Lecture Demonstrations

The Lecture Demonstration Laboratory (Bagley Hall 171) is available to assist professors and instructors in the Department of Chemistry through interactive displays and demonstrations. Select the appropriate chapter below to view available demonstrations.

To schedule a demonstration, or if you have any questions or comments, please send e-mail to:

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The following are designed to be a resource for University of Washington faculty and staff. Demonstrations are to be performed by approved UW faculty and staff only. Do not attempt any of these demonstrations at home.

General Chemistry

1. Chapter 1: Chemists and Chemistry
2. Chapter 2: Atoms, Molecules, and Ions
3. Chapter 3: Stoichiometry
4. Chapter 4: Types of Chemical Reactions and Solution Stoichiometry
5. Chapter 5: Gases
6. Chapter 6: Chemical Equilibrium
7. Chapter 7: Acids and Bases
8. Chapter 8: Applications of Aqueous Equilibria
9. Chapter 9: Energy, Enthalpy, and Thermochemistry
11. Chapter 11: Electrochemistry
12. Chapter 12: Quantum Mechanics and Atomic Theory
13. Chapter 13: Bonding: General Concepts
14. Chapter 14: Covalent Bonding: Orbitals
15. Chapter 15: Chemical Kinetics
16. Chapter 16: Liquids and Solids
17. Chapter 17: Properties of Solutions
18. Chapter 18: The Representative Elements
19. Chapter 19: Transition Metals and Coordination Chemistry
20. Chapter 20: Organic and Biochemical Molecules
Chapter 1: Chemists and Chemistry

Displays
1. Halogen Bulbs
2. Periodic Table of Samples
3. The Metric System
4. Density Bricks

Demonstrations
1. Density Column
2. Density Column of Coke and Diet Coke
3. Liquid Nitrogen
4. Galileo Thermometer
5. Phases of Bromine
6. Scientific Method - Hydrogen Balloons
7. Sublimation of Dry Ice
8. The Shell Game - Magic Cups

Chapter 2: Atoms, Molecules and Ions

Displays
- Ball and Stick Models and VESPR Geometries
- Crystals
- Crystal Lattices
- Halogen Bulbs
- Space Filling Model

Demonstrations
- Alkali Metals in Water
- Canal Rays
- Cathode Ray Tube
- Iron in Cereal
- Phases of Bromine
- Separation of Mixtures

Chapter 3: Stoichiometry

Displays
- Mole Board
- 22.4L Box

Demonstrations
Chapter 4: Types of Chemical Reactions and Solution Stoichiometry

Displays

- The Metric System

Demonstrations

- Conductivity
  - Barium Sulfate Conductivity Titration
  - Conductivity Change of Acetic Acid with Dilution
  - Conductivity of Ionic Solutions
  - Electric Pickle

- Combination Reactions
  - Combustion of Magnesium
  - Combustion of Steel Wool
  - Equilibrium of Nitrogen Dioxide and Dinitrogen Tetraoxide
  - Firefly Reaction
  - Pop Bottle Experiment
  - Precipitation of Ammonium Chloride

- Decomposition Reactions
  - Decomposition of Hydrogen Peroxide with Manganese Dioxide
  - Electrolysis of Water
  - Nitrogen Triiodide

- Displacement Reactions
  - Precipitation
    - Barium Sulfate
    - Carbonates
    - Lead Iodide
    - Lead Sulfide
    - Silver Chloride
  - Alkali Metals in Water
  - Bicarbonate Fizz
  - Metals with acid
  - Replacement Reaction of Copper onto Zinc
• Replacement Reaction of Silver onto Copper
• Thermite
• Titration of Mono and Dihydrate acids

Chapter 5: Gases
Displays
• 22.4L Box

Demonstrations
• Boyle’s Law
• Charles’s Law
• Collapsible Can
• Diffusion of Bromine
• Diffusion of Hydrogen

Chapter 6: Chemical Equilibrium
Demonstrations
• Bismuth Trichloride Equilibrium
• Chromate Dichromate Equilibrium
• Cobalt Equilibrium
• Copper Equilibrium
• Equilibrium of N₂O₄ and NO₂
• Reversible Reaction

Chapter 7: Acids and Bases
Demonstrations
• Buffered Solutions
• Dry Ice Witches Brew
• Edible Indicators
• pH Meter and Measurements of Various pHs
• pH of Household Items
• pH of Salts in Water
• pH of Various Oxides
• Rose Petal Indicator
• Strong Acids - pH of HCl
• Titration of Mono and Dihydrate Acids
• Weak Acids - pH of Acetic Acid
Chapter 8: Applications of Aqueous Equilibria

Demonstrations
- Acid Rain
- Amines
- Amphoteric Nature of Aluminum Hydroxide
- Amphoteric Nature of Copper Sulfate
- Buffered Solutions
- Silver Precipitates
- Titration of Mono and Dibasic Acids

