

MATERIALS AND EQUIPMENT FOR SPECIFIC CHEMISTRY EXPERIMENTS

NALT04102 Basic Experimental Chemistry

Why Chemistry is so important?

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- It is quantitative science
- Deals with study of matter which is the basis of all living and non-living things
- In our daily lives
 - ▣ New Materials
 - ▣ New Pharmaceuticals
 - ▣ New Energy Sources
 - ▣ Food Supplies
 - ▣ Etc

Chemistry Disciplines

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- **Analytical Chemistry**- concerned with the composition of substances.
- **Inorganic Chemistry**- primarily deals with substances without carbon
- **Physical Chemistry**- describes the behavior of chemicals
- **Organic Chemistry**- essentially all substances containing carbon
- **Biochemistry**- Chemistry of living things

Two major groups

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- **Pure chemistry-** gathers knowledge for the sake of knowledge
- **Applied Chemistry-** is using chemistry to attain certain goals, in fields like medicine, agriculture, and manufacturing: e.g. synthesis/production of ;
Nylon
Aspirin ($\text{C}_9\text{H}_8\text{O}_4$)
Use of technology

Definitions of terms

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- ❑ **Chemistry Experiment:** These are scientific tests or investigations that deals with how chemicals or mater interacts to produce a new substance or changing its form.
- ❑ Experiment materials
- ❑ Equipment
- ❑ Apparatus



Definitions of terms...

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- Equipment: Is the machinery item which perform a given task.
 - ▣ relates to a number of accessories
- An instrument is a specific device which performs a specified single task (to measure or observe)
 - ▣ example
 - thermocouple for measuring temperature
 - microscope

Definitions of terms...

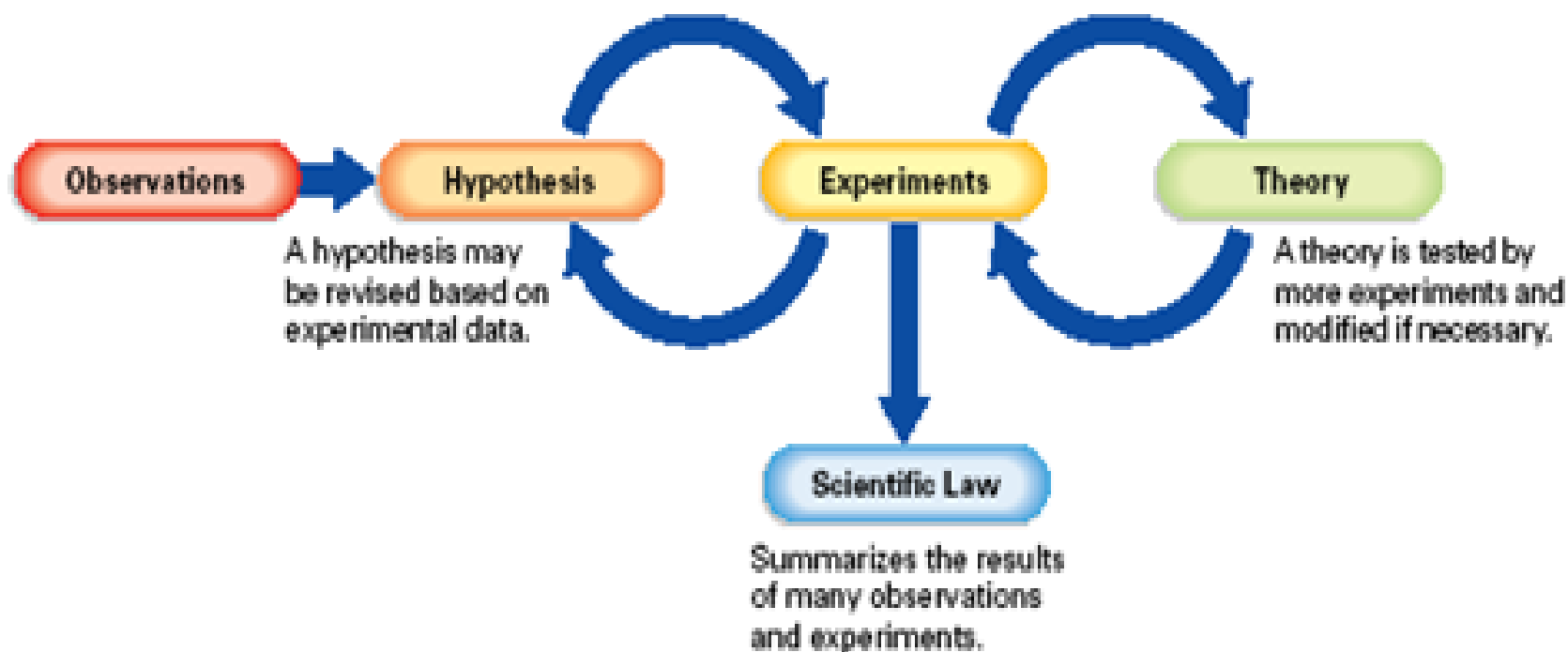
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- Materials are anything consumed in the experiment
 - ▣ e.g. water or salt for example.
- Apparatus are such items that are not consumed during the experiment.
 - ▣ E.g. beakers, thermometers, e.t.c

Chemistry Experiments

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□ Scientific Method/Approach



Chemistry Experiments...

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- Specific chemical substance, materials and equipment/ apparatus are used for specific chemistry experiment.
- Definite amount of chemical substances are used for specific chemistry experiment to produce desired results.

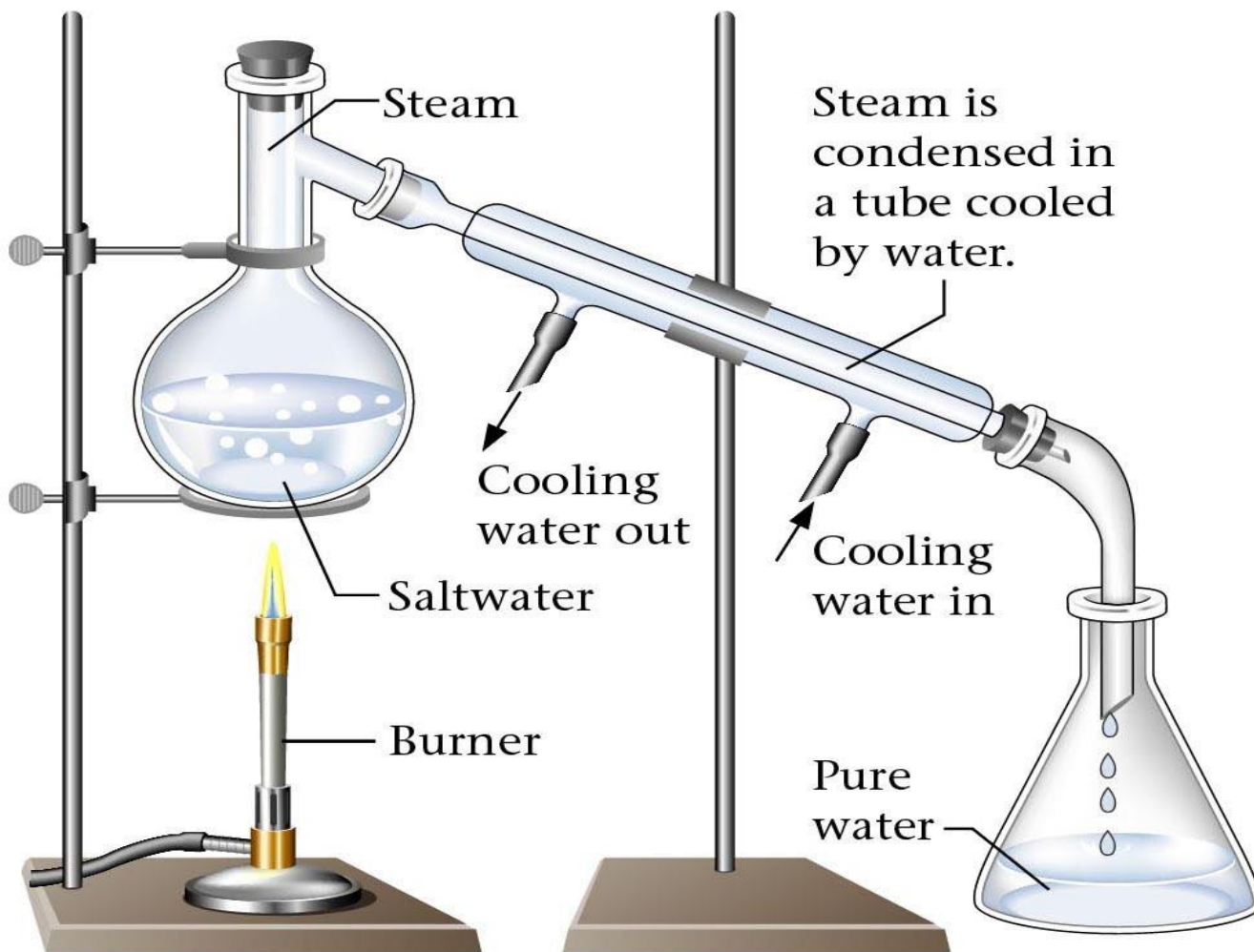
Chemistry Experiments...

