Module 1

The principles of matter, measurements, structure and periodicity of atoms, molecules and compounds, and their chemical reactions will be discussed in Chemistry 1.

Introductory Chemistry 1, the inorganic chemistry establishes the principles of matter, calculation, composition and periodicity of the atoms, molecules and compounds and their chemical reactions. This builds on the above-mentioned principles by being the foundation stone for chemicals to be better described and the various ways of classifying the elements in chemistry.

With the ever-expanding awareness of chemistry, the subject provides an explanation of the Periodic Table of Elements, how and why they are listed as such. The table allows us to understand, early enough, the concepts and facts of the chemistry of the elements. The chemistry of the elements and their compounds enables for a systematic arrangement of these elements and their compounds on the basis of their common properties.

In module 1, lesson 1 matter and beyond discusses the scope of chemistry. It deals about how chemistry affects our society and how society affects chemistry. In Lesson 2, Chemistry and other field of science talks about how chemistry related to other field of science and non-science related subjects. Lesson 3 discusses about the scientific method and lesson 4 talks about measurements, the mathematical aspects of chemistry. Laboratory equipment's and safety precautions are also discussed in this module.

General Objectives:

1. To provide students a comprehensive foundation in chemistry that highlights scientific reasoning and analytical problem solving.
2. The student will understand the interdisciplinary nature of chemistry and to integrate knowledge of mathematics, physics and other disciplines to a wide variety of chemical problems.

Lesson 1. Matter and beyond

In this module, the students will learn the following specific objectives;

- Define chemistry and the types of activities it includes.
- Differentiate the different Branches of Chemistry
- Describe how chemistry is applied in ways affect our lives and our society;
- Explain how chemistry is related to other sciences; and
- Understand the scientific method
- Analyze and solve Measurements

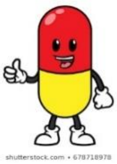
Review on matter

Matter refers to all things that ____________ and have ______________.

Some of these we can see, some cannot; some found in nature, some are manmade or synthetic; some are edible, others are poisonous.

Chemistry is the study of matter which includes composition, properties and structures. It also study the changes that matter undergoes and the energy involved in these changes.

To discover the fundamentals of chemistry, let's have the graffiti activity on the components of chemistry.



Let' get started

These are the basic building blocks of matter.

___________ consist of two or more atoms joined together and recognized as a unit.

The properties of matter depend to a large extent on how these building blocks are put together and these may be the same as in diamond and graphite; but if you put them together differently, different substances with different properties will come out. The composition of matter also depends on what and how they are put together.

Chemistry is the study of matter-its composition, structure and properties and the changes it undergoes. Unravelling the concepts of matter and beyond will help learners discover and appreciate the subject.

The work of scientists are guides with logic and precision, thus it would be helpful for the students to discover and learn how scientist conduct their studies.

Self-Check

1. Make a short article on the contributions and significance of chemistry in the society.

Lesson 2: Chemistry and other Fields of Science

The world of science is as much as big as the universe. Science is also concerned in studying the world and the universe. Chemistry plays a fundamental role in all fields of science.

Give at least 5 other field of science related to chemistry. Specify their contributions and relationship to chemistry

-
-
-
-
-

Chemistry is also related to other no science field of study. Artists are one of the examples. They have more choices of paints to use and many more chemicals to help them achieve the effect they want. There are primers or conditioners for better adhesion of paint and topcoats to give a painting more durability against environmental factors such as water and light. They have graffiti-resistant finishes to protect artwork form vandals. Numerous additives that allow artists to control textures, finish and color. The world of art has also challenged chemists in the area of conserving and restoring old masterpieces.

What are the major of fields of study in Chemistry?

1.
2.
3.
4.
5.
6.
7.
8.

Self-Check

3. Cite other areas of science aside from what you give earlier to which chemistry is linked. Give other examples and cite sources.

Tasks for the next Lesson

A scientist once said " Concern for man and his fate must always form chief interest of all technical endeavors…in order that the creations of our mind shall be a blessing and not a curse to mankind", who is this scientist?