Chapter 9: Energy, Enthalpy, and Thermochemistry

Demonstrations
- Combustion of Magnesium
- Combustion of Steel Wool
- Equilibrium of Nitrogen Dioxide and Dinitrogen Tetraoxide
- Firefly Reaction
- Hydrogen Rocket
- Magnesium Fires
- Match Head Reaction
- Methane Bubbles
- Non-Burning Towel
- Pop Bottle Experiment
- Reaction of Glycerol with Potassium Permanganate
- Relative Velocities of Ammonia and Hydrochloric Acid
- Scientific Method - Hydrogen Balloons
- Spontaneous Endothermic Reaction
- Stirling Engine
- Thermite

Chapter 10: Spontaneity, Entropy, and Free Energy

Demonstrations
- Entropy of a Rubber Band
- Match Head Reaction
- Pop Bottle Experiment
- Spontaneous Endothermic Reaction
- Thermite
Chapter 11: Electrochemistry
Displays
- Battery Cutaway

Demonstrations
- Baby Battery
- Brass Penny
- Cathodic Protection
- Concentration Cell
- Daniell Cell
- Electrolysis of Water
- Electroplating Copper onto Stainless Steel
- Lead Storage Cell Demonstration
- Replacement Reaction of Silver onto Copper
- Replacement Reaction: Tin and Zinc

Chapter 12: Quantum Mechanics and Atomic Theory
Displays
- Orbital Models
- Periodic Table of Samples

Demonstrations
- Alkali Metals in Water
- Electric Pickle
- Flame Tests
- Gas Emission Spectra
- Photoelectric Effect
- Waves

Chapter 13: Bonding: General Concepts
Displays
- Crystals
- Crystal Lattices
- VESPR Structures

Demonstrations
- Heat of Solutions
• Conductivity of Ionic solutions
• Methane Bubbles
• Hydrogen Rocket

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Chapter 14: Covalent Bonding: Orbitals
Displays
• Orbital Models
• VESPR Structures

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Chapter 15: Chemical Kinetics
Demonstrations
• Catalytic Decomposition of Peroxides with Manganese - Genie in a Bottle
• Cobalt Catalysis
• Combustion of Steel Wool
• Dust Explosion
• Equilibrium of NO₂ and N₂O₄
• Iodine Clock Reaction
• Kinetics of Crystal Violet
• Kinetics of Light Sticks
• Ozone
• Photochemical Reaction with Bromine
• Photochemical Reduction of Thionin

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Chapter 16: Liquids and Solids
Displays
• Solids and Geometries
• Barometers

Demonstrations
• Interference of Light Waves
• Liquid Nitrogen
• Phases of Bromine
• Sublimation of Dry Ice
• Sublimation of Iodine
• Supercooling of Acetic Acid
• Vapor Pressure of Water at Various Temperatures
Chapter 17: Properties of Solutions

Demonstrations
- Ammonia Fountain
- Conductivity of Ionic solutions
- Density Column
- Distillation
- Dry Ice Witch's Brew
- Effect on Temperature on Solubility
- Freezing Point Depression
- Non-Additive Volume
- Osmosis
- Polystyrene
- Separation of Polar and Non-Polar Substances
- Supersaturation of Sodium Acetate
- Tyndal Effect with Colloids

Chapter 18: The Representative Elements

Displays
- Allotropes of Carbon
- Minerals
- Halogen Bulbs

Demonstrations
- Alkali Metals in Water
- Combustion of Magnesium
- Reaction of Sodium with Chlorine
- Silicate Garden
- Acid Rain
- Dehydration of Sugar
- Equilibrium of NO₂ and N₂O₄
- Match Head Reaction
- Nitrogen Triiodide
- Plastic Sulfur
- Reaction of Sugar and Chlorate
- Replacement Reactions of Halogens

Chapter 19: Transition Metals and Coordination Chemistry
Displays
- Ball and Stick Models
- Cobalt Equilibrium
- Transition Metals
- VESPR Balloons

Demonstrations
- Ammines
- Cobalt Equilibrium
- Color and Complex Ions
- Copper Complexes
- Ethylenediamine Complexes of Nickel
- Nickel Complexes
- Oxidation States of Manganese
- Oxidation States of Vanadium

Chapter 20: Organic and Biochemical Molecules
Displays
- Ball and Stick Models
- Macromolecules

Demonstrations
- Addition Reaction of Bromine and Cyclohexene
- Balloon Trick
- Breathalyzer Test
- Diazonium Dyes
- Ester Sniff Kit
- Methane Bubbles
- Ninhydrin Reaction
- Nylon rope Trick
- Optical Activity
- Polystyrene
- Polyurethane
- Saponification
- Shell Game - Magic Cups
- Slime
- Tollens’ Test for Aldehydes

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