ConnChem Widget Defaults

Top Menus:
Unit Selection
> **Lesson Selection**

Left Sidebar (input):
Set Navigation Controls
ala “iTunes”
- **Play**/**Pause** button (starts animation)

Next/**Previous** Set buttons
- **Select Set** drop-down menu to directly select Set
- **Reset Set** to reload with Set molecules paused

Simulation Controls
- nothing by default

Legend, initially populated with:
- **Legend Compound Widgets,** 1 per each initial and result compound

Main Canvas: simulation in tabs (as other simulations are possible)
Main Simulation Controls
where the action happens
starts with no compounds, by default
- **Simulation Scale** slider (zoom)
- **Simulation Area** slider (grow)
- **Simulation Speed** slider (speed up)
- **Bunsen Burner** slider (to increase wall heat), with checkboxes on four walls
- **Water transparency** slider, from 10% - 100%; interactions will still happen

Right Sidebar (output):
Graphs, in tabs
Graphs show change over time, and have button to pop-out/enlarge
- **Compound and Total Quantity** graph (#)

Dashboard, can have more than one tab
Monitors are simple textual readouts
- **Elapsed Set Time** (seconds)
- **Total Molecule Quantity** monitor (#)
- **Total Mass** monitor (mg)
- **System Volume** monitor (ml)
- **System Temperature** monitor (K)
- **System Pressure** monitor (atm)

Custom Widgets

Top Menus

Left Sidebar
Simulation Controls
- **Add Substance** button, with function allowing custom amounts and label
- **Timer/Stopwatch** with ability to play for 30 seconds, then pause
- **Hide Compound** toggle: deactivates, but not removes, molecules (usually the water in a system), with label to indicate Compound
- **Plunger** slider, draggable to increase pressure
- **Heat** slider (bunsen burner), with levels from 1-10

Main Canvas
- **Bronsted/Lowry View** tab (this will need to be done differently)

Right Sidebar
Graphs
- **pH** graph
- **Concentration** graph, not effected by Set Reset (mol/ml)
- **Molecule Speed** (m/s)
- **Compound and Total Mass** graph (g)

Dashboard
- **Amount of Compound** monitor (mol)
  - Total in System
  - Solvent
  - Solute
  - Solute Dissolved
  - Product
  - Reactant
- **Volume of Compound** monitor (ml)
- **Total Kinetic Energy** monitor (kJ): sum of energy in system
- **System Pressure** monitor: number of collisions with walls (kPa)

misc, perhaps dialogs:
- **Periodic Table**
- **Compound Reference**
- **PV=nRT** controls