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- Different experiments have different apparatus set up.
- Chemistry experiments should have pre-defined;
 - ▣ Theory/Background/description
 - ▣ Materials and chemicals
 - ▣ Equipment and apparatus
 - ▣ Method
 - ▣ Conditions and precautions.
 - ▣ Reaction equations

Example: Separation of Mixtures

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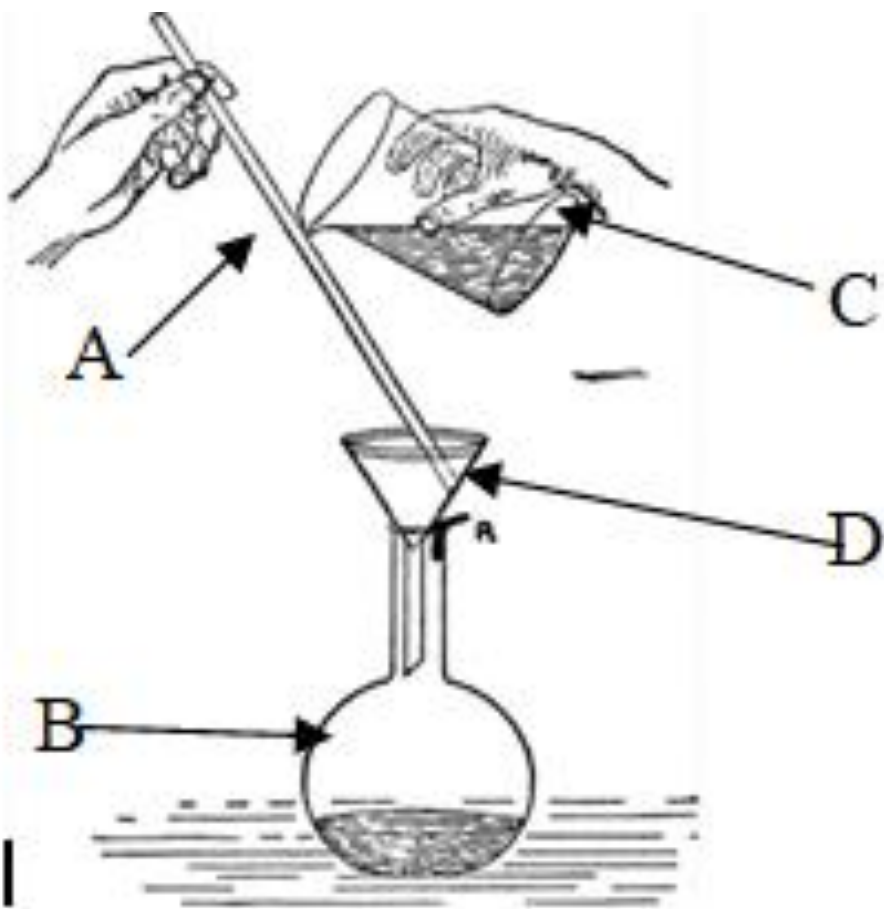


(a)

- ❑ Type of experiment?
- ❑ Theory/Background /description ?
- ❑ Materials and chemicals?
- ❑ Equipment and apparatus?
- ❑ Method?
- ❑ Conditions and precautions?
- ❑ Reaction equations?

Example: Preparation of Solution

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- Type of experiment?
- Theory/Background /description ?
- Materials and chemicals?
- Equipment and apparatus?
- Method?
- Conditions and precautions?
- Reaction equations?



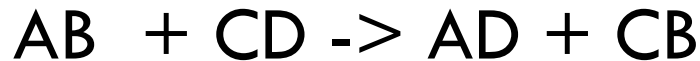
Combined for Heating

- ❑ Type of experiment?
- ❑ Theory/Background/description ?
- ❑ Materials and chemicals?
- ❑ Equipment and apparatus?
- ❑ Method?
- ❑ Conditions and precautions?
- ❑ Reaction equations?

Chemical reactions

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- Chemical reactions are **interactions** between pure substances (atoms or molecules) which result in the rearranging of atoms and molecules.



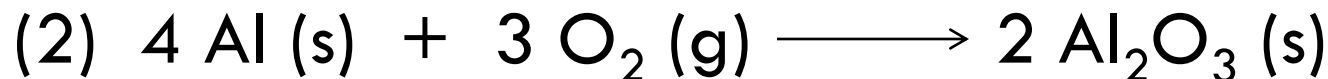
- The word rearranging is used because atoms never lost in chemical reaction.
- Example Iron rust (=iron (III) oxide) is a consequence of **chemical reaction** between **iron** and **oxygen** in air.



Representation of Chemical reactions

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- **Elemental formula:** how atoms are bounded together in an element e.g Li, O₂ , N₂ , S₈
- **Chemical formula:** representation of a compound, when atoms of different elements bond to each other NaCl, NH₃ , CO₂
- **Chemical equations**



Representation of chemical formula in chemical equation

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Coefficient:

represents how many of a particular element or molecule

i.e there are three molecules of oxygen gas

Subscript:

represents how many of a particular atom

i.e two oxygen atoms combined to form a stable compound oxygen molecule

Chemical reaction ...

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- Indication that chemical reaction has occurred or is taking place:-
 - ▣ Colour change
 - ▣ Fumes evolution
 - ▣ Bubbles (evolution of gas)
 - ▣ Heat absorbed or produced

Types of Chemistry Experiments

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□ The term “Types of chemistry experiments” and “types of chemical reactions” are interchangeably used, however, “experiments” are defined by the methods used:

□ Example

- | | |
|--------------------------|------------------|
| • Titration (volumetric) | • Electrolysis |
| • Qualitative analysis | • Potentiometry |
| • Gravimetric | • Chromatography |
| • Separation | • Spectroscopy |

Laboratory Apparatus

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Balance (electronic)



Beakers

Laboratory Apparatus ...

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Bunsen Burner



Buret

Laboratory Apparatus ...

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Crucible in Triangle



Crucible Tongs

Laboratory Apparatus ...

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Clay Triangle



Crucible



Dropper Pipets



Dropper in action



Erlenmeyer Flasks



Evaporating Dish

Laboratory Apparatus ...

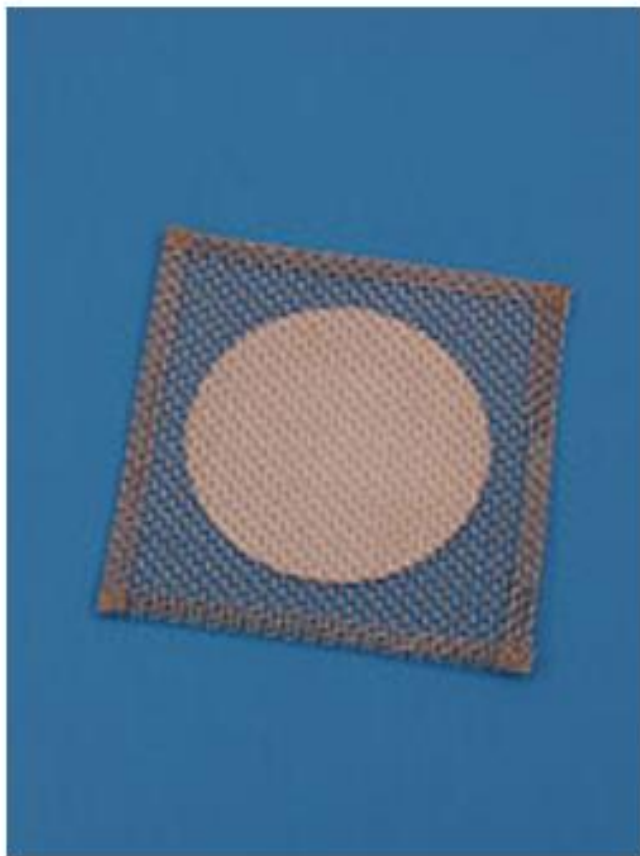
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Forceps



Funnels



Wire Gauze



Combined for Heating



Goggles



Graduated Cylinders

Laboratory Apparatus ...

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Pinch Clamp



Pipets and Bulbs



Plastic and Rubber
Policemen



Ring Clamp & Stand



Scoopula



Stirring Rods

Laboratory Apparatus ...

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Thermometers



Test Tubes in Rack



Test Tube Holder



Tube & Holder in Action



Utility Clamp



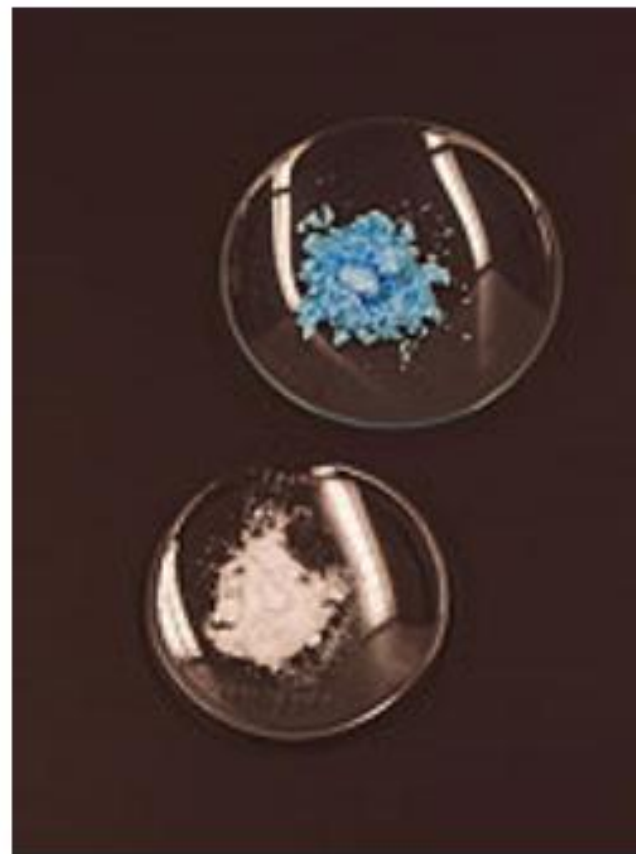
Clamp in action

Laboratory Apparatus ...

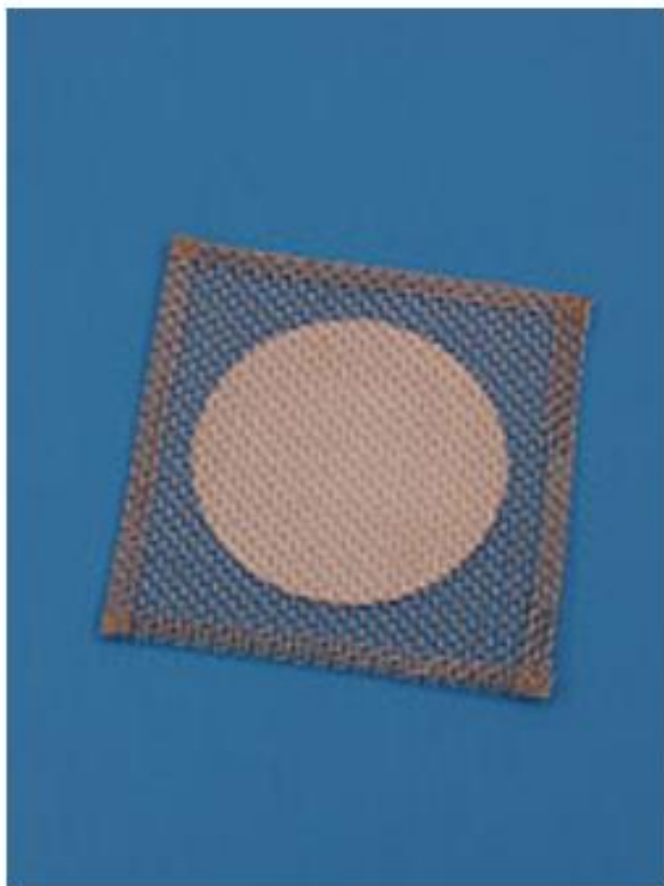
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Wash Bottle



