Teacher Labs Preparations

For Solutions, use 500mL corked bottles for stock solutions.

For student use, 60mL square bottles with screw caps are nice. For dropping bottles, 30mL with pipette.

A supply of distilled water for solutions and wash bottles.

Thermometers for students, -10°C to 120°C.

A set of test tubes (10) for each lab station.

A test tube rack per lab station.

Beakers, 250mL, 100mL, a couple of each per station.

Stirring rods, clamps, spatulas, etc, per station.

Safety goggles for each student per station.

Ring stands with clamps and rings.

A wash bottle for distilled water only per station.

Graduated cylinders, 10mL and 100mL.

A set of heat lamps in the fume hood for drying precipitates.

Molecular ball and stick models.

Medicine droppers.

Experiment 1 Observation of a Candle

Matches, used candle, can lid for candle holder. Metric ruler.

Experiment 2 Melting order of solids.

Steel can lid (10cm or 15cm to fit over iron ring), burner, small pieces of Sulfur, Lead, Tin, Copper (wire), steel wool, silver chloride (in the future save the AgCl precipitate from Exper. 8).

Experiment 3 Melting Temperature of Moth Crystals.

Moth crystals (from local store) 150 mm test tubes, thermometers to remain permanently in the test tubes, thermometers for measuring the temperature of water, 250mL beakers.

Experiment 4 is a teacher demo on Combustion. Students fill in the lab and write it up.

Candle (about 10cm long), can lid for candle, cobalt chloride paper, lime water, 2000mL beaker, 1000mL beaker, blow pipe (an eye dropper attached to a rubber tube), 500mL glass cylinder, a 3000mL beaker for the candle in water under the glass cylinder.

Experiment 5 Heat of Solidification & Combustion

Candle on lid, balance (to 0.01g), thermometer, Styrofoam cups (calorimeters), 250mL cans with holes punched on each side of the top for suspension from a ring stand. Be sure they fit though the ring. Stirring rod or spatula to suspend the can. See picture in Lab 5. Ten grams of wax in a test tube.

Experiment 7 Mole Ratios

About 25cm of #16 bare copper wire (from hardware store). A vial (75mm test tube) containing about 4 grams of silver nitrate. Wash bottle of distilled water. Heat lamps in the fume hood for drying the precipitate. Balance.

Experiment 8 Mass Relationships continued from Exper 7

The 250 mL beaker saved from Experiment 7, filter paper, funnel and support, burner, graduated cylinder. Heat lamps in the fume hood for drying the precipitate. Dilute Nitric Acid 6M (384mL of concentrated reagent per liter of solution. Add acid to water like you oughter! Gogs ON! *It is a good idea to have a single acid bottle in the fume hood where all students come to get their acid. It is NOT safe to have dangerous chemicals being passed around the lab.* Safety goggles.

BoomLab: Percentage Composition of a Cookie

Chocolate chip cookies from the store. Balance.

BoomLab: Water of Hydration

Copper sulfate crystals. Can be obtained from hardware stores as *Septic Tank Root Killer*. Balance. Burner. Test tubes.

BoomLab: Structure of the Nucleus

Needs *Abcertainers* lab models with ball bearings.

BoomLab: Molecular Models

Ball and Stick Molecular Models.

BoomLab: Allotropic Forms of Sulfur

Flowers of Sulfur, test tube, burner, safety goggles.

Experiment 9 Molar Volume of Hydrogen

Gas measuring tube, 50mL, one hole stopper that fits in gas measuring tube, thermometer, barometer in millimeters, 250mL beaker, 100mL graduated cylinder, metric ruler, about 5cm of magnesium ribbon, 6M hydrochloric acid (513mL concentrated acid/liter. Add acid to water like you oughter! Gogs ON! *It is a good idea to have a single acid bottle in the fume hood where all students come to get their acid. It is NOT safe to have dangerous chemicals being passed around the lab.* Safety goggles.

Experiment 10 Precipitates and Concentrations

Sodium iodide crystals, lead nitrate crystals, balance, 100mL beaker, 10mL and 100mL graduated cylinders, medicine dropper, test tubes.

Experiment 11 Precipitates and Ionic Equations

Several sets of six solutions in dropping bottles: The mass given is grams per 100mL of solution. All solutions are 0.1M.

Set 1: Barium nitrate (2.6), barium chloride (2.4), sodium chromate (1.6), potassium chromate (1.9), sodium nitrate (1.7), potassium chloride (1.5).

Set 2: Sodium sulfate (1.4), aluminum sulfate (4.7), strontium nitrate (2.1), barium chloride (2.4), barium nitrate (2.6), aluminum chloride (1.7).

Set 3: Ferric chloride (2.7), cobalt nitrate (2.9), cobalt chloride (2.4), sodium hydroxide (0.8), potassium hydroxide (1.1), sodium nitrate (1.7).

Set 4: Nickel chloride (2.4), magnesium chloride (2.0), sodium chloride (2.0), sodium sulfate (1.4), sodium hydroxide (0.8), barium hydroxide (1.7), magnesium sulfate (2.5).

Set 5: Barium chloride (2.4), strontium nitrate (2.1), sodium chromate (1.6), aluminum sulfate (4.7), potassium chromate (1.9), silver nitrate (3.4).

Experiment 12 A Study of Chemical Reactions

Test tubes, thermometer.

