pH Scale Sim

design version 4

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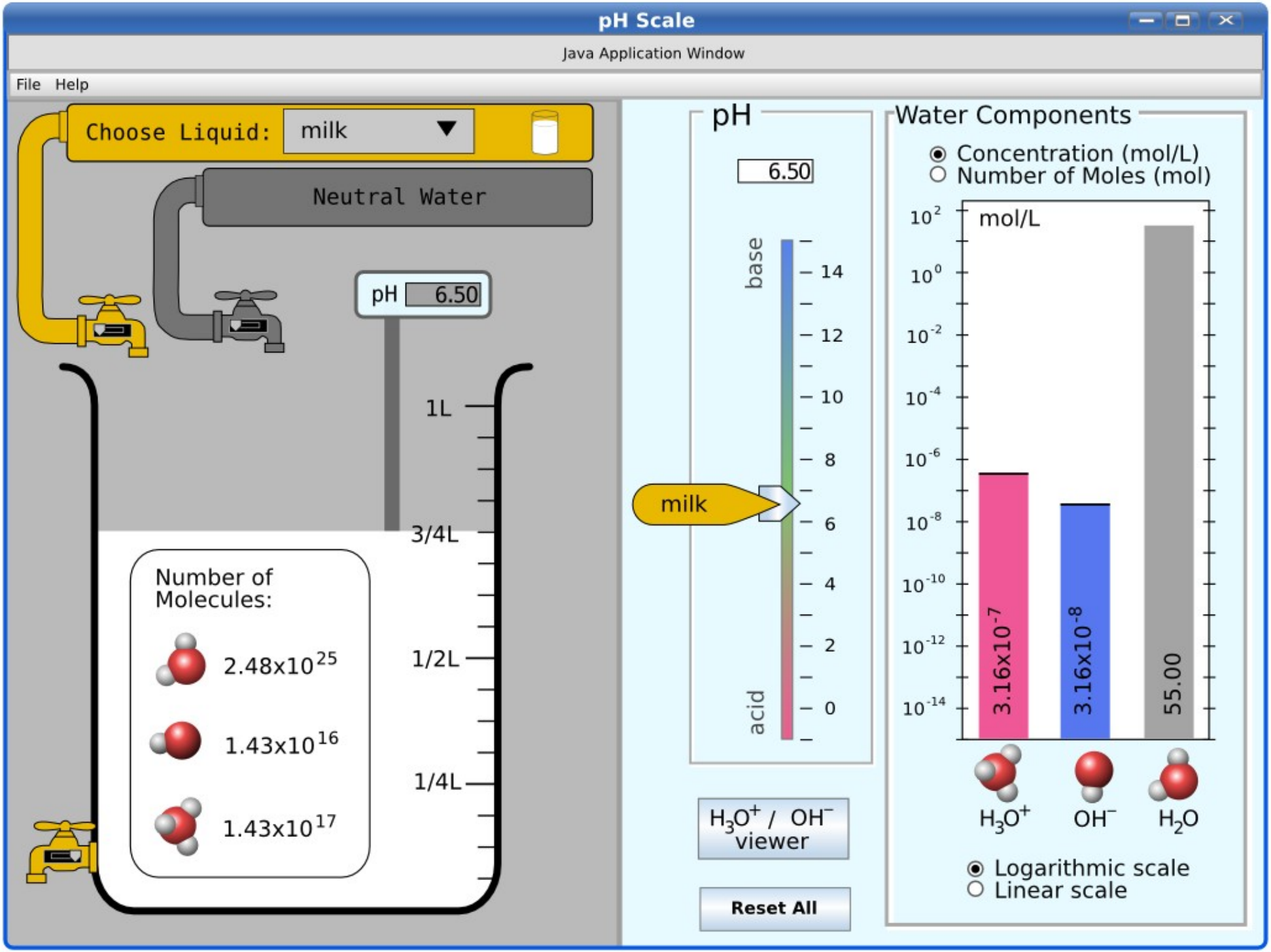
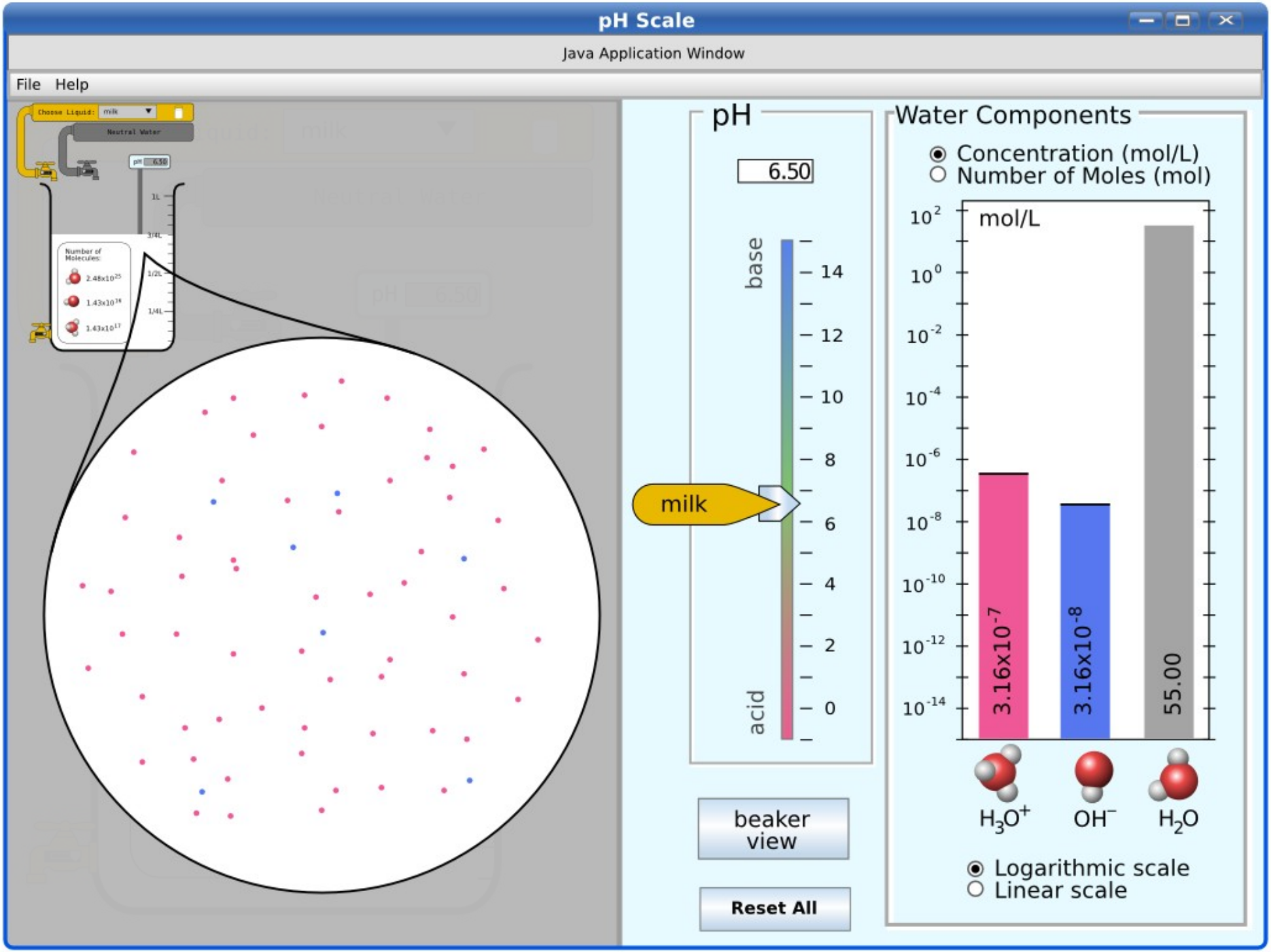
Contents