Watch Glasses



Wire Gauze



Combined for Heating

Types of Chemistry Experiments

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□ Example

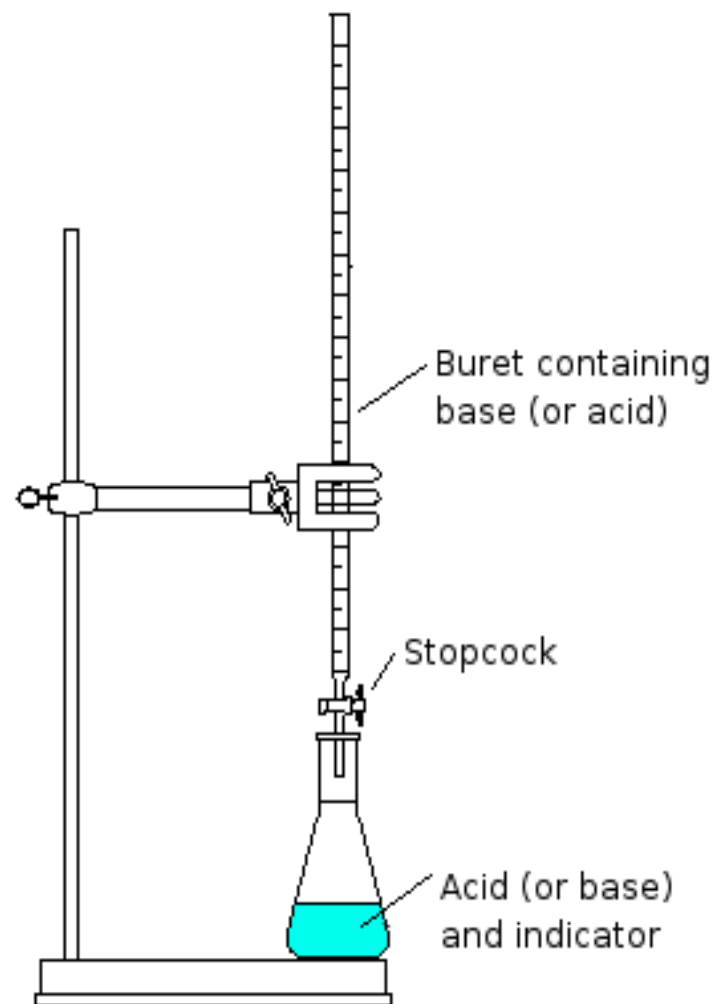
- | | |
|--------------------------|------------------|
| • Titration (volumetric) | • Electrolysis |
| • Qualitative analysis | • Potentiometry |
| • Gravimetric | • Chromatography |
| • Separation | • Spectroscopy |

Titration (volumetric or titrimetry)

Experiments = >titrant vs titrand

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- Is a common laboratory method of quantitative chemical analysis.
- Is the process of determining the quantity of a sample by adding measured volumes of a titrant (normally via a burette) until the end-point is reached.
- i.e. all of the sample has reacted.



Titration Experiments...

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- Is used to determine the unknown concentration of an identified **analyte**.
- A **titrant** or titrator is reagent prepared as a **standard solution**.
- A known concentration and volume of titrant reacts with a solution of **analyte** or **titrand** to determine concentration.
- The volume of titrant reacted is called **titration volume**. See Video <[Clip1](#)><[Clip2](#)> for automated titration.



Gravimetric Experiments

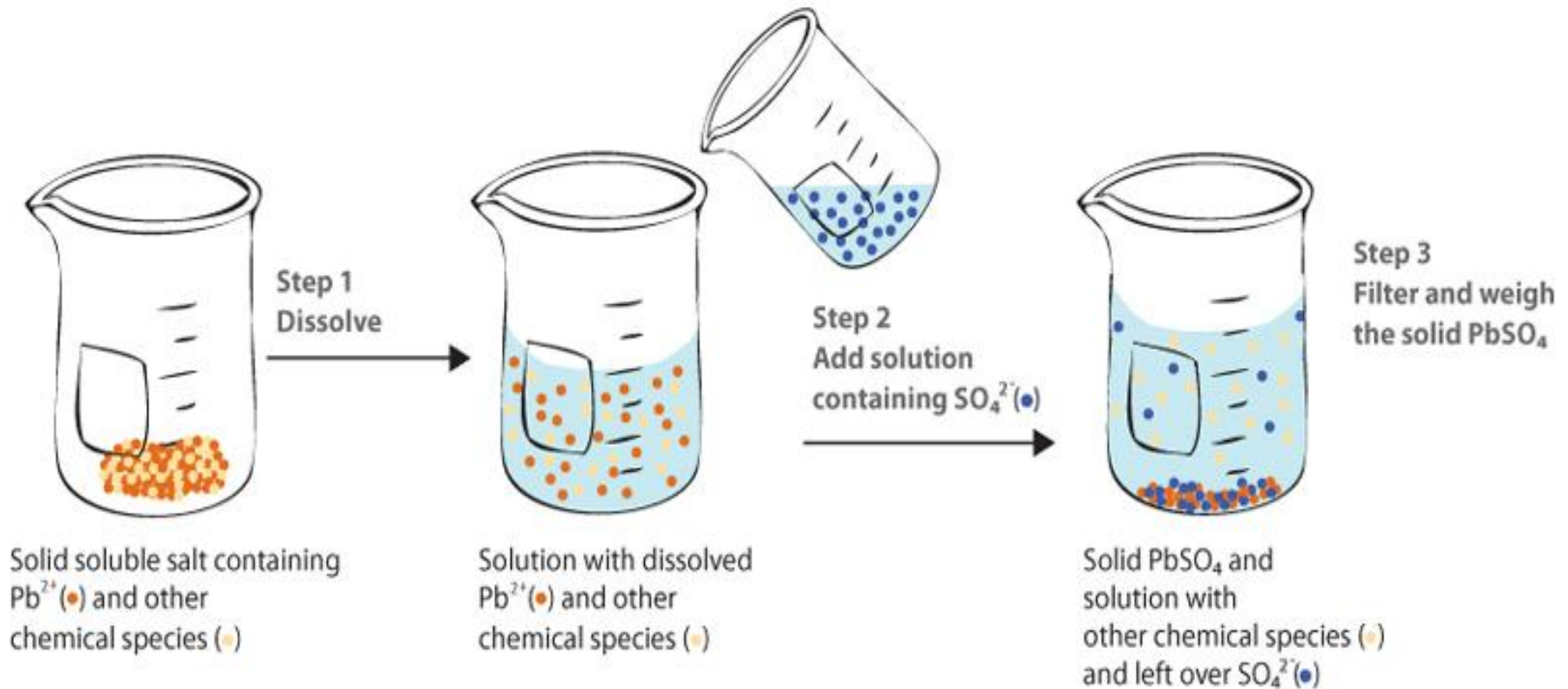
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- **Gravimetric analysis** is a technique through which the amount of an analyte (the ion being analyzed) can be determined through the measurement of mass.
- **Gravimetric analyses** depend on comparing the masses of two compounds containing the analyte.



Determination of Amount of lead present in a water sample

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Determination of %Cl in the unknown

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In this experiment the chlorine content of an unknown soluble chloride salt is to be determined. The unknown is dissolved in distilled water and dilute silver nitrate solution is added to precipitate out the chloride as silver chloride (AgCl).

The percent of chloride in the unknown is calculated as follows:

$$\% \text{ Cl} = \frac{\text{mass of Cl in sample}}{\text{mass of sample}} \times 100$$

EQUIPMENT

50 mL, and 400 mL or 500 mL beakers; Buchner Funnel; vacuum flask, filter paper; glass stirrer (with or without a policeman); iron ring, wire gauze, and aluminum foil.

The percent of chloride in the unknown is calculated as follows:

$$\% \text{ Cl} = \frac{\text{mass of Cl in sample}}{\text{mass of sample}} \times 100$$

The mass of Cl can be determined from the fact that it is precipitated and weighed as insoluble AgCl. The % composition of Cl in AgCl can be calculated as follows:

$$\text{mass of Cl in sample} = \text{mass of AgCl} \times \frac{\text{Atomic weight of Cl}}{\text{Molecular weight of AgCl}}$$

Thus, by substitution:

$$\% \text{ Cl} = \frac{\text{mass of AgCl in sample}}{\text{mass of sample}} \times \frac{\text{Atomic weight of Cl}}{\text{Molecular weight of AgCl}} \times 100$$

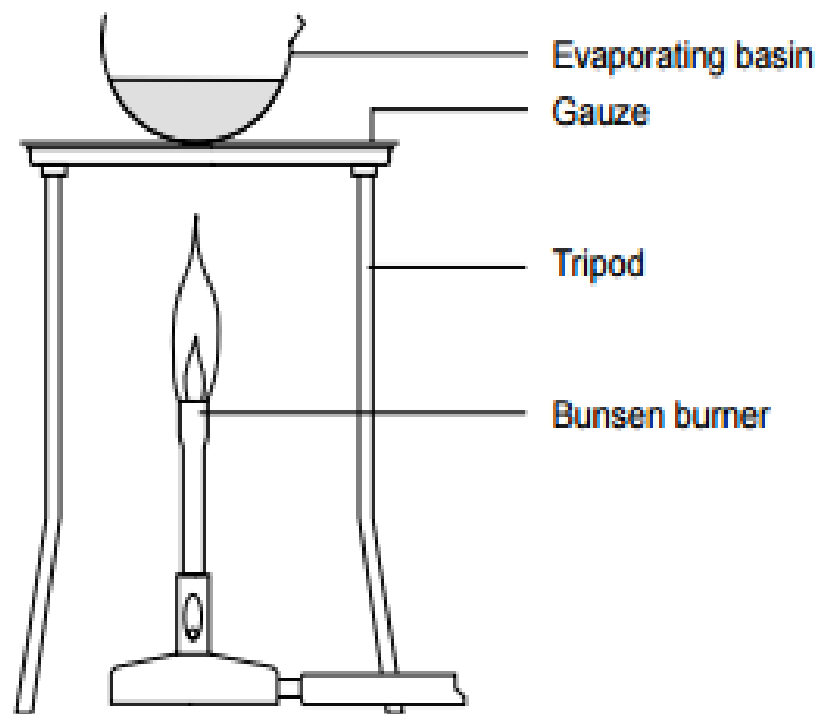
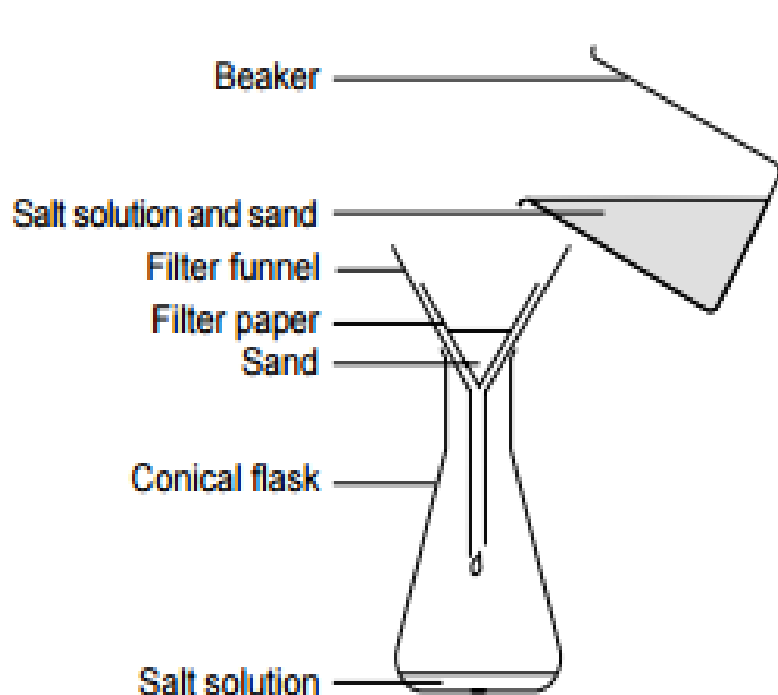
The ratio of the atomic wt of Cl to the molecular weight of AgCl as determined by % composition method is called GRAVIMETRIC FACTOR. For example if the chloride were precipitated as PbCl_2 then the gravimetric factor would be