Give your reactions to this quotation and cite examples.

Do a research about nanotechnology article to give you an overview on the application of chemistry. From this article, describe how chemistry affects our lives and society.

Lesson 3: The Scientific Method

Activity: Make a tower using scientific method

Answer the following question after building a tower.

1. What went well on building the tower?
2. What went wrong in building the tower?
3. How it is related to scientific Method?

4. What is a Scientific Method?

Lesson 4: Measurements

Mathematics is the language of science. Italian astronomer and physicist Galileo Galilei is attributed with the quote, "*Mathematics is the language in which God has written the universe*." When taking observations and gathering data, several questions should be taken more considerations like color, shape, length, price and temperature.

Measurement is the process of finding out how many measuring units are there in something. It give quantitative information about the physical world. The properties of matter can be measured by comparing it to the standard which has a fixed and known value for property.

Metric system is the most common and most widely used system of measurement. The most recent version of metric system is the Systeme Internationale d' Unites (International system of Units) or SI.

What are the seven fundamental quantities of SI units?

-
-
-
-
-
-
-

Table 1: Units and Measurements

BASE QUANTITY		BASE UNIT	
Name	Typical Symbol	Name	Symbol
Time	t	Second	s
Length	x, l, r, etc.	Meter	m
Mass	m	Kilogram	kg
Electric Current	I, i	Ampere	A

Temperature	T	kelvin	K
Amount of Substance	n	Mole	m
Luminous intensity	I_v	Candela	cd

Source: https://www.bipm.org/en/measurement-units/base-units.html

Length is the distance between two points. The basic unit for length is the meter. A meter is equal to the distance traveled by light in a vacuum in 1/299 792 458 second (s). All measurements of length can be expressed in meters. Very small and very large measurements of length can be expressed in meters with the appropriate prefix.

Mass is defined as the amount of matter in an object. Its basic unit is the kilogram (kg). The standard kilogram is the mass of a platinum-iridium cylinder that is kept in Sevre, France. One kilogram is equal to 1000 grams (g). The mole is a unit used to measure the amount of substance contains about 6.02×10^{23} elementary particles that make up the substance. Elementary particles may be atoms, molecules or ions. This large number is known as Avogadro's number after the Italian scientist Amedeo Avogadro's (1776-1856), who developed the concept of a mole, which could be discussed in more detailed in Module 6.

Temperature is the degree of hotness and coldness of an object. There are several temperature scales that one can use. One of these is the Celsius (°C) scale after the Swedish astronomer Anders Celsius (1701-1744). The freezing point and boiling point of water are the reference temperatures for this scale. The freezing point of water is set at °C and the boiling point is set at 100°C. The distance between these two points is divided into 100 equal intervals or degrees. Another temperature scale is the Kelvin (K) or absolute temperature scale. It was proposed by William Thomson (1824-1907), a British physicist with the title of Lord Kelvin. There are no negative temperatures in this scale since the lowest possible temperature is 0 K, known as absolute zero. In the absolute temperature scale, the boiling point of water is 373 K and the freezing point is 273 K. The relationship of the Celsius and absolute temperature is

$$K = {}^{\circ}C + 273$$

Absolute zero is equal to -273 °C. Instruments used in the study of X rays emitted by heavenly bodies need to be cooled down to temperatures a fraction above absolute zero.

Volume is the space occupied by an object. Volume is not considered a basic quantity; it is derived from length. To determine the volume of a box, one has to measure its length, width and height. The product of the three measurements gives the volume of the box. The SI unit for volume is cubic meter, m^3. The more common unit for volume is liter (L) which is a non-SI unit. One liter is equal to 1000 milliliters (mL). A box with sides that measure 1 cm each has a volume of 1 cubic centimeter or 1 cm^3. One cubic centimeter is equal to 1 mL.

