Things for Lab Set Ups

Unit 1 – Chemistry Basics and Atomic Structure

Types of Changes/Properties Card Sort

Phys/Chem Changes/Props Card Sort

Cards in Activity Cupboard

Physical Prop	Chemical Prop.	Physical Change	Chemical Change	Separation Techn
8	5	8	13	4
Color	Ability to rust	Melting	Change in color	Distillation
Density	Smell	Tearing	Corrode	Filtration
Solid	Taste	Freeze	Produces odor	Crystallization
Liquid	No rxn to acid	Cut	Burn	Chromatography
Shape	Corrosive resistant	Boiling	Explode	
Light weight		Breaking	Produce gas	
Conducts heat		Vaporize	Rusting	
White		Candle wax melting	Candle Burning	
			Mold Growing	
			Oxidize	
			Forms precipitate	
			Fermentation	
			Apple turning brown	

Isotopes of Pennies

PRE-1982 = 3.11g POST-1982 = 2.5g

Container #	Mass of Empty Container (g)
1	8.1187
2	7.6484
3	7.8361
4	7.8835
5	8.0357
6	8.0336
7	7.8451
8	7.5627

Container #	Mass of Empty Container (g)
9	7.9787
10	8.0644
11	7.9453
12	8.0522
13	7.8718
14	7.6190
15	7.9929
16	7.9297

Isotopes of Pennies

Isotopic Pennies Activity - Farmer			
Container #	Pre-1982	Post-1982	Mass
1	9	1	
2	8	2	
3	7	3	
4	6	4	
5	5	5	
6	4	6	
7	3	7	
8	2	8	
9	1	9	
10	9	1	
11	8	2	
12	7	3	
13	6	4	
14	5	5	
15	4	6	
16	3	7	
17	2	8	
18	1	9	

Canisters in Activity Cupboard

Isotopes of Pennies

Isotopic Pennies Activity - Farmer			
Container #	Pre-1982	Post-1982	Mass
1	9	1	
2	8	2	
3	7	3	
4	6	4	
5	5	5	
6	4	6	
7	3	7	
8	2		
9	1		
10	9		
11	8		
12	7		
13	6	4	
14	5	5	
15	4	6	
16	3	7	
17	2	8	
18	1	9	