$$\frac{2 \times \text{Atomic Weight of Cl}}{\text{Molecular weight of PbCl}_2}$$

Separation Technique/Experiments

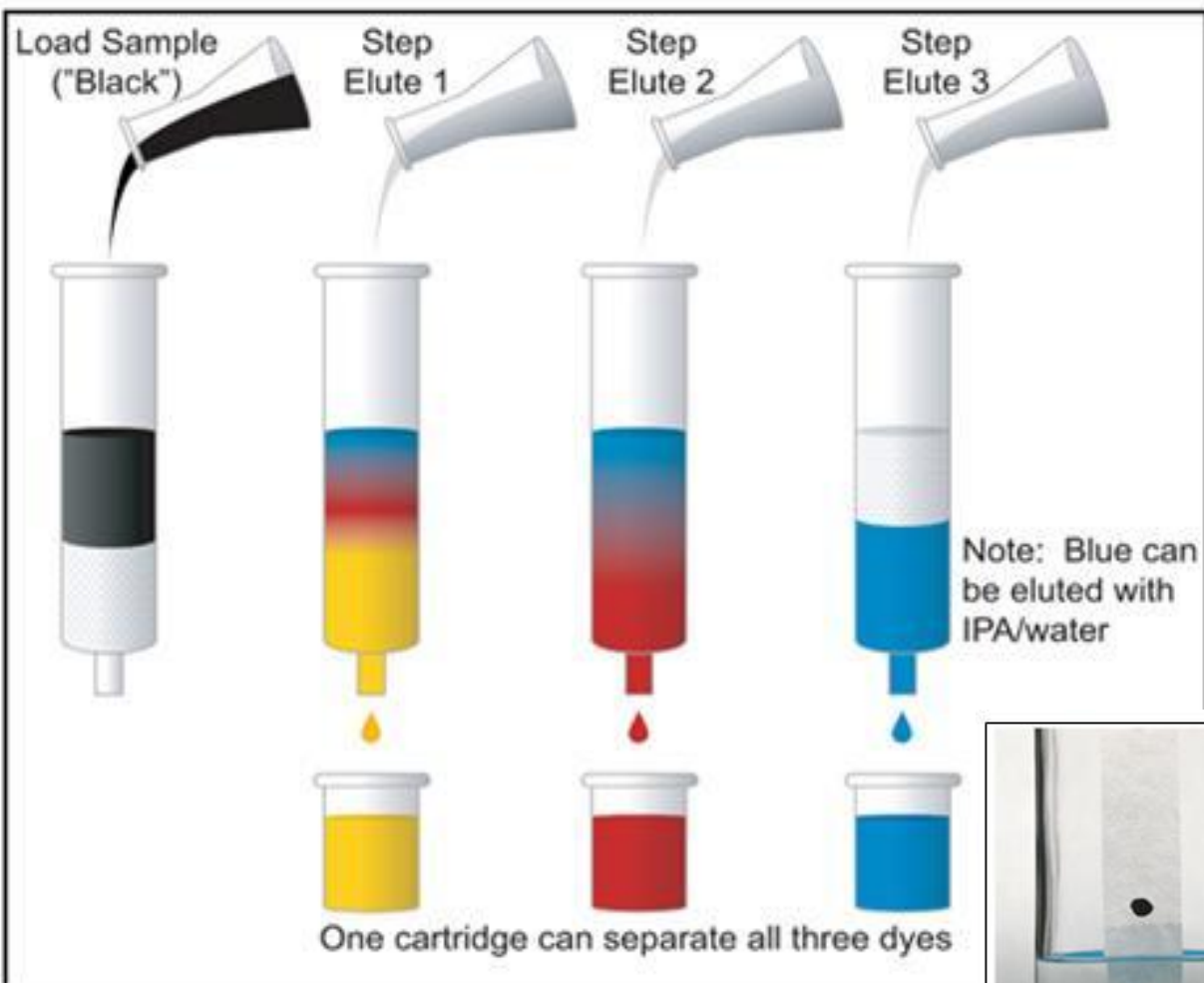
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In this experiment simple processes are used to separate salt from a sand and salt mixture.



Column Chromatography

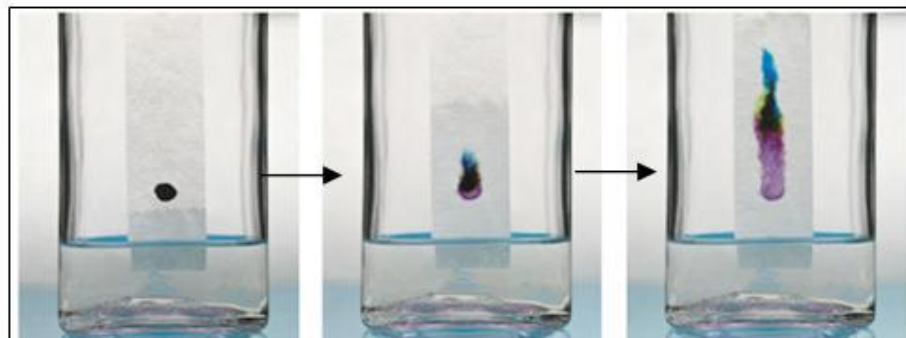
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If the test sample is a complex mixture then a sequential elution (separation by mobile solvent) should be carried out.

In sequential elution separation process starts from a less polar solvent and then the polarity of the solvent is gradually increased.

So that elution of the molecules will take place in a polarity range which means least polar will come very first and most polar will be the last.



Spectrophotometry

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- Spectrophotometry is a method to measure how much a chemical substance absorbs light by measuring the intensity of light as a beam of light passes through sample solution.
- The basic principle is that each compound absorbs or transmits light over a certain range of wavelength.
- This measurement can also be used to measure the amount of a known chemical substance.

Spectrophotometry..

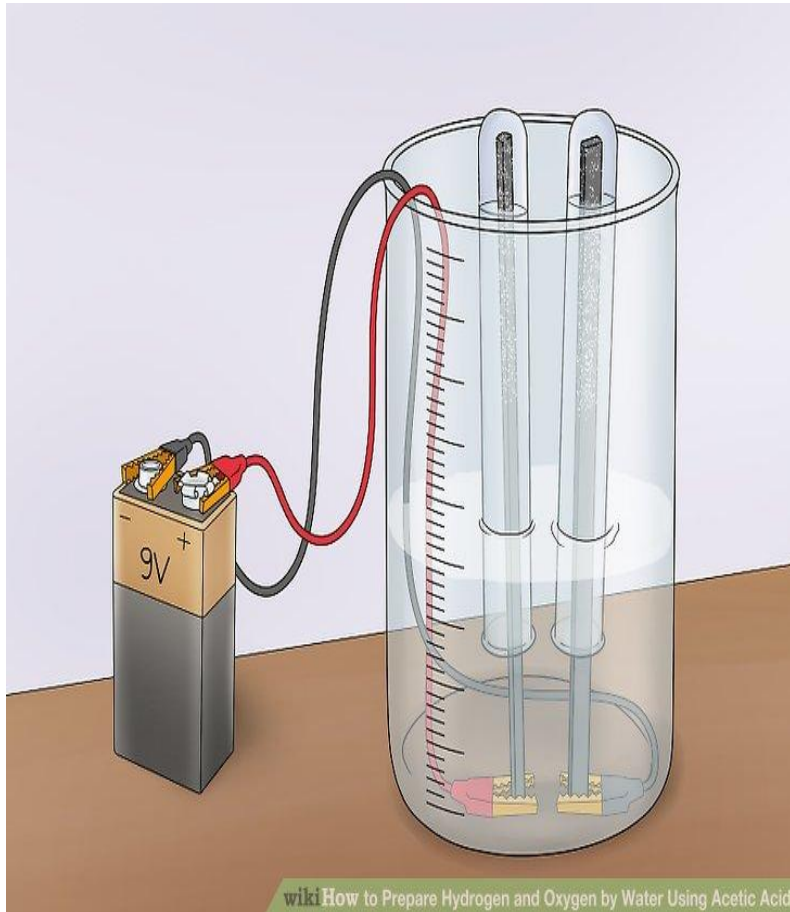
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- **UV-visible spectrophotometer:** uses light over the ultraviolet range (185 - 400 nm) and visible range (400 - 700 nm) of electromagnetic radiation spectrum.
- **IR spectrophotometer:** uses light over the infrared range (700 - 15000 nm) of electromagnetic radiation spectrum.