1 cm^3 = 1mL
1L = 1000 mL

Density is derived from mass and volume. It is expressed as the ration of mass in grams and volume cubic centimeter, making the unit of density g/cm^3 (or g/mL).

d= mass/volume = g/cm^3 or g/mL

The density of some common substances is listed in Table 3. Water has a density of 0.9971 g/mL at 25°C. All substances with a density less than 0.9971 g/mL will float on water. On the other hand, all substances with a density greater than 0.9971 g/mL will sink in water.

Table 2. Density of common substances

Material	Density (g/cm^3)	State of Matter
hydrogen (at STP)	0.00009	gas
helium (at STP)	0.000178	gas
carbon monoxide (at STP)	0.00125	gas
nitrogen (at STP)	0.001251	gas
air (at STP)	0.001293	gas
carbon dioxide (at STP)	0.001977	gas
lithium	0.534	solid
ethanol (grain alcohol)	0.810	liquid
benzene	0.900	liquid
ice	0.920	solid
water at 20°C	0.998	liquid
water at 4°C	1.000	liquid
seawater	1.03	liquid
milk	1.03	liquid
coal	1.1-1.4	solid
blood	1.600	liquid
magnesium	1.7	solid
granite	2.6-2.7	solid
aluminum	2.7	solid
steel	7.8	solid
iron	7.8	solid
copper	8.3-9.0	solid
lead	11.3	solid
mercury	13.6	liquid
uranium	18.7	solid

Material	Density (g/cm^3)	State of Matter
gold	19.3	solid
platinum	21.4	solid
osmium	22.6	solid
iridium	22.6	solid
white dwarf star	10^7	solid

Sample Problem 1.

A wooden cylinder has a mass of 5.6 g. What is the density of the wood if it has a volume of 4.0 cm^3?

Given: mass = 5.6 g

Volume = 4.0 cm^3

Find: Density

Solution:

D = mass / volume

= 5.6 g / 4.0 cm^3

= 1.4 g/cm^3

Sample Problem 2.

What is the density of the wooden block shown below if its mass is 15 g?

Given: mass = 15 g   width = 1.5 cm

Length = 3 cm   height = 1.5 cm

Find: density

Solution:

First, find the volume of the block. The volume of the block can be calculated from the product of its length, width and height.

V = l x w x h

= 3 cm x 1.5 cm x 1.5 cm

= 6.75 cm^3

Then, solve for density,

D = 15 g / 6.75 cm^3 = 2.22 g/ cm^3

Self-Check

I. Identify common measurements used in the following.

1. The mass of a paperclip is about 1 _____.

2. The length of the common housefly is about 1 _____.

3. The mass of a bowling ball is 7.25 _____.

4. Stand with your arms raised out to your side. The distance from your nose to your outstretched fingers is about 1 _____.

5. Colas may be purchased in two or three _____ bottles.

6. On a statistical basis, smoking a single cigarette lowers your life expectancy by 642,000 _____, or 10.7 minutes.

II. Problem solving. Solve the following properly and correctly.

1. Calculate the density in g/mL of 0.2 L of solution weighing 250 grams.
2. Calculate the density in g/mL of 3000 mL of solution weighing 4 kg.
3. Calculate the density in g/mL of 50 mL of solution that weighs 160 grams.

4.3 Conversion of Units

Conversion of units is very important since not all measurements are expressed in the same units. In calculations, it is necessary that the units of quantities match to come up with the correct answer. One method that can be used in converting from one unit to another is dimensional analysis. Dimensional analysis

The main purpose of this process is to cancel out units other than the desired units through the use of fixed relationship. A quantity has been converted from a unit for volume into other units of volume, weight, amount in moles, and number of atoms. Every factor used for the unit conversion is a unity. The numerator and denominator represent the same quantity in different ways