Canisters in Activity Cupboard

Unit 2 – Nuclear Chem

Detecting Ionizing Radiation with Cloud Chamber

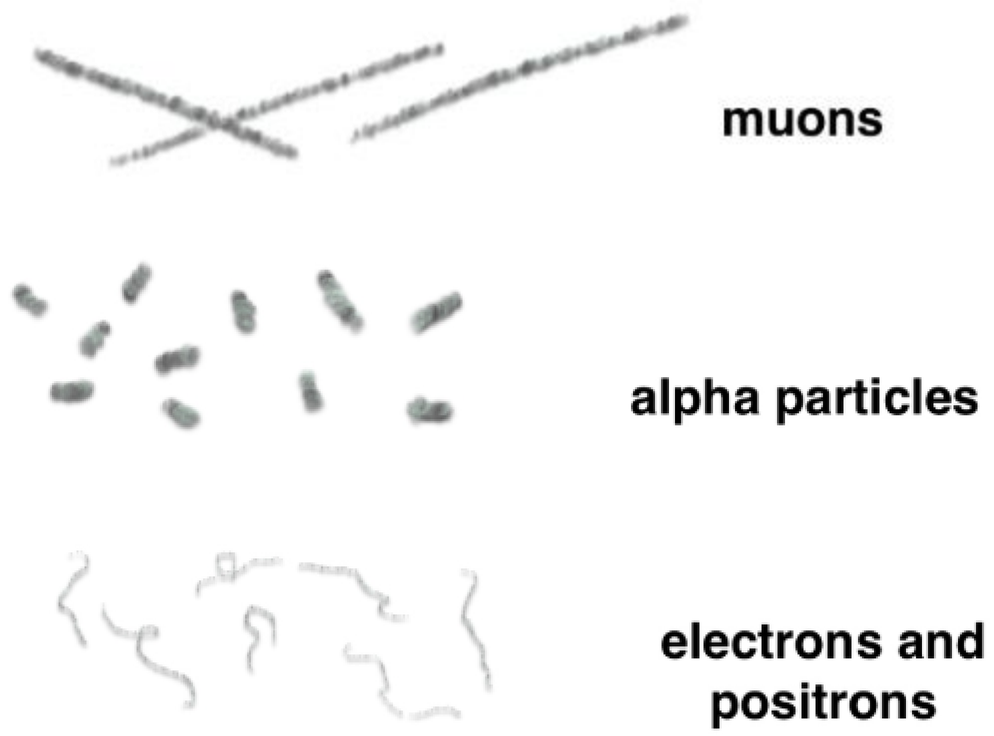
Cloud Chamber

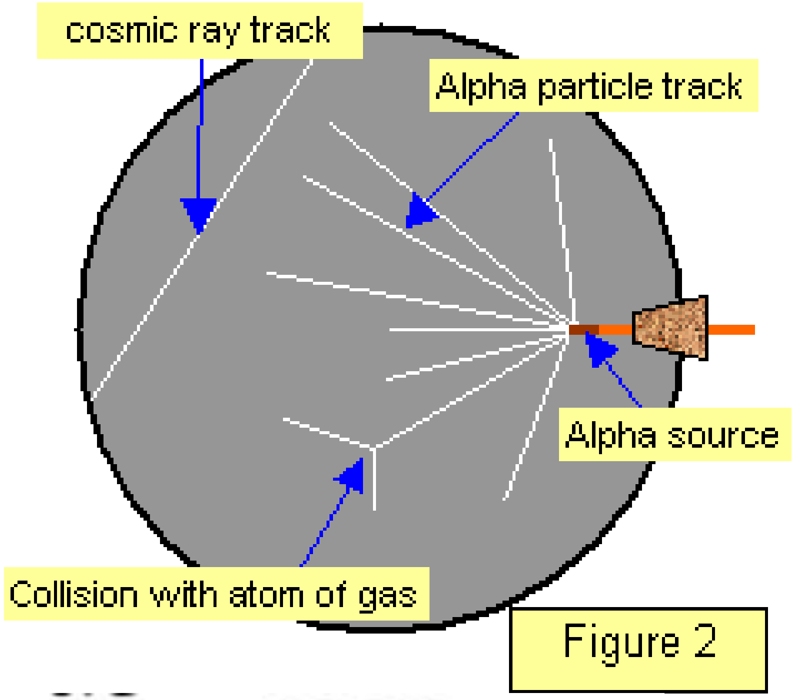
- Isopropyl alcohol
- Pipette
- Flashlight
- Gas lantern mantle
- Cloud chamber
- Dry Ice

Canisters in Activity Cupboard

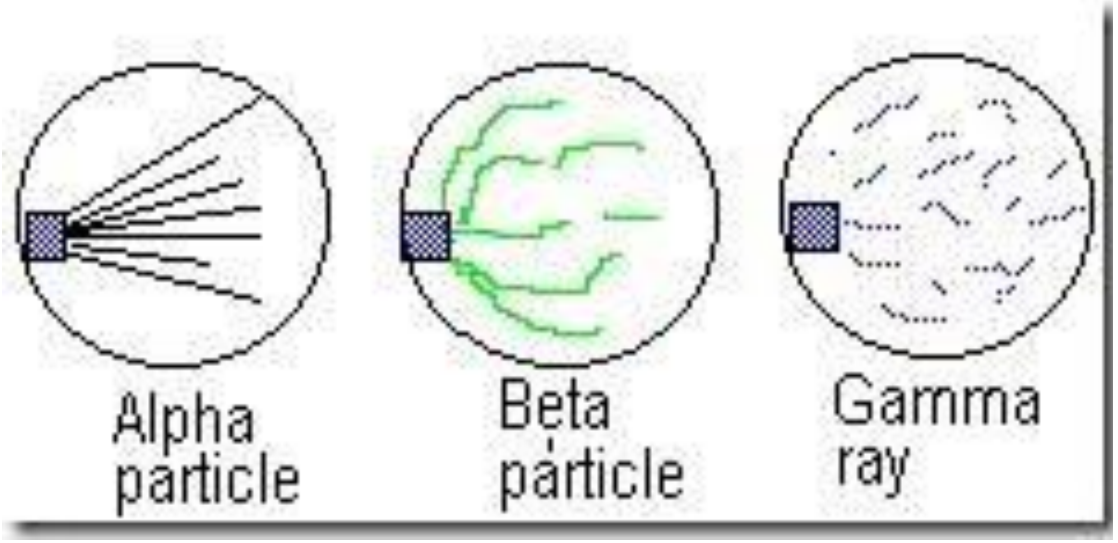
Lantern Mantles from Carolina
Item: SPEC39822
Item description: Lantern Mantle
Price: $7.95 Each

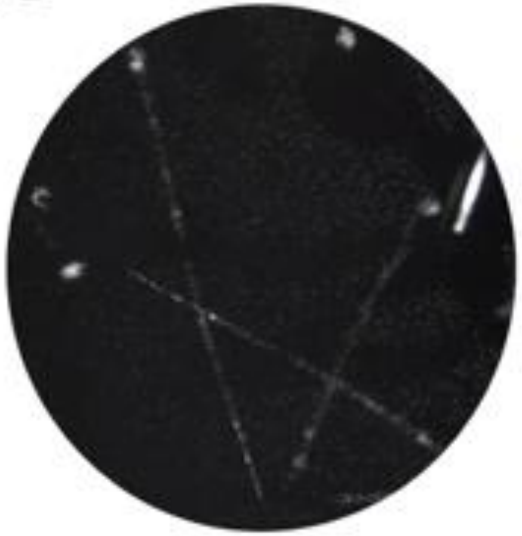
Special Order so MUST CALL to order:
1 (800) 334-5551