Unit	Sim	Widgets		Set #	Compounds			notes
		Unit	Sim		Initial (with quantity)		Results, or otherwise in Legend	
0: Default	0: Default			0	• Water: 1			default: for testing
1: Modeling Matter	1: Making Scientific Observations			1	• Water: 5			
	2: Classifying Matter			1	• Water: 10			
				2	• Hydrogen-Peroxide: 10			
				3	• Pentane: 10			
				4	• Mercury: 10			
				5	• Bromine: 10			
				6	• Phosphorus: 10			
	3: Physical Changes			1	• Water: 50			
	4: Chemical Changes			1	• Hydrogen-Peroxide: 10			
	5: Mixtures			1	• Water: 10	• Bromine: 10		
				2		• Mercury: 10		
				3		• Hydrogen Peroxide: 10		
				4		• Pentane: 10		
				5		• Bromine: 10 • Hydrogen Peroxide: 10		
				6		• Bromine: 10 • Pentane: 10		
2: Solutions	1: Introduction	• **Concentration** graph • Compound Names Hidden in Legend • **Add 5 Solute** button (Compound name hidden)		1	• Water: 25	• Sodium-Chloride: 10		
	2: Solubility			1	• Water: 25	• Sodium-Chloride: 10		
				2		• Silicon-Dioxide: 10		
				3		• Glycerol: 10		
				4		• Calcium-Chloride: 10		
				5		• Acetic-Acid: 10		
				6		• Pentane: 10		
				7		• Sodium-Bicarbonate: 10		
	3: Solubility Changes		• **Amount Solvent** (Water) monitor • **Amount Solute** (Sodium-Chloride) monitor • **Amount Solute Dissolved** (Sodium-Chloride) monitor	1	• Water: 25	• Sodium-Chloride: 10		
				2		• Silicon-Dioxide: 10		
				3		• Glycerol: 10		
				4		• Calcium-Chloride: 10		
				5		• Acetic-Acid: 10		
				6		• Pentane: 10		
				7		• Sodium-Bicarbonate: 10		
	4: Saturation			1	• Water: 25	• Potassium-Chloride: 10		
3: Reactions and Stoichiometry	1: Chemical Reactions	• **Amount Reactant 1** monitor • **Amount Reactant 2** monitor, grayed out if n/a • **Amount Product 1** monitor • **Amount Product 2** monitor, grayed out if n/a • **Compound and Total Mass** graph (g) • **Hide Compound** toggle (Water)		1	• Water: 25?	• 2Na: 10 (these and following: can't have more than two reactant molecules in reaction!) • Chlorine: 10	• Sodium-Chloride	Teacher Demo
				2		• 2HI: 20	• Hydrogen • Iodine	Teacher Demo
				3		• Ethene: 10 • $3O_2$: 10	• Sodium-Chloride	
				4		• Copper: 10 • $2AgNO_3$: 10	• Silver • Copper-II-Nitrate	

Unit	Sim	Widgets		Set #	Compounds		notes
		Unit	Sim		Initial (with quantity)	Results, or otherwise in Legend	
				5	• Methane: 10 • $2O_2$: 10	• Carbon-Dioxide • Water	
				6	• Iron: 10 • Copper-II-Sulfate: 10	• Copper • Iron-II-Sulfate	
				7	• 2HCl: 10 • Lithium-Sulfide: 10	• Hydrogen-Sulfide • Lithium-Chloride	
				8	• Hydrogen: 10 • Chlorine: 10	• Hydrogen-Chloride	
				9	• $2H_2O_2$: 10	• Water • Oxygen	
				10	• Silver-Nitrate: 10 • Sodium-Chloride: 10	• Silver-Chloride • Sodium-Nitrate	
	2: Limiting Reactants			1	• 2Al: 10 • $3Cl_2$	• Aluminum-Chloride	
				2	• Butene: 10 • $6O_2$	• Carbon-Dioxide • Water	
				3	• Manganese-Dioxide: 10 • 4HCl: 10	• Manganese-II-Chloride • Chlorine • Water	
	3: Precipitation			1	• Silver-Nitrate • Potassium-Bromide	• Potassium-Nitrate • Silver-Bromide	
				2	• Lithium-Nitrate: 10 • Potassium-Bromide: 10		
				3	• Silver-Nitrate: 10 • Lithium-Nitrate: 10		
				4	• Ammonium-Chloride: 10 • Lithium-Nitrate: 10		
				5	• Sodium-Carbonate: 10 • Lithium-Nitrate: 10		
				6	• Sodium-Hydroxide: 10 • Lithium-Nitrate: 10		
				7	• Ammonium-Chloride: 10 • Potassium-Bromide: 10		
				8	• Sodium-Carbonate: 10 • Potassium-Nitrate: 10		
				9	• Sodium-Hydroxide: 10 • Potassium-Bromide: 10		
				10	• Silver-Nitrate: 10 • Ammonium-Chloride: 10	• Silver-Chloride • Ammonium-Nitrate	
				11	• Sodium-Carbonate: 10 • Silver-Nitrate: 10	• Silver-Carbonate	
				12	• Sodium-Hydroxide: 10 • Silver-Nitrate: 10	• Silver-Hydroxide • Sodium-Nitrate	
				13	• Sodium-Carbonate: 10 • Ammonium-Chloride: 10		
				14	• Sodium-Hydroxide: 10 • Ammonium-Chloride: 10		
				15	• Sodium-Carbonate: 10 • Sodium-Hydroxide: 10		
	4: Redox (may be removed)			1	• Magnesium: 5 • Copper-II-Sulfate: 5	• Magnesium-Sulfate • Copper	Teacher Demo