Solid Reagents: ammonium chloride, sodium sulfite, sodium acetate, sodium hydroxide pellets, calcium carbonate (marble chips).

Solutions: Sulfuric Acid 18M. *It is a good idea to have a single acid bottle in the fume hood where all students come to get their acid. It is NOT safe to have dangerous chemicals being passed around the lab.* Safety goggles!

Add acid to water like you oughter! Gogs ON!
Acetic acid 6 M (340mL concentrated per liter), acetic acid 1 M (57mL concentrated/liter), hydrochloric acid, 6 M (85mL concentrated/liter), hydrochloric acid 1 M (100mL concentrated/liter), ferrous sulfate (28g/L), manganese sulfate (17g/L), potassium bromide (12g/L), potassium chromate (19g/L), potassium permanganate (16g/L), sodium chloride (6g/L), sodium oxalate (13g/L), silver nitrate (34g/L), phenolphthalein (1g/100mL of ethanol).

Teacher's Demonstration:

ammonium dichromate$_{(s)}$, lead oxide$_{(s)}$, lead nitrate$_{(s)}$.

Experiment 14 Reaction Rates

Test tubes, 250mL beaker, thermometer, burner, graduated cylinder,
Solution A (4.3g potassium iodate/liter of distilled water).
Solution B (0.2 g of sodium meta bisulfite + 4 g of starch, + 5mL of 1 M sulfuric acid.
Preparation of Solution B: You will need 1 liter per class. Boil in the starch, add the sodium metabisulfite. **Allow to cool over night.** Add the acid **the next day** and...

Test it by mixing 5mL of A + 5mL of B. It should take about 10 seconds to change color. If it is too slow, add more sulfuric acid. If it is too fast, dilute Solution B. **If it is not dark enough, add more Sodium Metabisulfate to Solution B.**

Experiment 16 Finding a Solubility Product

20 cm of bare copper wire (#16 from hardware store), steel wool, balance, a saturated solution of silver acetate in distilled water (16g/L).

Experiment 18 Acid-Base Indicators

Test tubes, graduated cylinder, medicine droppers.
The following indicator solutions in grams/100mL of water or ethanol: orange IV (0.1 water), methyl orange (0.1 water), indigo carmine (0.25 in ethanol), alizarin yellow R (0.1 water), phenolphthalein (1.0 in ethanol).
0.1 M HCl (8.6mL/L), 0.1 M NaOH (4g/L),
0.1 M acetic acid (5.6 mL/L), 1.0 M acetic acid (57 mL/L).
Unknowns: #1 1.0 M acetic acid, #2 potassium biphthalate saturated, #3 $Mg(OH)_2$ saturated, #4 0.1 M HCl.
Teacher's Demo after the lab: Use pH paper to test the unknowns.

Experiment 19 The Principle of le Chatelier

0.1 M potassium chromate (19.4 g/L), 0.1 M potassium dichromate (29.4g/L), 1 M NaOH (40g/L), 1 M HCl (86mL conc/L), 0.1 M barium nitrate (26g/L).

Experiment 20 Oxidation-Reduction

Solutions: 0.1 M cupric nitrate (24g/L), 0.1 M lead nitrate (33g/L), 0.1 M zinc nitrate (30g/L), 0.1 M sodium bromide (10g/L), 0.1 M sodium iodide (15g/L), 0.1 M sodium chloride (6g/L), chlorine water (pool chlorine), bromine water (saved from bromine demo), iodine water (saturate with iodine crystals), tetrachloromethane (or cyclohexane).

Experiment 22 Predicting Reactions

Solutions: 0.1 M magnesium nitrate (26g/L), 0.1 M sodium hydroxide (4g/L), 0.1 M sodium sulfate (14g/L), 0.1 M barium hydroxide (19g/L), 0.1 M sulfuric acid (5.6mL conc/L), 6 M sulfuric acid (334mL/L), 0.1 M potassium dichromate (30g/L), 0.1 M sodium sulfite (13g/L), .05 M potassium permanganate (8g/L), .01 M potassium permanganate (1.6g/L), 1.0 M hydrochloric acid (85.5 mL conc/L), 0.1 M potassium iodide (17g/L), 0.1 M ferric chloride (27g/L), 0.1 M potassium bromide (12g/L), 0.1 M ferrous sulfate fresh (28g/L), 0.1 M zinc sulfate (29g/L), 0.1 M ammonium carbonate (10g/L).

Experiment 23 Titration

Two 50mL burets per lab station, buret clamps, beakers, 125mL or 250mL Erlenmeyer flask, sample vials (75mm test tubes).
Solutions: Students are assigned to bring 10mL samples of acids and bases from home to test. Standard Acid: 0.1 M HCl (8.5mL of 12M/L), Unknown Base: 0.2 M NaOH (8g/L), phenolphthalein, Unknown solid acid: potassium biphthalate (about 1 gram/vial).

Experiment: Organic Molecular Models

One set of ball and stick models per lab station.

Experiment: Organic Esters

Ethanoic acid (acetic), salicylic acid (solid), ethanol, pentanol (iso amyl), octanol, butanol, methanol.

Qualitative Analysis:

Go to the Chemistry Page/Enter the Qual Zone, scroll to the bottom for:
Preparing the solutions for Qual (for the Instructor).