People's Democratic Republic of Algeria

Université FARHAT ABBES Setif

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End of study report

To obtain the Diploma in Computer Science

Theme:

Iodine–Starch Mixing Experiment Animation in Blender

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1. Introduction

The iodine–starch reaction is one of the most iconic chemical demonstrations: when iodine solution comes into contact with starch, the mixture instantly turns a deep blue color. In Blender, this effect can be simulated by building a 3D laboratory setup and animating the color change using liquid simulations, mesh deformation, or shader-based transitions

2. the concepts and the steps:

The goal of the animation is to visually represent a real chemical reaction in a 3D environment. The essential steps in the real experiment are:

- A beaker contains a transparent or lightly colored starch solution.
- Iodine (dark brown) is poured from a test tube.
- Once iodine mixes with starch, the solution quickly turns blue.

3. Building the Blender Setup

3.1. Creating the Main Objects

- **Beaker:**
  - Add a cylinder from the mesh
  - change the number of segments to 64 to smooth the chape
  - Go to edit mode, using the face selector select the top face and delete it
  - Use the loop cut to cut the cylinder horizontally
  - Select an edge line, move it forward to create the spout of the beaker (using the proportional editing to get smooth spout)
  - add solidify modifier for glass thickness
  - Add bevel for realistic edges
  - Add subdivision modifier for smooth surface
  - Add glass shader (glass BSDF)
- **Test Tube:**
  - Add a UV sphere (make the numbers of rings odd)
  - In edit mode select the top half of the sphere and delete it
  - Select the top ring and extrude it to get a tube shape
  - Add solidify modifier for thickness

- Add a glass shader (glass BSDF)

- **Starch Solution Mesh:**
  - Inside the beaker, add a cylinder slightly smaller than the beaker
  - Smooth it with shade smooth to get rid of the rough edges
  - Assign a light shader
  - This represents the starch before mixing
- **Iodine Liquid:**
  - duplicate the tube
  - scale it down on z axe
  - select the rim of the object
  - hit (F) to add the top face
  - Assign a brown transparent shader
- **Duplicate the tube and the iodine to get other tubes then change the color if the liquids**

4. Creating the Animation

4.1. Moving the Test tube

- In key frame 1 press I then location to save the starting position
- In key frame 20 move the test tube and the liquid up on the z axe then press I then location & rotation to save the position
- In key frame 40 tilt the tube over the beaker about 225° then press I then location & rotation to save
- In key frame 60 put the tube in the 20 key frame position then press I then location & rotation
- In key frame 80 return the test tube to the starting position then press I then location

4.2. Animating the Color Change (Starch → Blue)

Select starch solution mesh. In Shader Editor:

- Frame 1: normal starch color (hover over the color property the press I)
- Frame 30: little bit brownish to simulate the two liquids mixing (hover over the color property the press I)
- Frame 60: blue color (hover over the color property the press I)

5. Rendering the Animation

5.1. Scene Lighting

- Add a plane from mesh to captor the shadows
- Add point lights
- Position it on top of the objects

5.2. Camera Setup

- Lock camera to view (press 0)
- Position slightly above the object
- Make sure all the object are in the camera view

5.3. Render Settings

- Use cycles rendering engine
- 2048 samples
- Denoiser ON

5.4. Exporting

- Output → FFmpeg → MP4.
- Render Animation (ctrl + F12)

6. Conclusion

Creating the iodine–starch experiment animation in Blender shows mastery of several essential Blender concepts:

- **Modeling:** building lab glassware and fluids.
- **Shading:** realistic water, iodine, and reaction color change.
- **Animation:** moving objects, timing the pour, and transitioning materials.
- **Physics Simulation:** understanding inflow controls, domains, and collisions.
- **Rendering:** lighting, camera setup, and exporting.

Successfully completing this animation proves that the Blender user understands how to combine physics, materials, and animation to simulate scientific visualizations