

Molecule Simulator Step By Step Instructions:

Standards:

M5P4 Students will make connections among mathematical ideas and to other disciplines.

S5P2 Students will explain the difference between a physical change and a chemical change.

- Investigate physical changes by separating mixtures and manipulating paper to demonstrate examples of physical change.
- Recognize that the changes in state of water (water vapor/steam, liquid, ice) are due to temperature differences and are examples of physical changes.
- Investigate the properties of a substance before, during, and after a chemical reaction to find evidence of change.

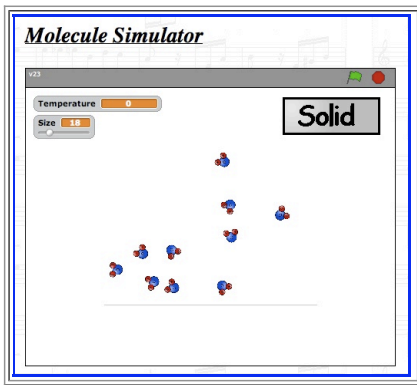
Requirements:

- Has at least 10 molecule sprites
- Each molecule moves and bounces off edge and each other
- Each molecule moves faster and slower depending on the energy variable.

Extras:

- Molecules "stick" closer together when energy is lower.
- Molecules move farther apart when energy is higher.
- Label sprites show the states of matter (solid, liquid, gas) at different energy levels.

Finished Sample:



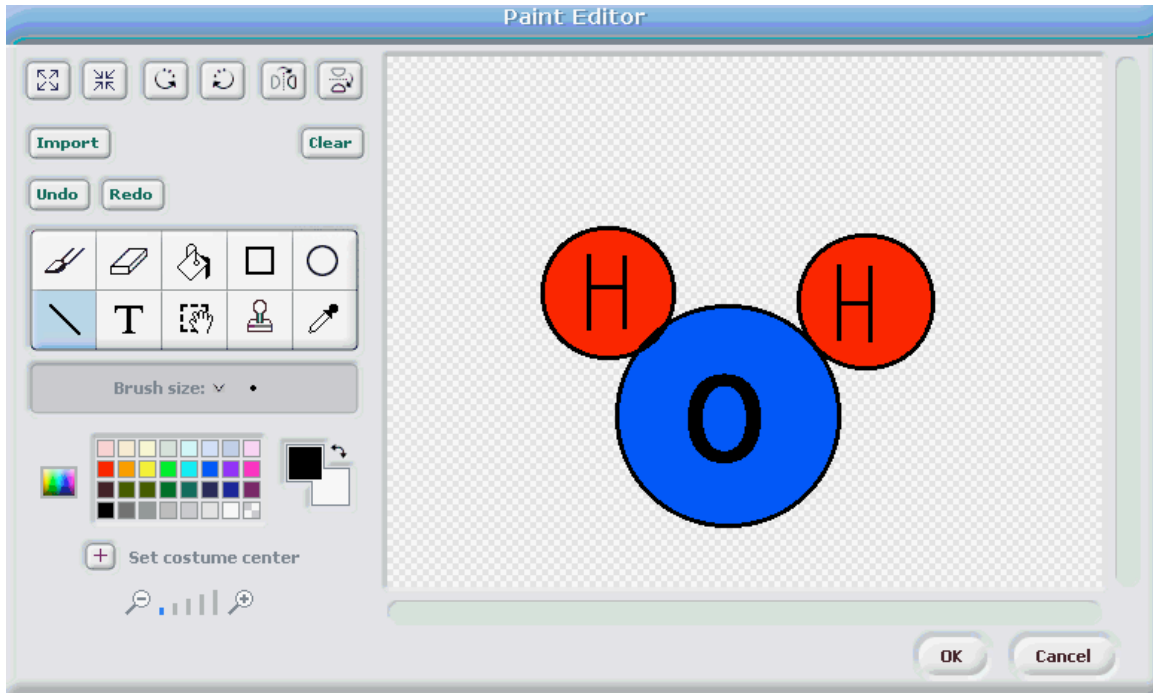
Step By Step Instructions:

Open Scratch and Draw Water Molecule:

- Open Scratch
- Delete the Cat
- Draw a Water Molecule
 - Click on "Draw a New Sprite"



- Draw Three Circles
- Use Flood Fill to fill the Circles
- Label with Text Tool (O, H, H)



4. Label the Water Molecule (You always have to name your sprites)



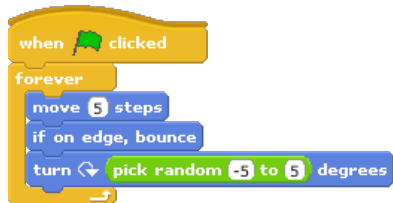
Add Scripts for Molecule to Move and Bounce:

5. Create the Scripts for the Water Molecule (Test, Run, Fix)

a. Basic Movement Script:

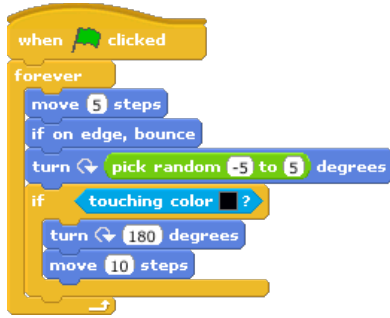


b. Simulate Molecule "Wiggle"



c. Test and Run

d. Bouncing off other Molecules

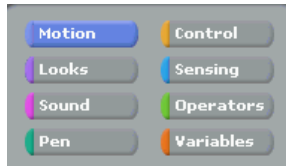


e. Run and Test

Add Variables for Speed and Size:

6. Create Variables for Speed and Size (What is a Variable?)

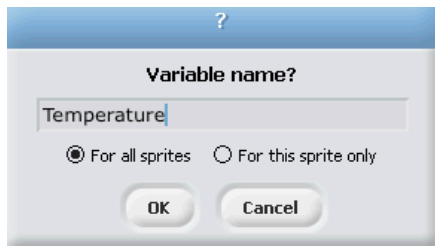
a. Click on Variables



b. Click "Make a variable"



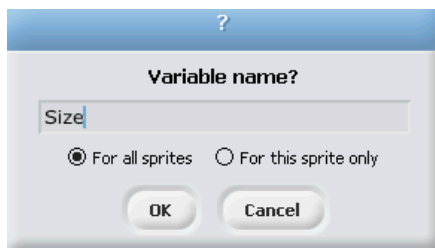
c. Type "Temperature" -> Click "OK"



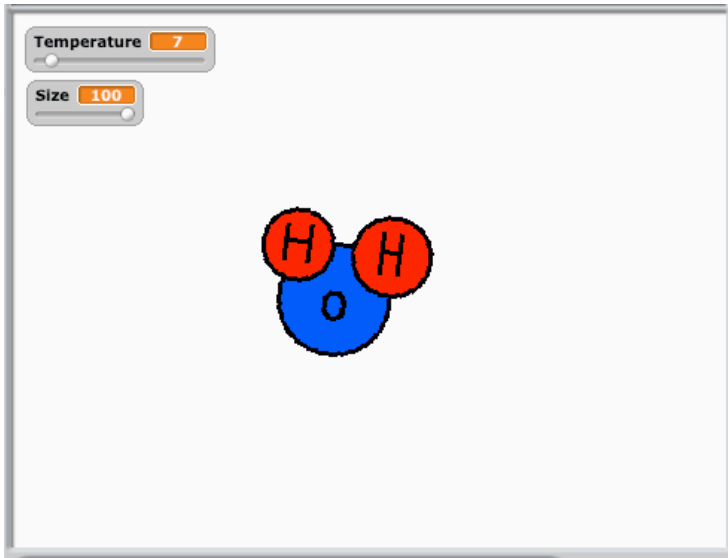
d. Click "Make a variable"



e. Type "Size" -> Click "OK"



7. Double Click on Sliders for Temperature and Speed



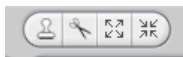
8. Put the Variable Blocks into the Scripts
 - a. Put "Temperature" into the Move 5 steps block
 - b. Add "set size to" Command
 - c. Put "Size" variable block into "set size to" command



9. Run and Test

Make More Molecules:

10. Make more molecules!
 - a. Use the stamp tool and make one more Molecule
 - b. Run and Test
 - c. Make lots of Molecules



11. Save Your Work. Click "File -> Save"
(Scratch 1.4 automatically saves to a Folder it creates called "Scratch Projects" in your home directory.)

12. Finished Project:

The screenshot displays the Scratch development environment for a project named "MichaudMoleculeSample".

- Top Bar:** Shows the Scratch logo, navigation icons, and the title "MichaudMoleculeSample- Scratch".
- Left Sidebar:** Contains category tabs (Motion, Looks, Sound, Pen, Control, Sensing, Operators, Variables) and a list of code blocks. Visible blocks include:
 - switch to costume (costume1)
 - next costume
 - costume #
 - say Hello! for 2 secs
 - say Hello!
 - think Hmm... for 2 secs
 - think Hmm...
 - change color effect by 25
 - set color effect to 0
 - clear graphic effects
 - change size by 10
 - set size to 25 %
 - size
 - show
 - hide
 - go to front
 - go back 1 layers
- Center Stage:** Features a "WaterMolecu" sprite with the following script:
 - when green flag clicked
 - forever loop:
 - set size to Size %
 - move Temperature steps
 - if on edge, bounce
 - turn pick random -5 to 5 degrees
 - if touching color (black)?:
 - turn 180 degrees
 - move 10 steps

- Right Panel:** Shows the "MichaudMoleculeSample" stage with several water molecule sprites. It includes sliders for "Temperature" (set to 7) and "Size" (set to 25). The coordinates are x: -481, y: -437.
- Bottom Right:** A "New sprite" menu with options: "WaterM...", "Sprite1", "Sprite2", "Sprite3", "Sprite4", "Sprite5", "Sprite6", "Stage", and "Sprite7".