Electrolysis

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- Electrolysis is a commonly used process that separates bonded compounds by breaking the substances into ions.
- This process is often used in the chemical industry, as well as in other applications such as mining and manufacturing.
- e.g. NaCl (common table salt) into two ions, Na^+ and Cl^-

Potentiometry Experiments

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- Potentiometry An electroanalytical technique based on the measurement of the electromotive force of an electrochemical cell comprised of a measuring and a reference electrode.
- Indicator electrode: The simplest example of a measuring electrode is a metal electrode whose potential depends on the concentration of the cation of the electrode metal.
- Electrochemical measuring system: When a metal M is immersed in a solution containing its own ions M^{n+} , then an electrode potential is established, the value of which is given by the **Nernst equation**:



Nernst equation

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- Predicts the voltage that would result from different ion concentrations
- Looks like this:

$$E_m = \frac{RT}{zF} \ln \frac{[K^+]_o}{[K^+]_i}$$

E_m : membrane potential

R : the gas constant ($8.315 \text{ J mol}^{-1} \text{ K}^{-1}$)

T : absolute temperature ($20^\circ \text{C} = 293 \text{ K}$)

z : charge on the ion ($z=1$ for K^+)

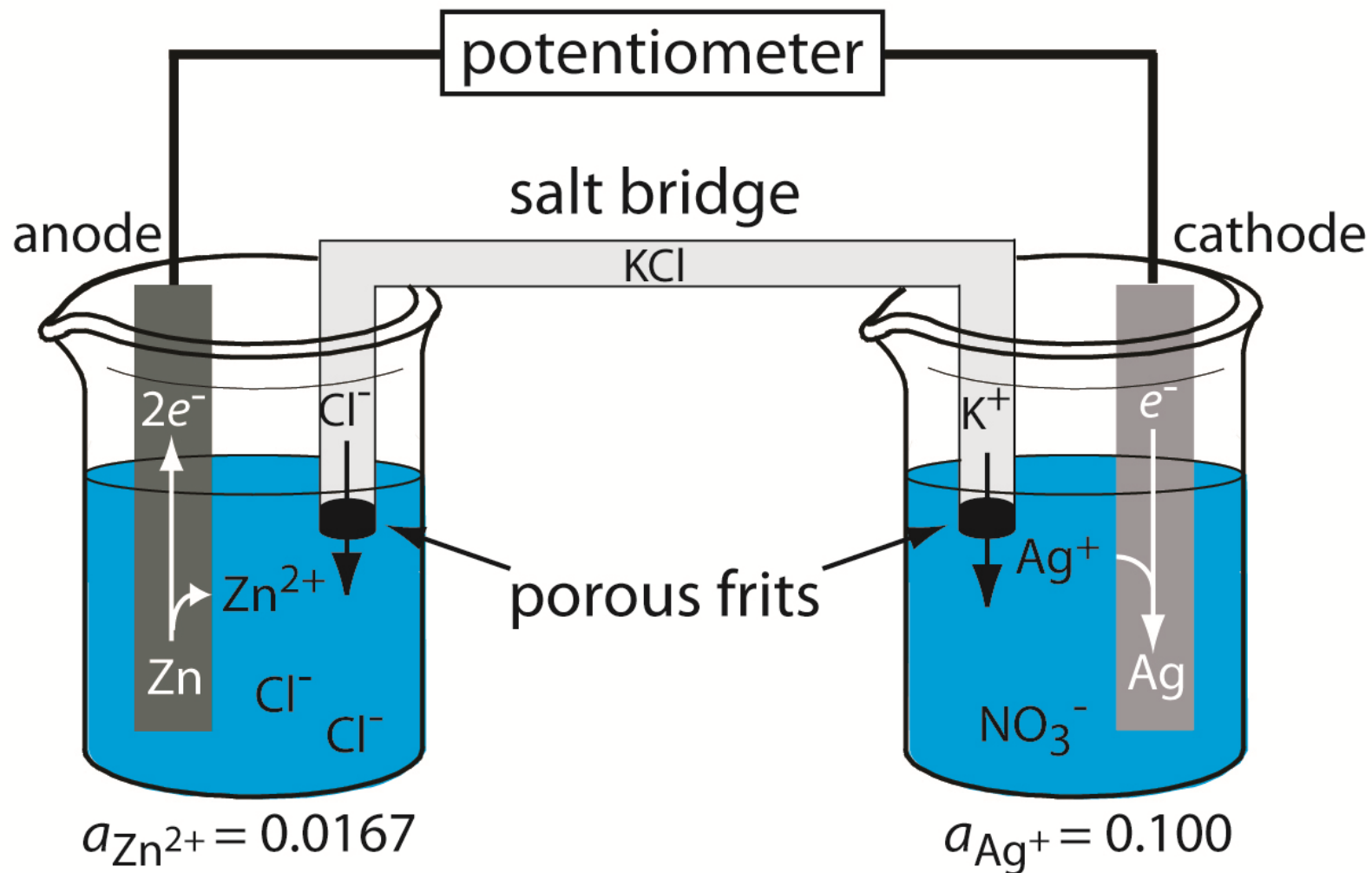
F : Faraday's constant (96480 C mol^{-1})

$[K^+]_o$, $[K^+]_i$: K^+ ion concentrations outside and inside cell

\ln : natural logarithm

Potentiometry Experiments

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Qualitative analysis

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- Qualitative analysis is a method used for identification of ions or compounds in a sample.
- In many cases, qualitative analysis will also involve the separation of ions or compounds in a mixture
- Examples of qualitative tests would include ion precipitation reactions (solubility tests) or chemical reactivity tests



•The separation of ions is easily achieved by taking advantage of their solubility properties

Cation	NaOH(aq)			NH ₃ (aq)		
Cu²⁺	 Light blue ppt	 Insoluble in excess		 Light blue ppt	 Soluble in excess to give dark blue solution	
Fe²⁺	 Dirty-green ppt	 Insoluble in excess		 Dirty-green ppt	 Insoluble in excess	
*Fe³⁺	 Reddish-brown ppt	 Insoluble in excess		 Reddish-brown ppt	 Insoluble in excess	

Note: On standing in air (oxygen), the dirty-green ppt of Fe(OH)₂ turns reddish-brown due to oxidation of Fe²⁺ ions.



*Colour of solution containing Fe³⁺ may range from colourless to pale yellow depending on concentration of Fe³⁺.

MATERIALS AND EQUIPMENT FOR SPECIFIC CHEMISTRY EXPERIMENTS

Types of Chemical Reactions

Types of Chemical Reactions

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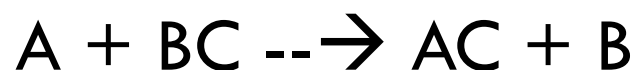
- Decomposition Reactions
- Single Displacement Reactions
- Double Displacement Reactions
 - ▣ Precipitation
 - ▣ Acid-Base Neutralization
- Combustion
- Organic Reactions
- Synthesis Reactions
- Redox

Single displacement reaction

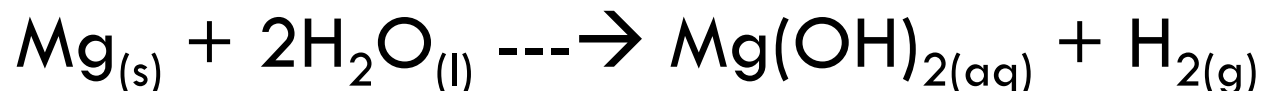
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□ Is the type of reaction whereby one metal displaces another metal or hydrogen from a compound or aqueous solution

□ The element that is displaced is less reactive



□ Example



Double displacement reaction

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- This is type of reaction where two compounds exchange anions to form different compound
- $AB + CD \rightarrow AD + CB$
- Example
- $Pb(NO_3)_{2(aq)} + 2KI_{(aq)} \rightarrow PbI_{2(s)} + 2KNO_3$

Synthesis reaction (combination reaction)

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- This reaction involves two or more substances being combine into a single compound
- $A + B \rightarrow AB$
- The reaction may involve;
 - ▣ *metal and oxygen*
 - ▣ *nonmetal and oxygen*
 - ▣ *metal and nonmetal*

Synthesis reaction...

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□ Example

- $S_{(s)} + O_{2(g)} \rightarrow SO_2$ (*nonmetal and oxygen*)
- $2Mg_{(s)} + O_{2(g)} \rightarrow 2MgO_{(s)}$ (*metal and oxygen*)
- $2Na_{(s)} + Cl_{2(g)} \rightarrow 2NaCl_{(s)}$ (*metal and nonmetal*)

Decomposition reaction

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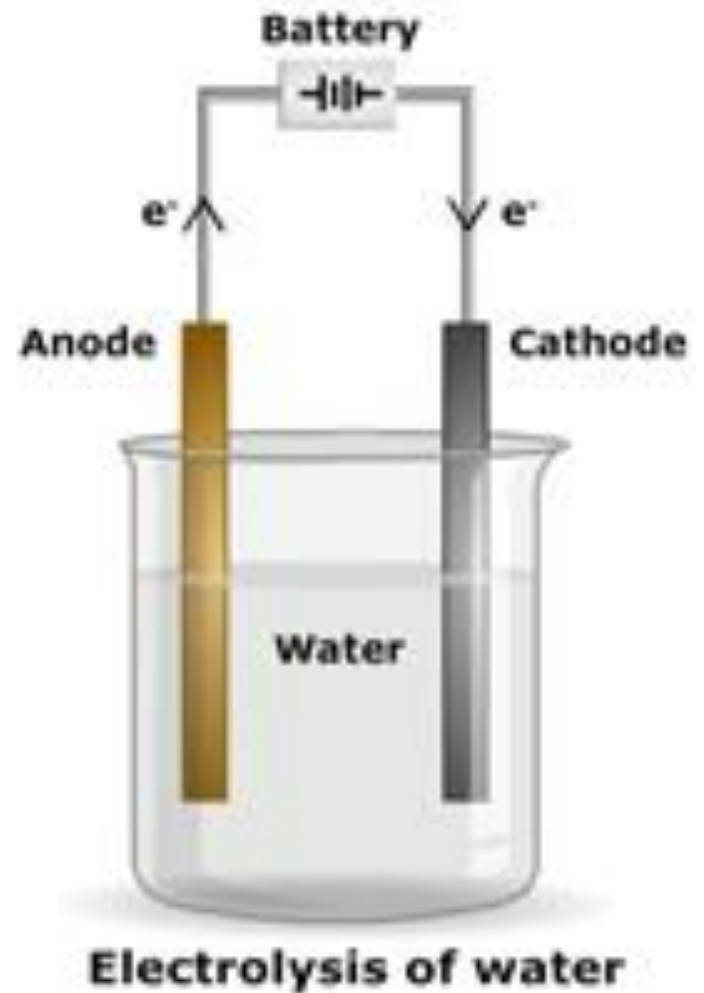
- Is the type of reaction which single compound is broken down to two or more substances.
- This is the opposite of synthesis reaction



- Types of Decomposition Reactions
 - ▣ Thermal decomposition reaction
 - ▣ Electrolytic decomposition reaction
 - ▣ Photo decomposition reaction