Unit	Sim	Widgets		Set #	Compounds			notes
		Unit	Sim		Initial (with quantity)		Results, or otherwise in Legend	
				2		• Chromium-III-Oxide: 5 • Aluminum: 5	• Chromium • Aluminum-Oxide	
				3		• Zinc: 5 • Copper-II-Sulfate: 5	• Iron	
4: Pressure and Gas Laws	1: Physical Properties of Air	• **Amount of Compound** monitor • **Volume of Compound** monitor • **Total Kinetic Energy** monitor • **System Pressure** monitor • **Add 5 Helium** button • **Add 5 Oxygen** button		1	• Helium: 10			
	2: KMT, Pressure, and Throwing Gases			1	• Oxygen: 10			
	3: PV = nRT		• **PV=nRT** controls	1	• Oxygen: 10			
	4: Dalton's Partial Pressure		• **Add 5 Carbon-Dioxide** button • **Add 5 Water** button	1	• Helium: 10 • Oxygen: 10 • Carbon-Dioxide: 10 • Water: 10			
5: Thermodynamics								
6: Kinetics								
7: Chemical Equlibrium								
8: Acids and Bases	1: pH	• **pH Graph** • **Timer** with 30 sec intervals • **Hide Compound** toggle (Water)		1	• Water: 40	• Hydrochloric-Acid: 10 • Sodium-Hydroxide: 10	• Hydroxide • Hydronium	
				2				
				3				
				4				
	2: Bronsted/Lowry or Lewis Selection		• **Bronsted/Lowry View** switch	1	• Water: 25	• Hydrochloric-Acid: 10 • Sodium-Hydroxide: 10	• Water • Sodium-Chloride	
				2	• Water: 0	• Hydrochloric-Acid: 10 • Ammonia: 10		
				3		• Cyanide: 10 • Hydrogen-Bromide: 10		
				4		• Boron-Trichloride: 10 • Chloride: 10	• Boron-Tetrachloride	
	3: Strong and Weak Acids			1	• Water: 25	• Hydrochloric-Acid: 2		
				2		• Hydrogen-Fluoride: 25		
				3		• Sodium-Hydroxide: 2		
				4	• Water: 10	• Ammonia: 10		
	4: Identifying Acids and Bases		• **pH Graph Deactivated**	1	• Water: 25	• Acetic-Acid: 0		
				2		• Lithium-Hydroxide: 0		
				3		• Acetic-Acid: 0		
				4		• Hydrochloric-Acid: 0 • Sodium-Hydroxide: 0		
	5: Neutralization Reactions			1	• Water: 0	• Hydrochloric-Acid: 25 • Sodium-Hydroxide: 0	• Water • Sodium-Chloride	
	6: Titration Curves			1	• Water: 25	• Hydrochloric-Acid • Sodium-Hydroxide	• Water • Sodium-Chloride	
				2		• Ammonia: 25 • Hydrochloric-Acid: 25		

Unit	Sim	Widgets		Set #	Compounds			notes
		Unit	Sim		Initial (with quantity)		Results, or otherwise in Legend	
				3		• Sodium-Hydroxide: 25 • Acetic-Acid: 25		
				4		• Ammonia: 25 • Acetic-Acid: 25		
	7: Buffers		• **Add 10 Acid** button • **Add 10 Base** button	1	• Water: 25	• Bicarbonate: 5 • Carbonate: 5 • Sodium-Bicarbonate: 5 • Sodium-I: 5 • Indicator: 2	• Sodium-Hydroxide • Hydronium	
9: Nuclear								