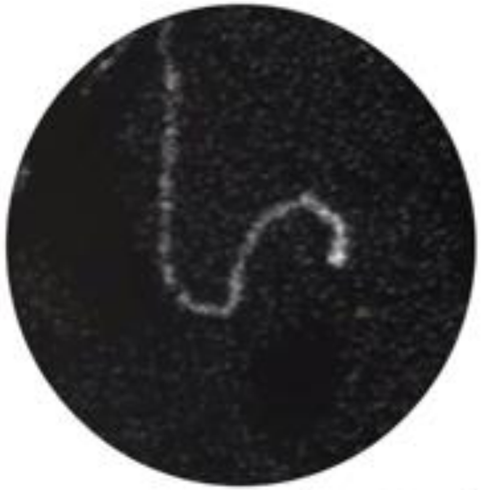





Alpha particle




Muons


Beta particle

https://www.youtube.com/watch?v=pewTySxfTQk&feature=youtu.be

https://www.youtube.com/watch?v=e3fi6uyyrEs

https://www.symmetrymagazine.org/article/january-2015/how-to-build-your-own-particle-detector

Show if cloud chambers don’t work

Neat extension about cosmic rays and trying to find dark matter

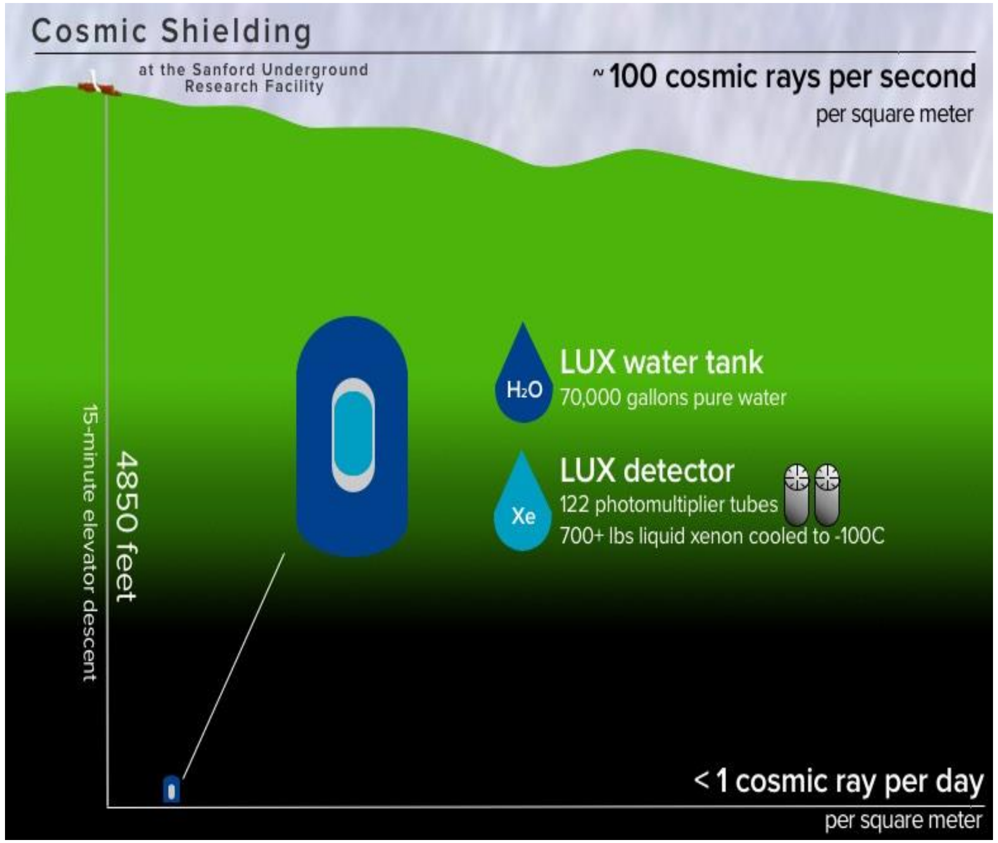
https://www.sciencefriday.com/educational-resources/build-a-cloud-chamber/

If you're looking for dark matter, background radiation is a major problem

- Physicists have evidence that in addition to the known subatomic particles that make up most of the things we can see and touch, there is an entirely separate class of very small, potentially weakly interacting particles that make up the majority of our universe called dark matter. Though it comprises over 90 percent of our galaxy, dark matter is poorly understood.
- Dark matter is difficult to study because it's made of unimaginably small particles that we can't see, and it interacts with other atoms very rarely. Detecting dark matter interactions that are so minute and rare is made especially difficult because they are grossly overshadowed by the background radiation that is constantly pouring down on our planet from cosmic rays. Our planet's background radiation makes the search for dark matter like trying to hear a shy, whispering child in a party of shouting adults. Science Friday's video producer, Luke Groskin, visited with scientists looking for dark matter, who describe this conundrum in the video "4850 below."
- Science Friday Documentary: "4850 Below"

In an effort to quiet the "noise" of background radiation, a long-running dark matter experiment called the LUX dark matter experiment (LUX stands for Large Underground Xenon) was built inside a giant water tank in an old mine a mile below the surface of the earth. The tank of water and mile of rock and dirt shield the experiment from background radiation by effectively putting a lot of other atoms – in the form of lots of dense materials like rock and water – between sources of radiation and the experiment.