METRIC CONVERSION FACTORS

Prefix	Abbreviation	Conversion Factor		For Example…	For Example…
Mega-	M	1000000	10^6	1 Megabyte = 1 x 10^6 bytes	1 byte = 10^{-6} Megabytes
kilo-	k	1000	10^3	1 kilometer = 1000 meters	1 meter = 0.001 kilometers
deci-	d	0.1	10^{-1}	1 deciliter = 0.1 liters	1 liter = 10 deciliters
centi-	c	0.01	10^{-2}	1 centimeter = 0.01 meters	1 meter = 100 centimeters
milli-	m	0.001	10^{-3}	1 milliliter = 0.001 liters	1 liter = 1000 milliliters
micro-	μ	0.000001	10^{-6}	1 microgram = 10^{-6} grams	1 gram = 10^6 micrograms
nano	n	0.000000001	10^{-9}	1 nanometer = 10^{-9} meters	1 meter = 10^9 nanometers
pico	p	0.000000000001	10^{-12}	1 picometer = 10^{-9} meters	1 meter = 10^{12} picometers

OTHER CONVERSION FACTORS AND CONSTANTS

Weight/Mass 16 ounces = 1 pound 1 kilogram = 2.2 pounds 454 grams = 1 pound 1 ton = 2000 pounds	**Volume** 1 liter = 1.0567 quarts 1 mL = 1 cm^3 1 gallon = 3.78 liters 1 gallon = 4 quarts = 128 fluid ounces 1 quart = 2 pints = 32 fluid ounces 1 pint = 2 cups = 16 fluid ounces	**Length/Distance** 1 inch = 2.54 centimeters 1 mile = 5280 feet = 1.609 kilometers 1 yard = 3 feet = 36 inches = 0.9144 meters 1 meter = 39.37 inches = 3.281 feet = 1.094 yards 1 kilometer = 1094 yards = 0.6215 miles
Density of Water: 1.00 g/mL		**Energy:** 1 cal = 4.184 J
Time 1 year = 365 days = 12 months = 52 weeks 1 day = 24 hours 1 hour = 60 minutes 1 minute = 60 seconds		**Temperature** $°C = \frac{5}{9}(°F - 32)$ and $°F = \left(°C \cdot \frac{9}{5}\right) + 32$ Kelvins = °C + 273.15
Pressure Units: 1 atm = 760 mmHg = 101.325 kPa = 101325 Pa = 1.01325 bar = 14.7 psi = 29.92 inches Hg		
Useful Constants: Avogadro's Number (N_A) = 6.02 x 10^{23} items / mole Ideal Gas Constant (R) = 0.0821 $\frac{L \cdot atm}{mol \cdot K}$		Speed of Light (c) = 3.00 x 10^8 m/s Planck's Constant (h) = 6.63 x 10^{-34} J • s

Source:https://fl01000126.schoolwires.net/site/handlers/filedownload.ashx?moduleinstanceid=3450&dataid=6686&FileName=Conversion_Factors.pdf

Let us consider the following examples.

Sample Problem 1

Convert 3.6 Km to meters.

Given: 3.6 Km

Find: Value in meters

Solution:

Since, 1 km is equal to 1000m. In ration form, it can be expressed as

$$\frac{1\ Km}{1000m} \quad or \quad \frac{1000m}{1\ Km}$$

$$\_\_\_\_\_ meter = 3.6\ Km \times \frac{1000m}{Km}$$

= 3600 m

2. Convert 310 pounds to kilograms. Round off your answer to the correct number of significant figures.

1 pound (lb) = 454 grams (g)

1000grams (g) = 1 Kilograms (kg)

Step 1: pounds to grams to kilograms

Step 2: $310 \text{ lbs} \times \frac{454\text{g}}{1\text{lb}} \times \frac{1 \text{ kg}}{1000\text{g}} =$ **140.74 kg or 1.4×10^{2} kg**

Self-Check. Problem solving. Solve the following properly and correctly.