Example: Electrolysis of water

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Task

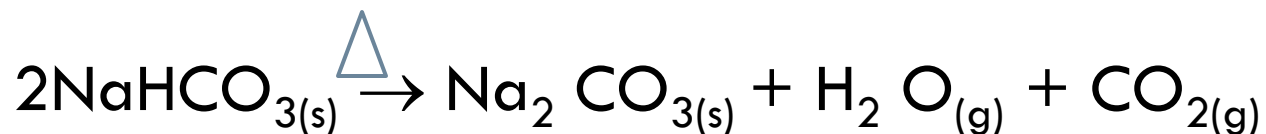
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- Illustrate decomposition of
 - ▣ calcium carbonate
 - ▣ potassium chlorate
 - ▣ ferric hydroxide
 - ▣ hydrated oxalic acid

Example:

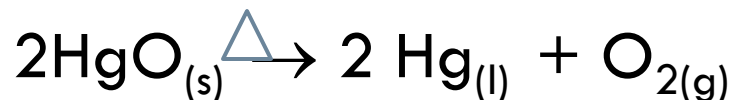
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- ▣ Metal hydrogen carbonate



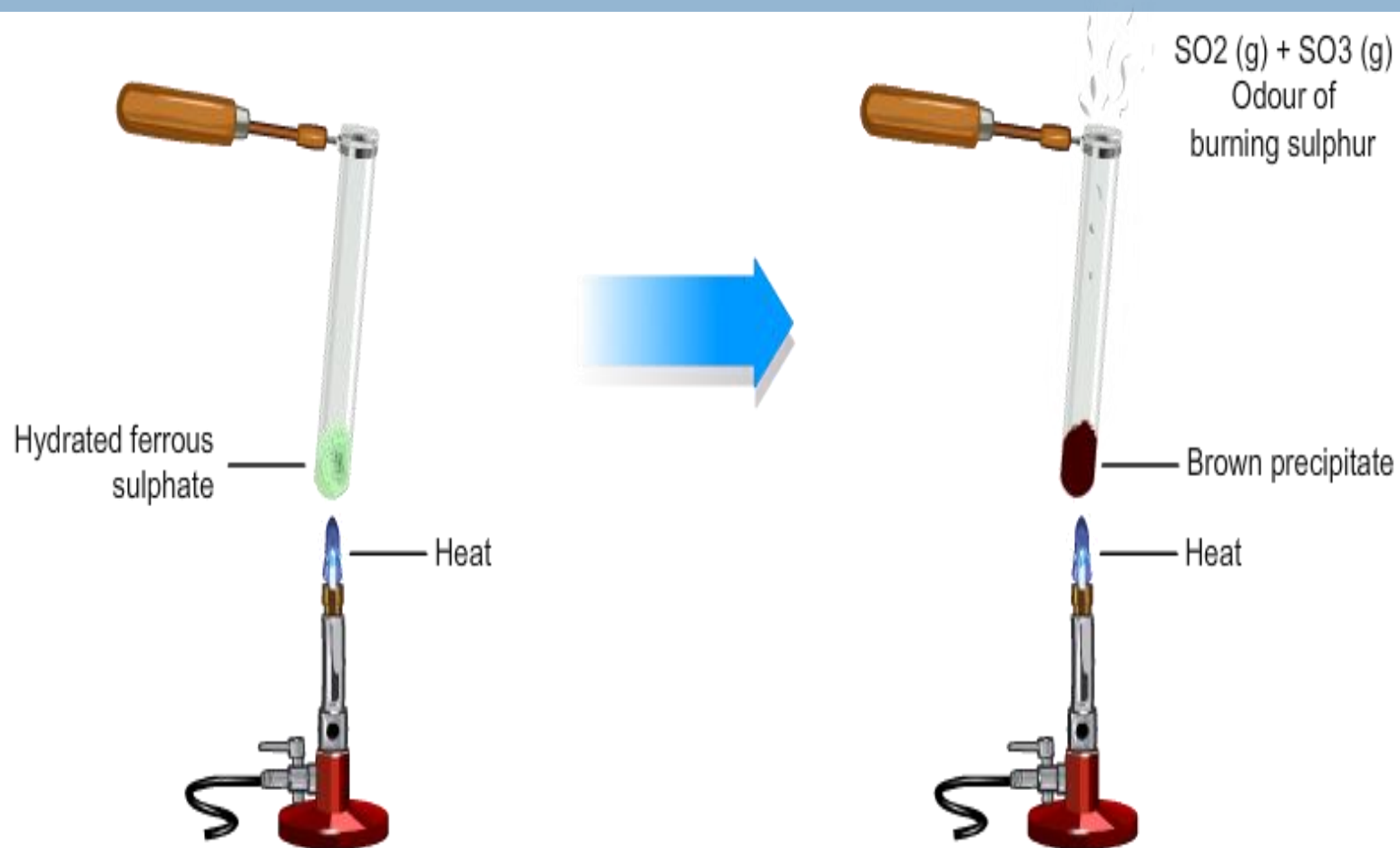
- ▣ Metal carbonates: $\text{CaCO}_{3(s)} \xrightarrow{\Delta} \text{CaO}_{(s)} + \text{CO}_{2(g)}$

- ▣ Miscellaneous oxygen-containing compounds



Example : Thermal decomposition reaction

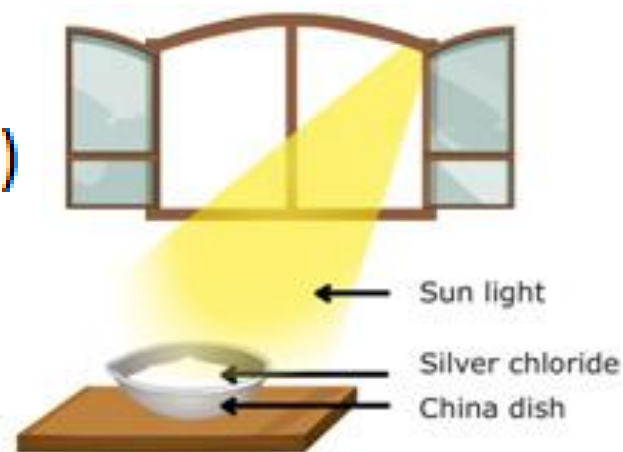
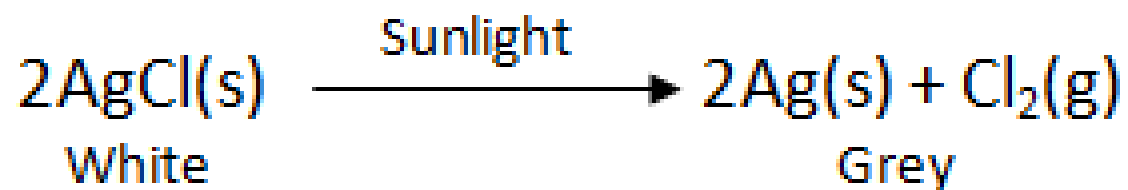
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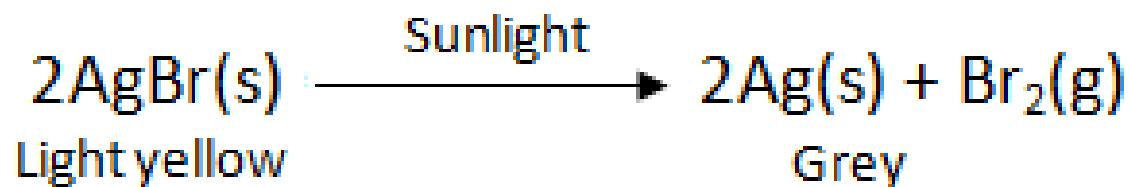
Thermal Decomposition

Photolysis

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Decomposition of silver chloride



Neutralization reaction (Acid-Base reaction)

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- It is a special double displacement reaction that involve acid and base
- It switches anion partners
- $\text{HA} + \text{BOH} \rightarrow \text{BA} + \text{H}_2\text{O}$

MATERIALS AND EQUIPMENT FOR SPECIFIC CHEMISTRY EXPERIMENTS

Chemical Hazard Signs

Hazard labels

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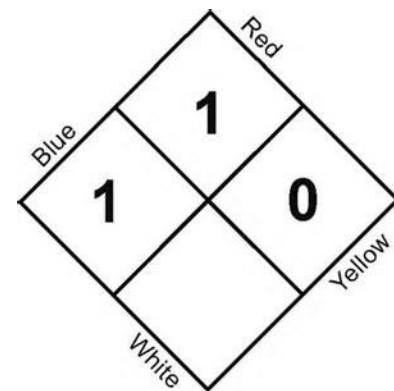
- Hazard labels on the chemical containers tells what hazardous information is attached to a particular chemical.
- Two Systems will be explained
 - ▣ NFPA? the National Fire Prevention Association
 - ▣ GHS? Global Harmonized System
- Any other?

NFPA Hazard labels



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- The diamond symbol is designed to show the hazards of chemicals under emergency conditions such as **spills** and **fires**.
- It can also be used as a guide to provide information about non-emergency hazards associated with chemicals.
- Information on the presence of
 - **acute health** (coloured blue)
 - **flammability** (coloured red)
 - **reactivity** (stability) hazards (coloured yellow)