https://www.youtube.com/watch?v=YxMGWQMoR10&feature=youtu.be



Unit 3 – Electrons

Flame Test

Flame Lab

- Bunsen burner
- Gas hose
- Matches
- 50 mL beaker with a little water in it.
- Cardboard dividers to protect the wall.
- TURN GAS ON!
- Plenty of paper towels in the room
- Lysol spray to clean desks with

SPRAY BOTTLES NEEDED

Calcium Chloride	$CaCl_2$
Copper (II) Chloride	$CuCl_2$
Barium Chloride	$BaCl_2$
Potassium Chloride	KCl
Sodium Chloride	$NaCl$
Lithium Chloride	$LiCl$
Strontium Chloride	$SrCl_2$
Calcium Nitrate	$Ca(NO_3)_2$
Copper (II) Nitrate	$Cu(NO_3)_2$
Barium Nitrate	$Ba(NO_3)_2$
Potassium Nitrate	KNO_3
Sodium Nitrate	$NaNO_3$
Lithium Nitrate	$LiNO_3$
Strontium Nitrate	$Sr(NO_3)_2$
UNKNOWN #1	$Cu(NO_3)_2$
UNKNOWN #2	$Sr(NO3)_2$

Flame Lab Preparation
0.1 M for all solutions

- Rinse 1 L volumetric flask with distilled water.
- Weigh out the needed grams in a weigh boat.
- Put solid into a 250 mL beaker.
- Add DI water to dissolve.
- Transfer to volumetric flask using a funnel.
- CAREFULLY add DI water until the bottom of the meniscus touches the etched line on the neck of the volumetric flask. Use your squirt bottle to go carefully at the end!
- Pour into a 1 L jug, cap jug, and invert to make sure it is mixed

Compound	**Formula**	**Molar Mass**	**Grams Needed to Make 1 L of 0.1 M**
Calcium Chloride	$CaCl_2$	110.98 g	**11.01 g**
Copper (II) Chloride	$CuCl_2$	134.45 g	**13.45 g**
Barium Chloride	$BaCl_2$	208.23 g	**20.82 g**
Potassium Chloride	KCl	74.55 g	**7.45 g**
Sodium Chloride	$NaCl$	58.44 g	**5.84 g**
Lithium Chloride	$LiCl$	42.39 g	**4.24 g**
Strontium Chloride	$SrCl_2$	158.53 g	**15.85 g**
Calcium Nitrate	$Ca(NO_3)_2$	164.09 g	**16.41 g**
Copper (II) Nitrate	$Cu(NO_3)_2$	187.56 g	**18.78 g**
Barium Nitrate	$Ba(NO_3)_2$	261.34	**26.1 g**
Potassium Nitrate	KNO_3	101.10 g	**10.11 g**
Sodium Nitrate	$NaNO_3$	84.99 g	**8.50 g**
Lithium Nitrate	$LiNO_3$	68.95 g	**6.90 g**
Strontium Nitrate	$Sr(NO_3)_2$	211.63 g	**21.16 g**
UNKNOWN #1	$Cu(NO_3)_2$	187.56 g	**18.76 g**
UNKNOWN #2	$Sr(NO3)_2$	211.63 g	**21.16 g**

BE SAFE.

NO 2ND CHANCES.

NONE.

Spray at a slight upward angle.

AWAY FROM PEOPLE.

Don't waste chemicals!

NO WALKING AROUND THE ROOM!

GET QUIET WHEN YOU HEAR THE DOORBELL!

CLEAN UP

Make sure gas is OFF

Wipe down table really well

- **When done with the lab for the year –**
  - Disassemble tubes, nozzles
  - Soak them in water
  - Rinse with DI water
  - Reassemble the tubes to the nozzles and put the tube into a beaker of distilled water. Spray several times to clear the whole system with DI water.
  - Reattach the tube/nozzle to the bottles.
  - Hang them on the edge of the tub so they stay upright.
  - Refill any that need refilling. Filling ½ -3/4 full is plenty