Basic Sim Operation

- pH slider
  - affects the number of speck-molecules shown in the beaker and the bars in the bar chart
  - does not affect the label tag (see "choose a liquid")
- bar charts
  - radio buttons for "concentration" and "number of moles"
  - concentration
    - mol/L bars of both OH and H3O are drag-able, and tied to the pH slider
  - number of moles
    - all three bars are drag-able
    - changing the OH and H3O bars moves the pH slider
    - changing the H2O slider turns on the faucet/drain (for increasing/decreasing the bar height) to change volume in beaker
- faucet and drain
  - cannot fill above 1 liter
  - neutral water can be added to any liquid (it then becomes "custom")
- Choose a liquid
  - when a new liquid is chosen, the beaker liquid disappears and the faucet turns on to fill with the new liquid
  - a label tag appears on the pH slider to indicate the pH of the current and previous liquids chosen
- Number of Molecules
  - continuous display of the number of the three molecules in the beaker


pH Scale
Java Application Window
File Help
Choose Liquid: milk
Neutral Water
pH 6.50
1L
3/4L
1/2L
1/4L
Number of Molecules:
2.48x10^25
1.43x10^16
1.43x10^17
pH
6.50
base
acid
14
12
10
8
6
4
2
0
milk
H3O+ / OH- viewer
Reset All
Water Components
Concentration (mol/L)
Number of Moles (mol)
mol/L
10^2
10^0
10^-2
10^-4
10^-6
10^-8
10^-10
10^-12
10^-14
3.16x10^-7
3.16x10^-8
55.00
H3O+
OH-
H2O
Logarithmic scale
Linear scale


pH Scale
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Choose Liquid: milk
Neutral Water
pH 6.50
1L
3/4L
1/2L
1/4L
Number of Molecules:
2.48x10^25
1.43x10^24
1.43x10^17
pH
6.50
base
acid
14
12
10
8
6
4
2
0
milk
beaker view
Reset All
Water Components
Concentration (mol/L)
Number of Moles (mol)
mol/L
10^2
10^0
10^-2
10^-4
10^-6
10^-8
10^-10
10^-12
10^-14
3.16x10^-7
3.16x10^-8
55.00
H3O+
OH−
H2O
Logarithmic scale
Linear scale

Learning Goals

Students will be able to use pH scale to write descriptions that demonstrate how to:

A. Determine if a solution is acidic or basic
B. Determine if a solution weak or strong by looking at the pH
C. Place acids or bases in relative order
D. Describe on a molecular scale, with illustrations, how the water equilibrium varies with pH
E. Determine concentration of hydroxide, hydronium and water at a given pH

New learning goals (rough):

1. pH does not change with volume
2. diluting with water moves pH closer to 7