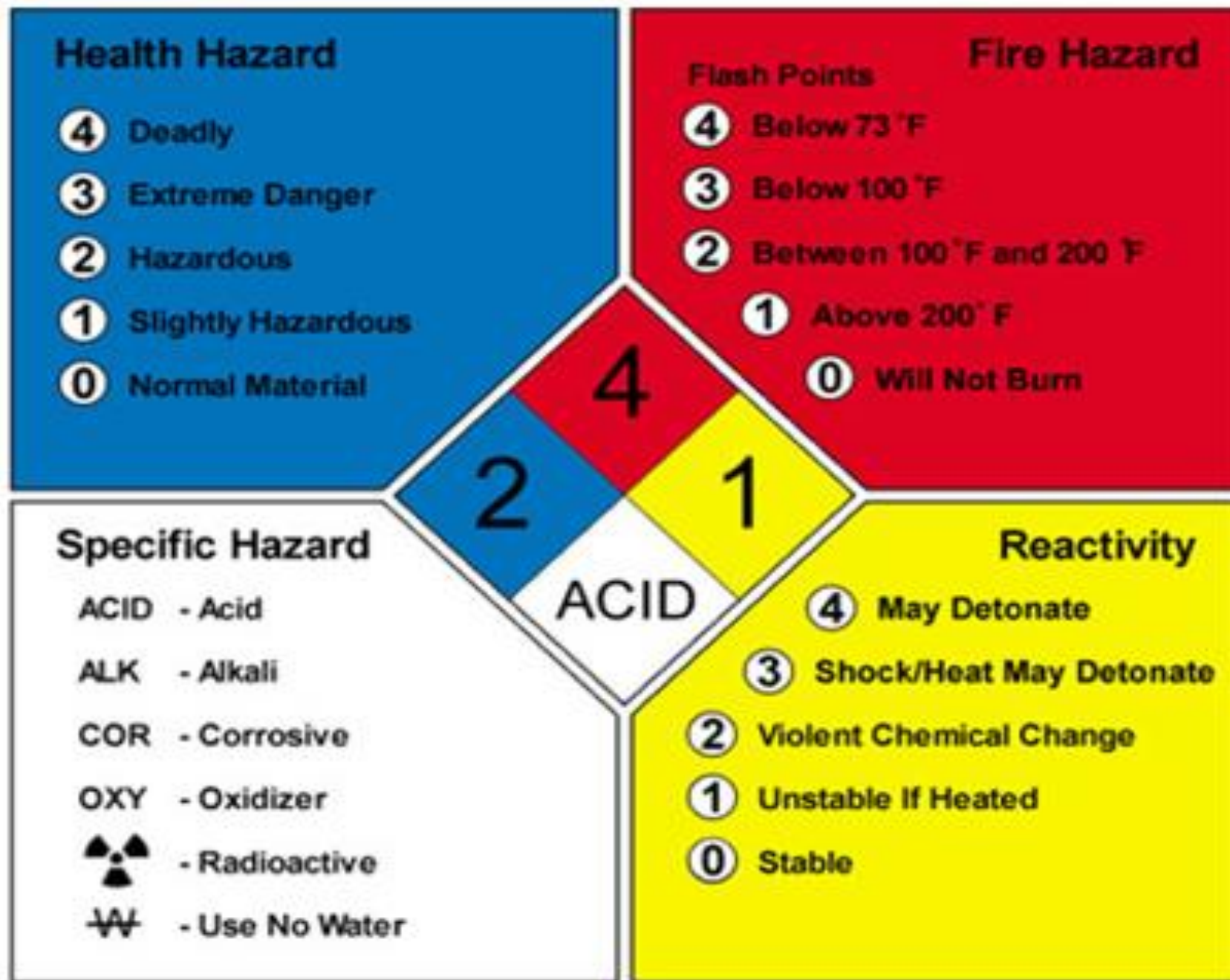
NFPA Hazard labels ...



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- The relative severity of the hazards are shown on the symbol by numerical designations from 0 to 4.
- The numbers represent the following hazards:
 - ▣ 0- no significant hazard
 - ▣ 1- slight
 - ▣ 2- moderate
 - ▣ 3- serious
 - ▣ 4- severe





Sodium Metal



Drinking Alcohol



Nitrogen Gas



Hydrogen Cyanide



My Mixtape



GHS Hazard pictograms

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- The Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
- Two sets of **pictograms** are included within the **GHS**:
 - ▣ one for the labeling of **containers** and **for workplace** hazard warnings, and
 - ▣ a second for use during the **transport of dangerous goods**.
- Either one or the other is chosen, depending on the target audience, but the two are not used together.

GHS Pictogram

The Beginner's Guide to GHS



ChemSafetyPro



Oxidizers



Flammables, Self Reactives,
Pyrophorics, Self-Heating,
Emits Flammable Gas,
Organic Peroxides



Explosives, Self
Reactives, Organic
Peroxides



Acutely Toxic
(severe)



Burns Skin, Damages
Eyes, Corrosive to Metals



Gases Under Pressure



Carcinogen, Respiratory
Sensitizer, Reproductive
Toxicity, Target Organ
Toxicity, Mutagenicity
Aspiration Toxicity



Toxic to aquatic
environment



Acutely toxic(harmful),
Irritant to skin, eyes or
respiratory tract, Skin
sensitizer, Hazardous to
the Ozone layer.

GHS – Hazard Pictograms and correlated exemplary Hazard Classes

Physical Hazards



Explosives



Flammable Liquids



Oxidizing Liquids



Compressed Gases



Corrosive to Metals

Health Hazards



Acute
Toxicity



Skin Corrosion



Skin Irritation



CMR¹⁾, STOT²⁾,
Aspiration Hazard



Hazardous to the
Aquatic Environment

Env. Hazards

1) carcinogenic, germ cell mutagenic, toxic to reproduction / 2) specific target organ toxicity

Read label before use. Keep out of reach of children

Flammosol

FLAMMABLE LIQUID, TOXIC N.O.S.
(aliphatic hydrocarbons, toxicole)
UN 1992

Contains:
Aliphatic hydrocarbons 95%
Toxicole 5%



Pictogram

Product Identifier

Signal Word

4 L

DANGER

Highly flammable liquid
Toxic if swallowed
Causes skin irritation

Hazard Statement

IF ON SKIN (or hair): Take off contaminated clothing and wash before re-use.
Rinse skin using plenty of soap and water.

If skin irritation occurs: Get medical advice/attention.

IF SWALLOWED: Immediately call a POISON CENTRE or doctor/poison centre.
Rinse mouth.

Store locked up in a well-ventilated place.
Keep cool.

Dispose of contents/container in accordance with jurisdictional regulations.

In case of fire: Use powder for extinction.

Keep away from sparks and open flames. - No smoking.
Keep container tightly closed.

Use only non-sparking tools.

Take precautionary measures against static discharge.
Wear protective gloves and eye and face protection.

Wash hands thoroughly after handling.

Do not eat, drink or smoke when using this product.

Precautionary Statements

Refer to the Safety Data Sheet before use.

Madeup Chemical Company, 999 Chemical Street, Chemical Town, My State, T
www.madeup-chemical-company.com.au

Supplier Info

Product label analysis

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- Of the following supplies identify
 - ▣ Product identifier
 - ▣ Signal word
 - ▣ Pictograms
 - ▣ Hazard statement
 - ▣ Precautionary statements
 - ▣ Supplier information
 - ▣ Any specification (expiry date, packing, e.t.c)

GHS Label For Epichlorohydrin

Bottom
Half Of
Label

Precautionary statements:

- **Keep out of reach of children.**
- **Keep container tightly closed.**
- **Do not handle until all safety precautions have been read and understood.**
- **Wear eye/face protection.**
- **Wear protective gloves/clothing.**
- **Wear respiratory protection, as specified by the manufacturer.**
- **Do not breathe dust/fume/gas/mist/vapors/spray.**
- **Use appropriate ventilation.**
- **Wash thoroughly after handling.**

United Nations Co., Ltd.

1-1, Peace Avenue

Geneva, Switzerland

Tel. 41 22 917 00 00

Fax. 41 22 917 00 00

Ammonia, Anhydrous: 99.80 - 99.98 %

DANGER

HAZARD STATEMENTS:

H221 Flammable gas.
H331 Toxic if inhaled.
H314 Causes Severe skin burns and eye damage.
H400 Very toxic to aquatic life.

PRECAUTIONARY STATEMENTS:

P405 Store locked up.
P403 Store in a well-ventilated place.
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P273 Avoid release to the environment.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P310 Immediately call a POISON CENTER or doctor/physician.

FIRST AID MEASURES:

GENERAL : If in doubt, seek medical advice.
If there is any suspicion of ammonia gas left in the emergency area, the rescue workers must wear self-contained breathing apparatus with filter K1.
No action shall be taken involving any personal risk or without suitable training.
INHALATION : Provide rest, warmth and fresh air. Rinse nose and mouth with water.
If respiratory problems, artificial respiration/oxygen. Get medical attention.
SKIN CONTACT : Promptly flush contaminated skin with water. Promptly remove clothing if soaked through and flush the skin with water. Continue to rinse for at least 15 minutes. Get medical attention immediately.

DISPOSAL:

Deliver as hazardous waste according to the local regulations.

Company Name and Address Here



SUPPLEMENTAL INFORMATION:

Rapid evaporation of liquid ammonia may cause frostbite



SEE THE S.D.S FOR MORE INFORMATION

Ammonia (Anhydrous)

DANGER



Fatal if inhaled. Causes severe skin burns and eye damage. Contains gas under pressure. May explode if heated. Very toxic to aquatic life.
Contact with eyes: Flush eyes immediately with plenty of water for 15 minutes and seek medical advice immediately.
Skin Contact (or Heat): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
Inhalation: Remove to fresh air. If breathing is stopped, give artificial respiration. If breathing is difficult, give oxygen. Seek medical advice.
Store in a locked cabinet. Protect from sunlight. Store in a well-ventilated place.

See Material Safety Data Sheet for further details regarding safe use of this product.

Acetone

Danger!

Highly flammable liquid vapor. Causes severe eye irritation.



Keep away from heat, sparks and flame – No smoking. Take precautionary measures against static discharge. Keep from direct sunlight. Keep container closed when not in use. Store in a cool/low temperature, well-ventilated place away from heat and ignition sources. Use only in a well-ventilated area. Avoid contact with eyes, skin and clothing. Wear appropriate personal protective equipment, avoid direct contact.

IF CONTACT WITH EYES: Flush eyes with water for at least 15 minutes while holding eyelids open.

In case of fire, use water spray, fog or mist. Dry chemicals. Halon. Powder, foam or CO₂.

See Safety Data Sheet for further details regarding safe use of this product.

ABC Company, Main Street, Anytown, NJ 00000, Tel: 555 123 4567



Chemical Name: _____

HEALTH HAZARD

4 - Deadly
3 - Extreme Danger
2 - Hazardous
1 - Slightly Hazardous
0 - Normal Material

FIRE HAZARD

Flash Points
4 - Below 73° F
3 - Below 100° F
2 - Below 200° F
1 - Above 200° F
0 - Will Not Burn

Acid..... ACID
Alkali..... ALK
Corrosive..... COR
Oxidizer..... OX
Radiation Hazard...☢
Use No Water....☞

SPECIFIC HAZARD

4 - May Detonate
3 - Shock and Heat
May Detonate
2 - Violent Chemical
Change
1 - Unstable if Heated
0 - Stable