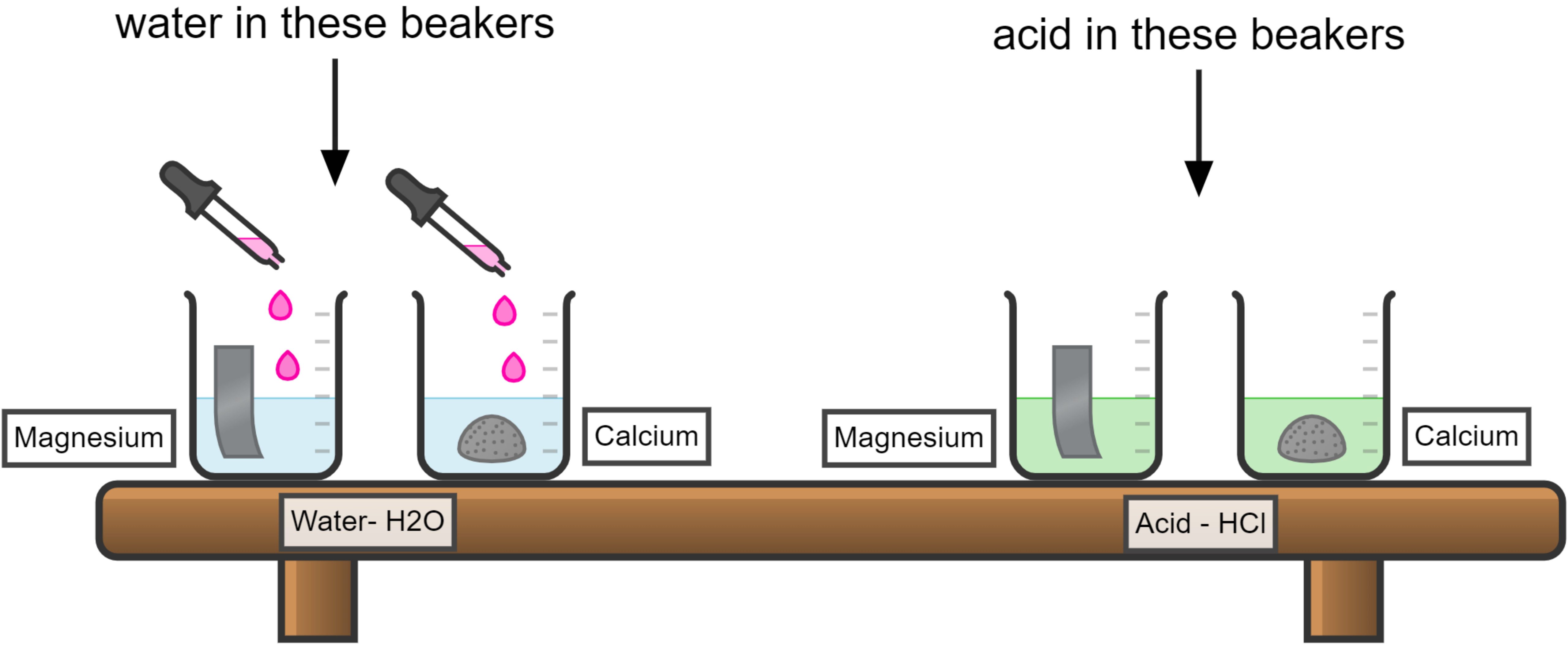
Unit 4 – Periodic Table

Periodic Trends

- Weigh boat
- Distilled water bottle
- 50 mL beakers – x4
- 125 mL Erlenmeyer flask – green tape
- Pipette – green tape
- Metal forceps

Chemicals needed:

- Magnesium ribbon
- Calcium metal chunks
- Phenolphthalein bottles x8
- 1.0 M HCl



Liquids – down the drain with running water

Solids – in trash can – use forceps or paper towels, not your hands!

Unit 5 – Bonding and Structure

Unit 6 – Reactions

Types of Reactions
Unit 2 – Reactions

Reactions Lab

- Test Tube
- Paper Clip – 1/period
- Steel wool
- White paper
- 100mL beaker x 1
- 50mL beaker x3
  - One with red tape, one with green tape, one with blue tape
- Pipette x 3
  - One with red tape, one with green tape, one with blue tape
- Graduated Cylinder
- Squirt bottle H_2O
- Bunsen Burner
- Bunsen Burner Hose
- Tongs
- Gold paper with Reading

