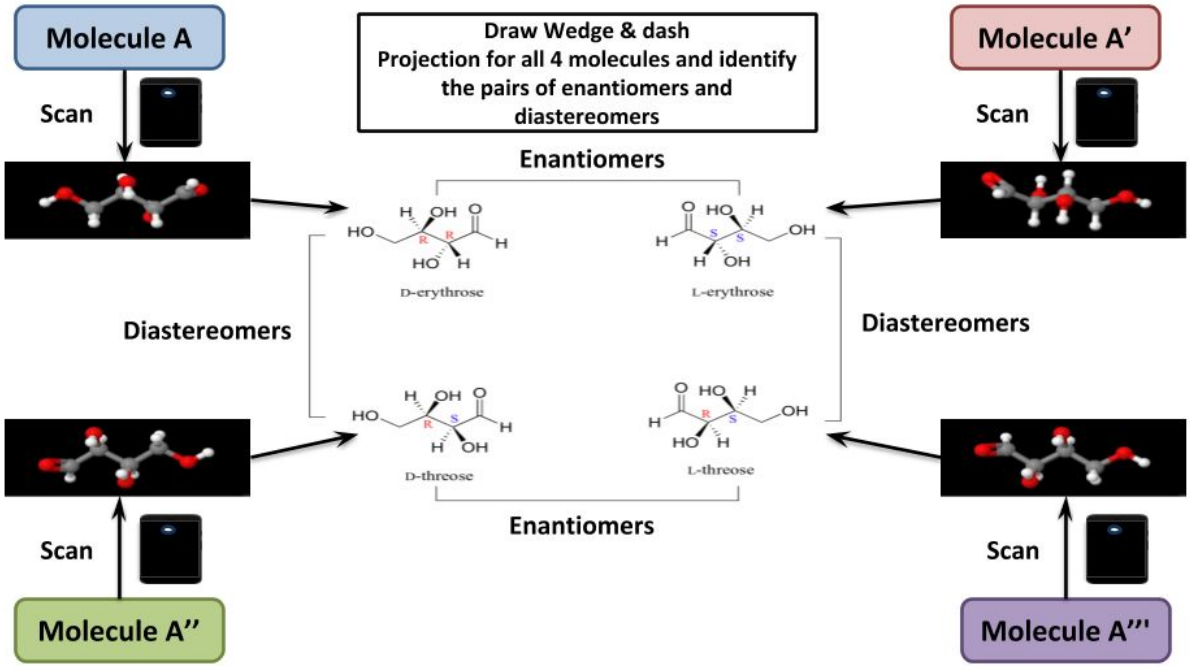

Figure 2: Learning Activity 2- Identifying pairs of enantiomers and diastereomers

V. What are the screen components of StereoChem?

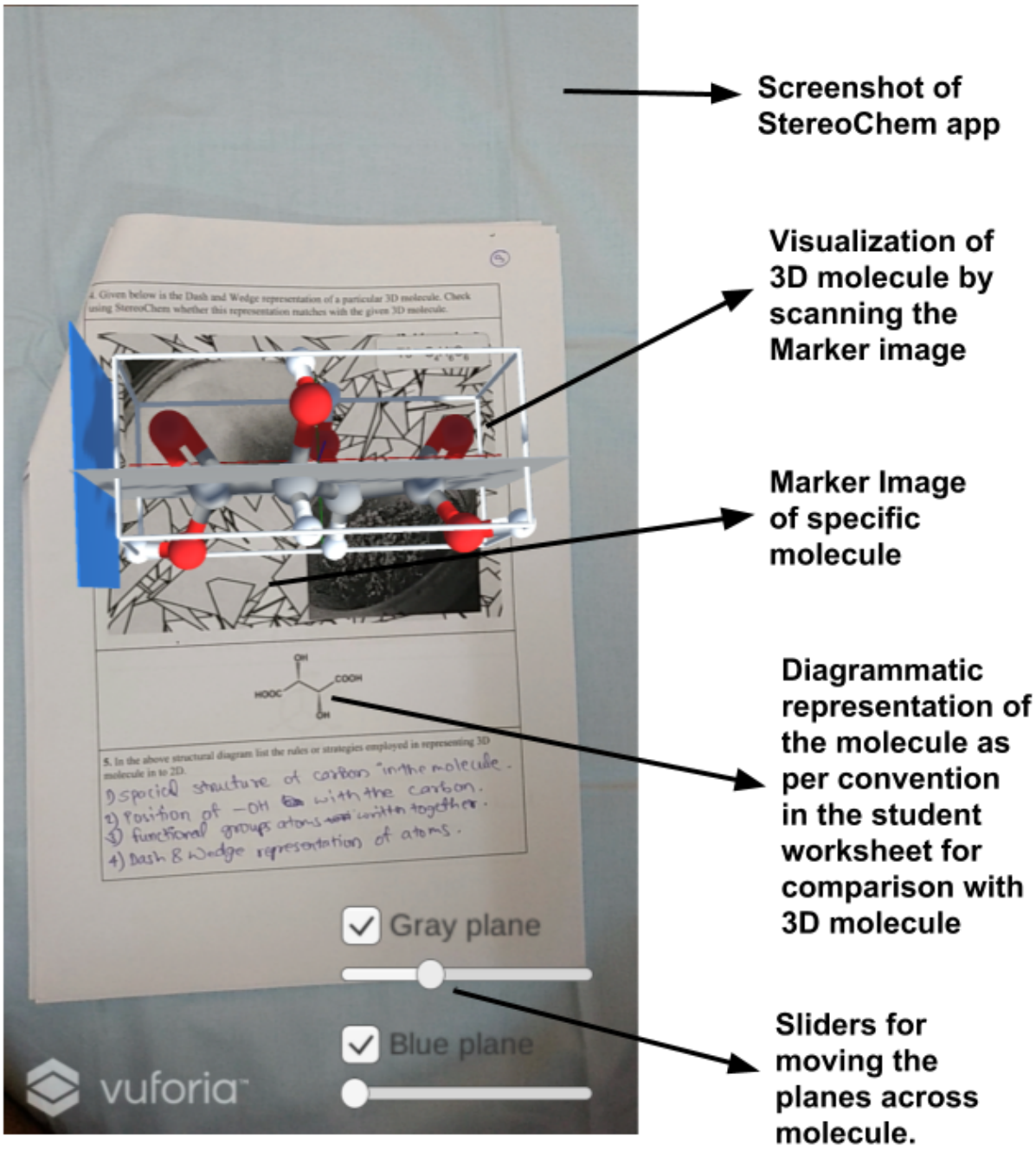

Fig 3: Screenshot of StereoChem with 3D molecule visualization

VI. Credit table

Conceptualization & Design of StereoChem App	Narasimha Swamy K L, Research Scholar Pankaj S Chavan, Research Scholar Prof. Sahana Murthy
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Troubleshooting and Technical Advice	Ashutosh Raina, Research Scholar
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