INSTABILITY HAZARD

REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☐


Safety Glasses

☐


Gloves

☐


Splash Goggles

☐


Synthetic Apron

☐


Face Shield & Eye Protection

☐


Full Suit

☐


Dust Respirator

☐

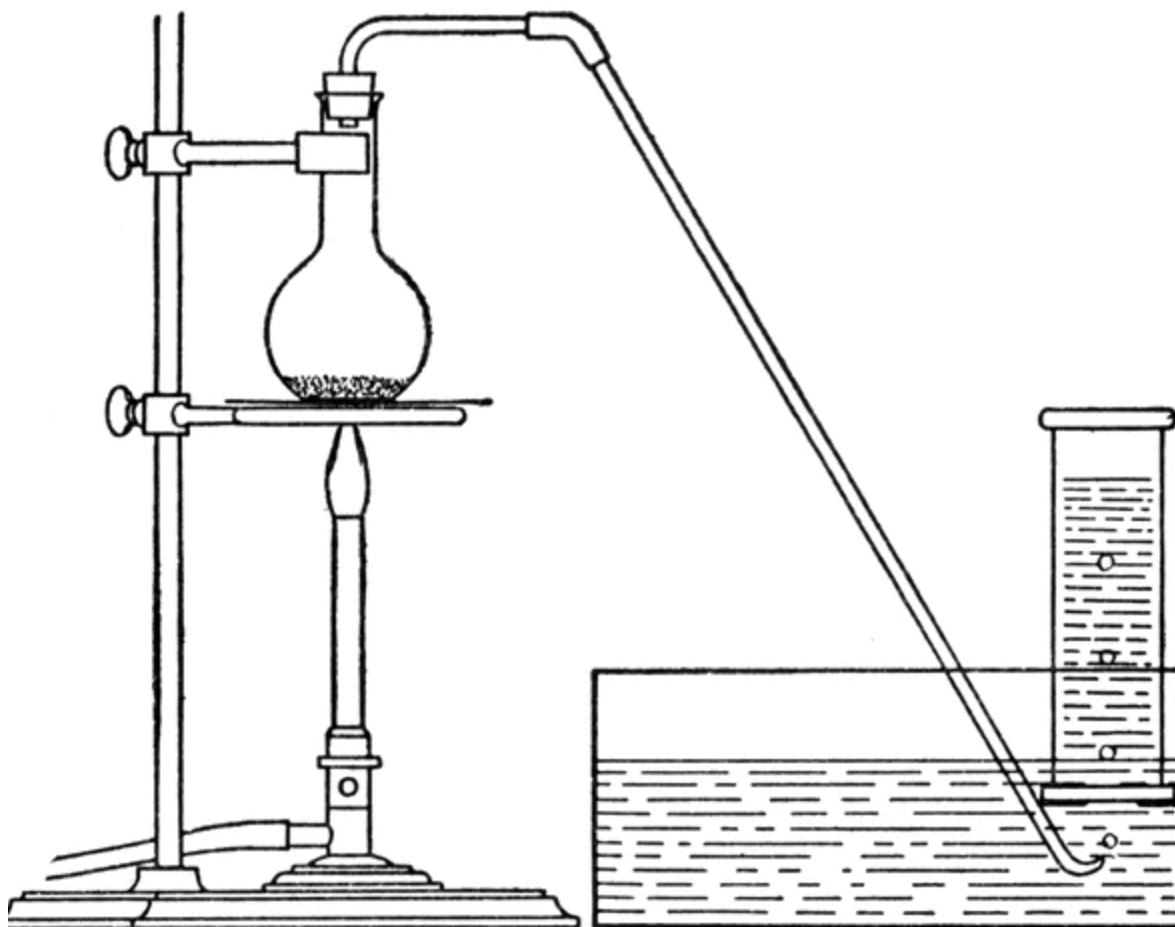

Boots

☐


Vapor Respirator

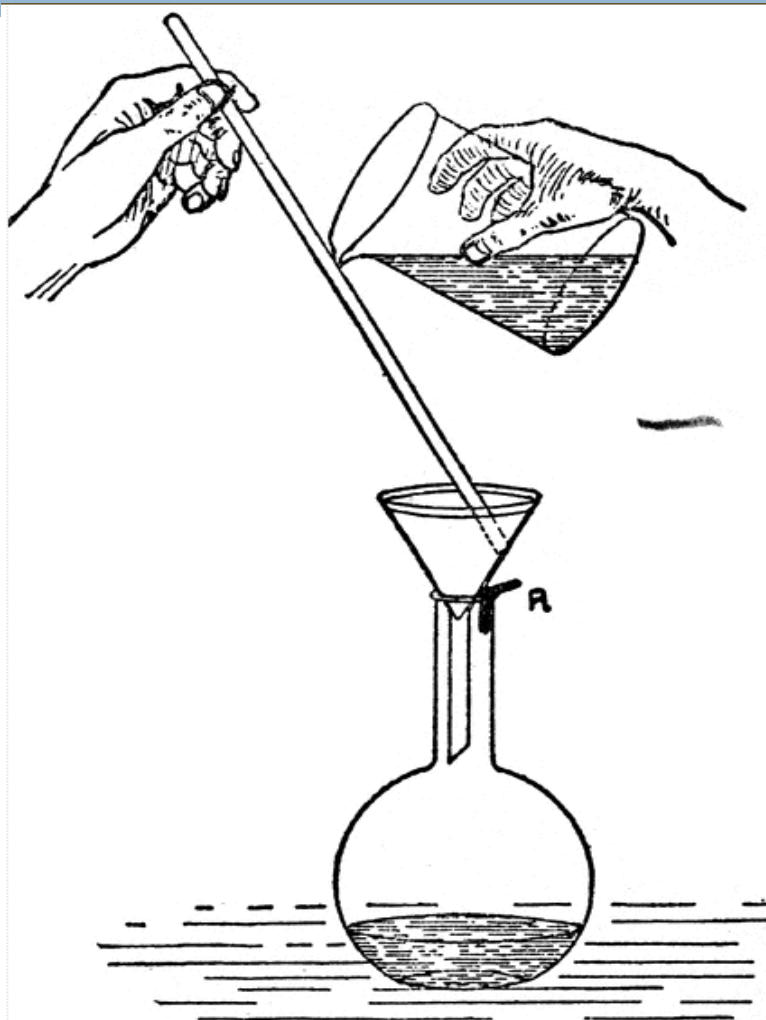
☐

Other: _____



- 1. Draw and label the apparatus.
- 2. What experiment can be conducted by using this set up?

- Name the apparatus
- You want to prepare dil. of sulfuric acid and you have water and conc. Sulfuric acid which container do you this will contain acid?
- Give reason





CONICAL FLASK



VOLUMETRIC FLASK



ROUND-BOTTOM FLASK



FLORENCE FLASK



KJELDAHL FLASK



PEAR-SHAPED FLASK



RETORT FLASK



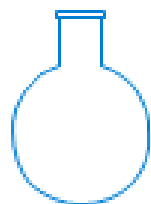
SCHLENK FLASK



STRAUS FLASK



CLAISEN FLASK



Boiling flask,
250ml



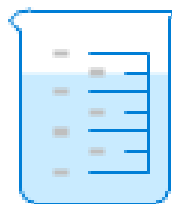
Boiling flask,
50ml



Beaker 100ml,
filled



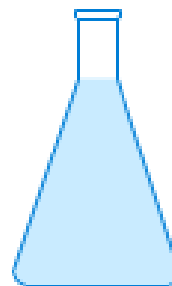
Beaker 100ml,
empty



Beaker 300ml,
filled



Beaker 300ml,
empty



Erlenmeyer flask
250ml, filled



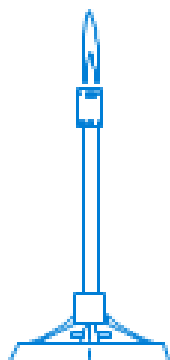
Erlenmeyer flask
250ml, empty



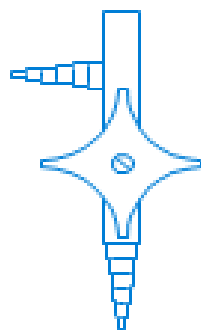
Erlenmeyer flask, 25ml



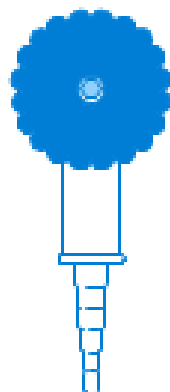
Suction flask



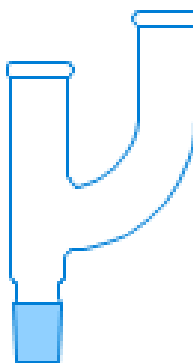
Bunsen burner



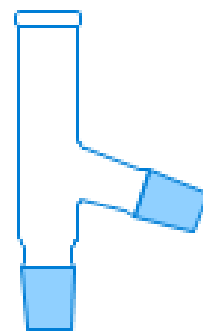
Water faucet



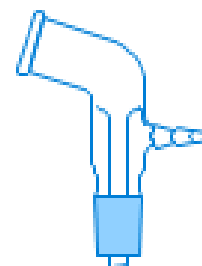
Steam nozzle



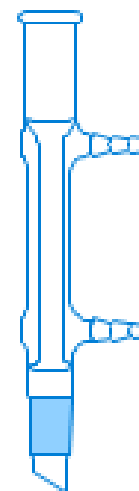
Claisen adapter



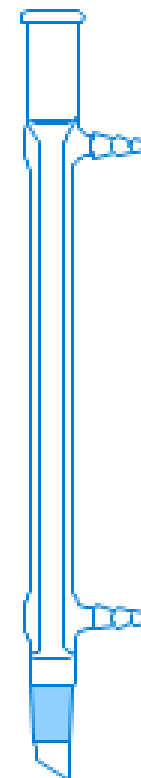
Distillation adapter



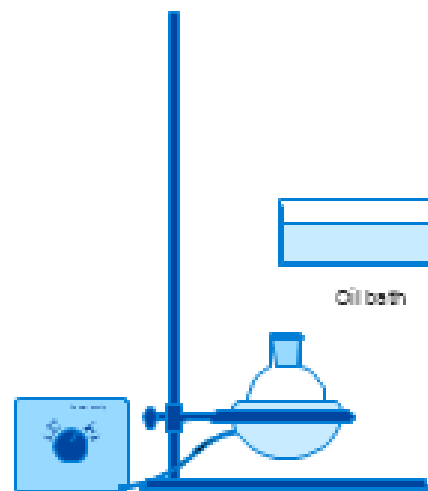
Vacuum adapter



Short condenser



Long condenser



Heating mantle



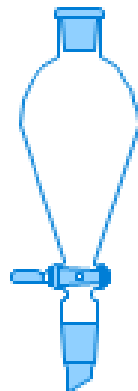
Gas nozzle



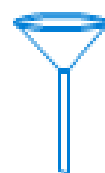
Steam bath



Hot plate



Separatory funnel



Stemmed funnel



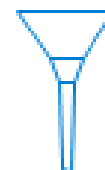
Filter paper



Stainless funnel



Buchner funnel



Hirsch funnel



Vigreux distillation
column



Thermometer



1. Test Tube
2. Test Tube Rack



Test Tube Holder



Reagent Bottle



Beaker



Bunsen Burner



Stand and
Clamp



Crucible



Measuring
Cylinder



Dropper



Electronic
Balance



Evaporating
Dish



Filter Funnel



Flat Bottomed
Flask



Safety Glasses



Mortar and Pestle
(used for grinding
paste or powder)



Round Bottomed
Flask



Spatula



Tripod