CHEMICALS NEEDED

- $CuSO_4$
- 0.15M $SrCl_2$
- 0.25M Na_2CO_3

Unit 7 – Stoichiometry

Unit 8 – Advanced Chemical Ratios

Limiting Reagent Stoichiometry Lab

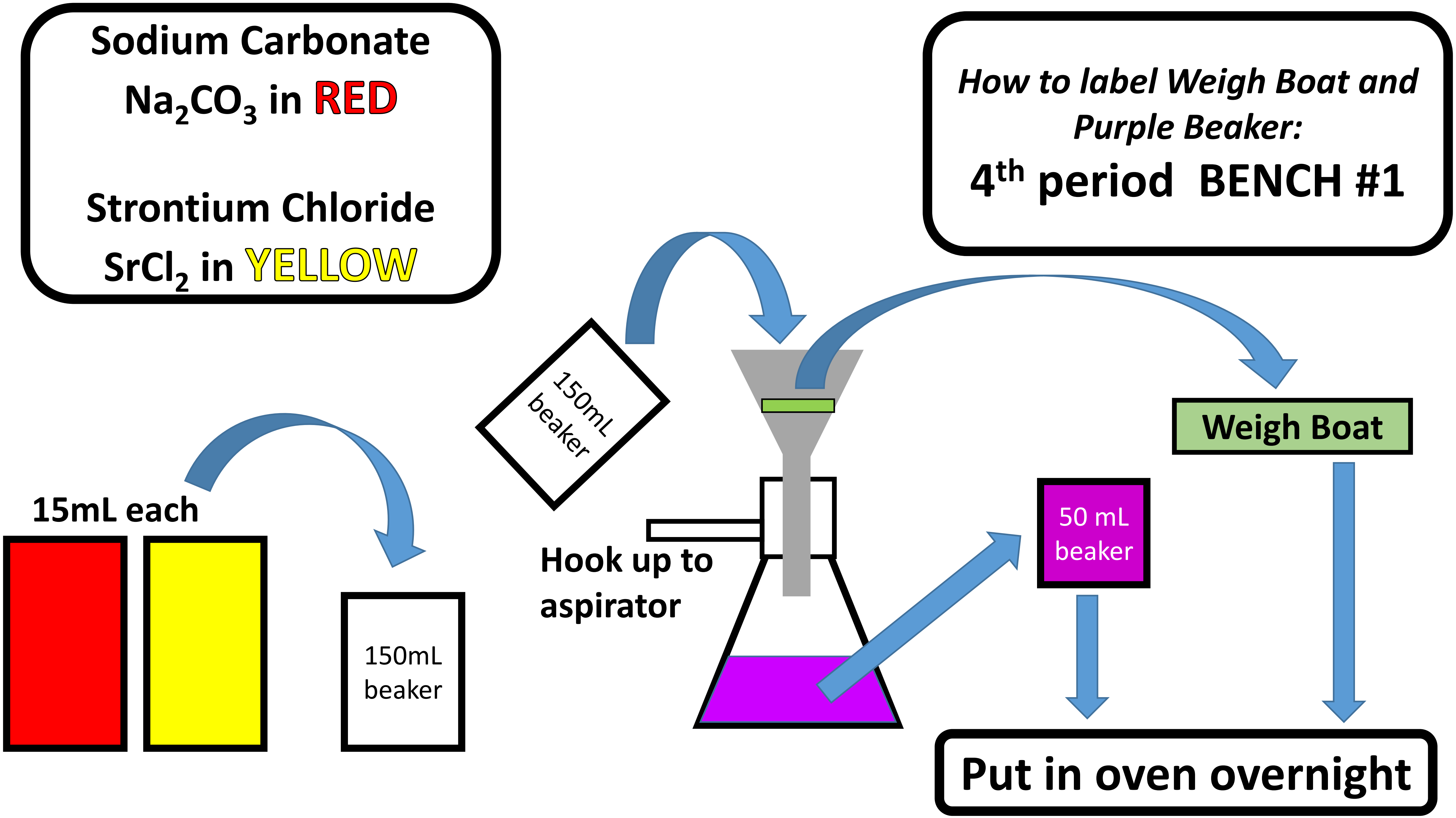
Limiting Reagent Stoichiometry Lab

- Pipette with red tape
- Pipette with yellow tape
- 150mL Beaker with red tape
- 150mL Beaker with yellow tape
- One 50mL Beaker with purple tape per period (Farmer = 2, Kerr = 4)
- Extra weigh boat for each period (Farmer = 2, Kerr = 4)
- Filter paper for each period (Farmer = 2, Kerr = 4)
- Scale
- Distilled water bottle
- Hot plate
- Small graduated cylinder
- Buchner funnel
- Filter flask with hose
- Rubber collar
- Metal Scoopula

15 mL of each solution	x 8 groups	x 10 periods	= 1200 mL needed

1 L $SrCl_2$	0.15 mol	158.53 g	= 23.7795 g
	1 L	1 mol	To make 1 L

1 L Na_2CO_3	0.25 mol	105.99 g	= 26.4975 g
	1 L	1 mol	To make 1 L



Sodium Carbonate
Na_2CO_3 in RED
Strontium Chloride
$SrCl_2$ in YELLOW
How to label Weigh Boat and Purple Beaker:
4th period BENCH #1
15mL each
150mL beaker
150mL beaker
Hook up to aspirator
Weigh Boat
50 mL beaker
Put in oven overnight

Combustion Analysis Lab

Combustion Analysis Lab

Each Lab Station Needs:

- White tray
- Magnesium Ribbon
- Clay triangle
- Bunsen burner
- Bunsen burner hose
- Balance
- Crucible tongs
- Wire gauze
- Crucible and lid
- Scissors
- Ring stand
- Ring clamp
- Matches
- Watch glass

Unit 9 – Gas Laws

Gas Law Stations Activity

Gas Stations Activity

CHEMICALS NEEDED

- **Cans**
- **Marshmallows**
- **Alka Seltzer**
- **Balloons**
- **Tea Candles**

#1 – get several cans going at once Graduated cylinder Hot Plates x 3 Beaker Tongs Large beaker with water	**#2** Cartesian Diver	**#3** Marshmallows Syringe
#4 2L soda bottle Strip thermometer Fizz keeper	**#5** Metal pie pan Food coloring Tea Candle Matches 100 mL beaker	**#6 – set up two station #6's (It's the slowest station)** Alka Seltzer Balloon Scale Metal scoop Mortar pestle Erlenmeyer flask Scissors

Molar Mass of Butane Lab

Molar Mass of Butane Lab

Each Lab Bench Needs:

https://www.youtube.com/watch?v=joBSZi520Wc

- **White Tray**
- **Thermometer**

https://www.youtube.com/watch?v=JlxyfE6YnsU&t=633s

- **Plastic tub**
- **Butane Lighter**
- **50mL Graduated Cylinder**
- **Scale**

Unit 10 – Thermochemistry

Calorimetry Lab

Calroimetry Lab

- Calorimeter
- Thermometer
- Hot plate
- Scale
- Metal cube
- 100mL graduated cylinder
- 500mL beaker with water boiling

Brass
Aluminum
Lead
Steel

$$Q = mC\Delta T$$

Purpose of the lab:

Solve for C (specific heat) of a metal

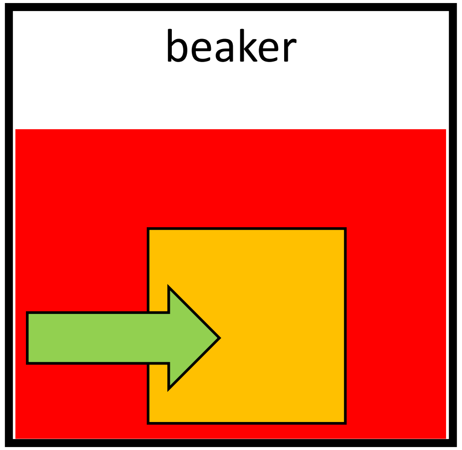
Energy absorbed → $Q = +$

Energy released → $Q = -$

ENERGY IN = ENERGY OUT

$Q_{metal} = +$

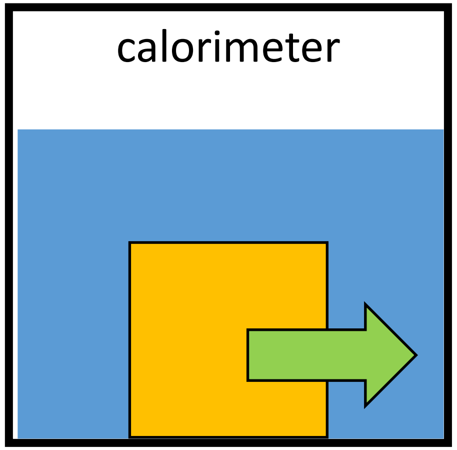
$Q_{water} = -$



Hot Water

Metal is heating up

Energy transfer into METAL



$Q_{metal} = -$

$Q_{water} = +$

Cold Water

Water is heating up

Energy transfer into WATER

Q_{water} =	?
m_{water} =	From the water you put in the calorimeter 1mL = 1g
C_{water} =	4.184 J/g°C
ΔT_{water} =	Tf – Ti *(From your thermometer readings)*

Q_{metal} = $-Q_{water}$	*Energy IN must = energy OUT!* *(opposite sign, not necessarily negative)*
m_{metal} =	From your scale
C_{metal} =	?
ΔT_{metal} =	Tf – Ti Tf - 100°C Tf: From water — *(At the end the metal and water will be same temp)* 100°C: From boiling — *(The metal was put in the boiling water so it reached 100℃)*

Unit 11 – Solutions

Serial Dilution Lab

Serial Dilution Lab

- 100 mL grad cylinder
- 150-250 beakers x3
- 100 mL beaker x1
- 100 mL volumetric flask
- Pipette
- Funnel
- DI water bottle
- Kim Wipes
- Spec
- Cuvette
- DI water bottle up front with large beaker for rinsing cuvette

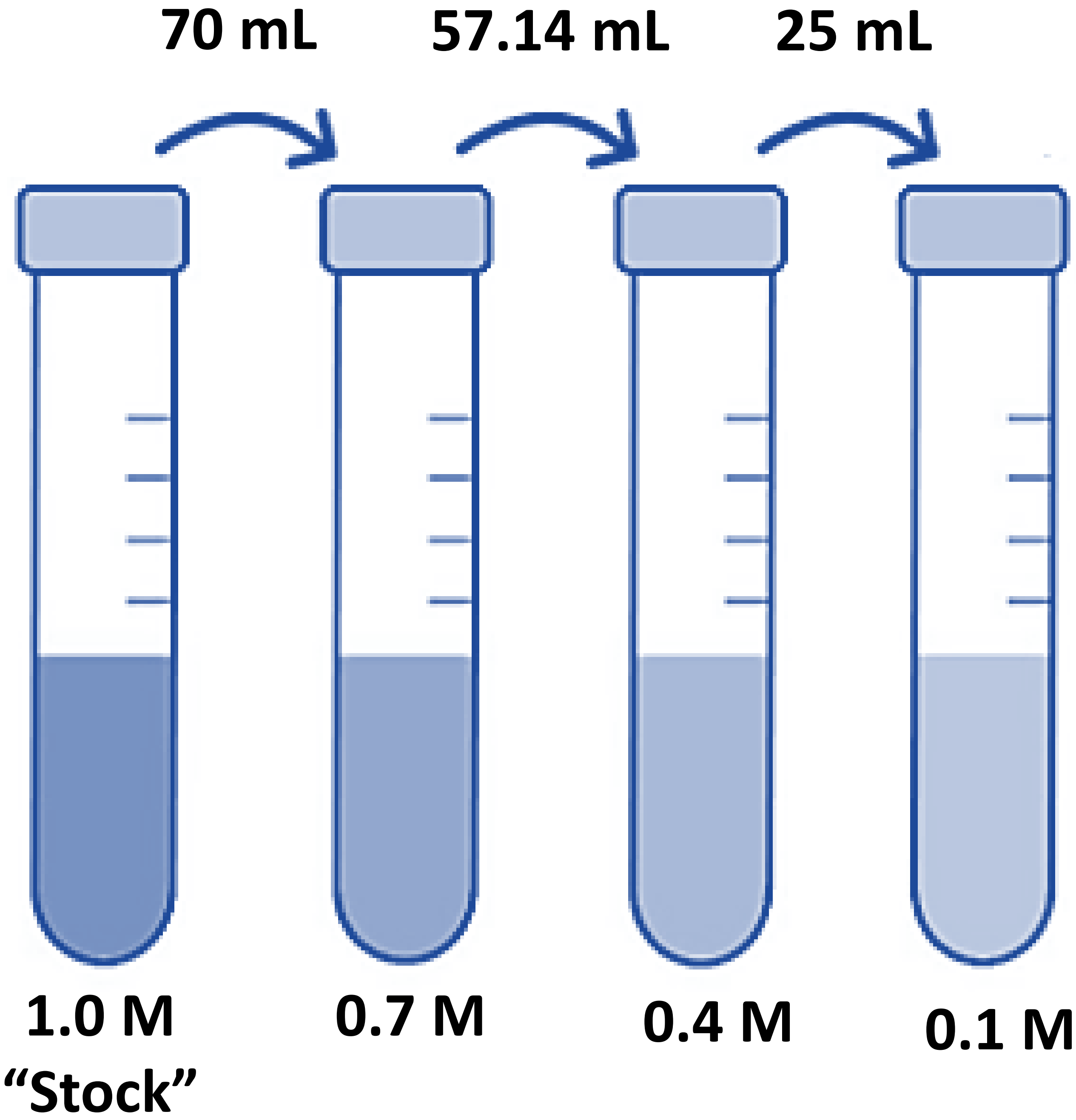
Blue Stock Solution
Blue food coloring added to beaker of water until dark blue. 10drops/L
70 mL per group = 560 mL per period

620 nm
2023 Accepted Absorbance Values:
1.00 M = 0.636
0.70 M = 0.445
0.40 M = 0.064

2024 Accepted Absorbance Values:
1.00 M = 0.636
0.70 M = 0.445
0.40 M = 0.064

Jumpstart

1. Get WS #7 out and start reading and highlighting it! Stop when you get to the procedure.
2. Once we have talked about the procedure then you will do the calculations to determine what volumes you will need during the lab.


70 mL
57.14 mL
25 mL
1.0 M
"Stock"
0.7 M
0.4 M
0.1 M

Unit 12 – Kinetics

Kinetics Lab Iodination of Acetone

Kinetics Lab

- 10mL graduated cylinder
- 125mL Erlenmeyer flask
- 100mL beaker
- 400 mL beaker x 3
- Pipettes x 3
- Distilled water bottle
- Stop watch
- 4M acetone
- 1M HCl
- 0.0050 M iodine in isopropyl alcohol

4.0M ACETONE

Each class period needs: 320mL
294mL → add water to 1000mL

1.0M HCl

Each class period needs: 320mL
82.6mL 12M HCl → add water to 1000mL

0.0050M IODINE SOLUTION

Each class period needs: 448mL
1.27g Iodine crystals → add Isopropyl Alcohol until 1000mL
Stir on stir plate, heat to 50C to help dissolve

Jumpstart

Grab the lab handout from the teal cart and START READING IT!!!!!!!

Sample Data for Iodination of Acetone Kinetics Lab		
Trial	**Time**	**Rate**
1	92 sec	5.43×10^{-6} M/sec
2	151 sec	6.62×10^{-6} M/sec
3	184 sec	8.15×10^{-6} M/sec
4	264 sec	9.35×10^{-6} M/sec

Unit 13 – Equilibrium

Equilibrium of CO2

Equilibrium Lab

- 100mL beaker x2
- 50mL beaker
- White piece of paper
- Squirt bottle of universal indicator
- Dry ice
- Hot plate
- Hot plate cord
- Tongs
- Syringe w/ cap and nail
- 1M HCl
- 0.0050 M iodine in isopropyl alcohol

BUY DRY ICE!!!!!!!!!!

Unit 14 – Acid Base

Salts Activity

Salt Activity

- 3 small beakers
- 3 stir rods
- pH paper
- pH paper color key
- 0.1 M solutions
  - $NaC_2H_3O_2$
  - $NaHCO_3$
  - NH_4Cl

Titration Lecture

Titrations

- 8x burettes
- 8x burette clamps
- 8x ring stands
- 8x small beaker to keep under burette
- 8x 125mL flasks for HCl
- 8x Pheno bottles
- 8x Distilled water bottles
- Funnel for NaOH (teacher only!)
- 2x small Graduated cylinder up front for HCl into their flask
- 2x 400mL beaker up front with HCl
- 2x Pipettes up front for HCl

8 tables
x 4 trials per table
x 12 period
= 384

NaOH - _0.1__M HCl = __0.1___M

384 x ___5mL____amount of NaOH needed to reach end point = __1.9 L__ NaOH to make (round up)

384 x ____5mL___amount of HCl in each flask to titrate = ___1.9 L____ HCl to make (round up)