1. 180 cm = _____ mm	6. 9 mm = _____ cm
2. 178g = _____ Kg	7. 6 lb = ______g
3. 5.6 m = _____ cm	8. 4.5 L = _____mL
4. 27.5 mg = _____ g	9. 2 mi = _____ft
5. 56,500 mm = _____ Km	10. 26,000 cm = _____ m

4.1 **Scientific Notation**

It is very tedious to write a very large or a very small numbers. You have to write several zeros just to indicate how large or how small a number is. To get rid of this problem, the scientific notation can be used. The scientific notation has the following format:

$N \times 10^{n}$

Where N is the coefficient whose value ranges from 1 to 9 and n is the exponent of 10 and is either positive or a negative integer. The exponent indicates how many times the coefficient must be multiplied by 10. For example,

$3.2 \times 10^{4} = 3.2 \times 10 \times 10 \times 10 \times 10 = 32{,}000$

Quantities can be written in scientific notation by counting how many time the decimal point has been moved either to the left or to the right. The sign of the exponent depends on the movement of the decimal point. Let's take into consider the Avogadro's number:

602 214 210 000 000 000 000 000 particles

Move the decimal point to the left to obtain the coefficient less than 10. The decimal point is moved 23 times to the left. This results in

6.0221421×10^{23} particles

Let us take another example, this time the mass of an electron.

0.000 000 000 000 000 000 000 000 910 938 97 kg

This time, move the decimal point to the right to obtain a coefficient less than 10. Since the decimal point is moved 31 times to the right, the mass of the electron in scientific notation is

$9.1093897 \times 10^{-31}$ kg

From the examples given, moving the decimal point to the left results in a positive sign of the exponent while moving it to the right results in a negative sign.

Self-Check. Express the following in scientific notation

1. 0.000143	6. 5.900×10^{8}
2. 1005000000	7. 2.77958×10^{12}
3. 8.5×10^{6}	8. 3.14159×10^{-2}
4. 0.00000000000007	9. 6.108×10^{18}
5. 1.1010×10^{21}	10. 0.00000000099

4.2 Significant Figures

These are all digits that we are sure of plus the one that we guessed are called significant figures. In calculations. It is important to record the answer and that we retain only those numbers that are significant. For example, solving using calculator, like,

9.817 X 3.16 X 4.26 =?

The number on the screen of the calculator is ___________________. It would not be correct to write all these figures because it would mistakenly indicate that the measurements made were very precise, having ten significant figures. The correct number to record after the calculation is ______. Rules have been devised to help us determine how many significant numbers to retain after calculation.

The following rules will help us determine the number of significant figures in a given number.

1. All non-zero digits are significant.

Examples:

1. 12 345m = 5sf	3. 1 597 567s = 7 sf
2.17.8 L= 3 sf	4. 567 mL = 3 sf

2. Zeros between nonzero digits are significant.

Examples:

1. 10.36g = 4sf	3. 5.2800006 = 8 sf
2. 7.08 g= 3 sf	4. 12.7003 mL = 6 sf

3. Zeros before the first non-zero digits are not significant. These are called leading zeros.

Examples:

1. 0.46 = 2sf	3. 0. 00001 = 8 sf
2. 0.00128 = 3 sf	4. 0.003 mL = 1 sf

4. Zeros after the last non-zero digit may or may not be significant. These are called trailing zeros.

4.1 If there is a decimal point in the number, all trailing zeros are significant.

1. 10.23 = 4sf	3. 1. 0000 = 5 sf
2. 1895.0 = 5 sf	4. 50.0 mL = 3 sf

4.2 If there is no decimal point in the number, the trailing zeros are not significant.

1. 14 500 km= 3sf	3. 8300 = 2 sf
2. 3800 = 2 sf	4. 1 000 000 mL = 1 sf

5. Exact numbers are considered to have an infinite number of significant figures. These are the numbers obtain by counting or multipliers in numbers that are part of a formula.

Example:

The number 2 in the formula of calculating the area of a circle, $2\prod r^2$, is an exact number.

Self-Check. Determine how many significant figures are there in the following:

1. 5.3900007 g = ______________	**6. 180.75 mL = ______________**
2. 8 220 km = ______________	**7. 6430056 m/s = ______________**
3. 1 593 567 s = ______________	**8. 658.000m = ______________**
4. 0.005869 = ______________	**9. 0.60 mm = ______________**
5. 1.00g = ______________	**10. 17.24 L = ______________**

2. Explain why 0.0023040g is a measurement having 5 significant figures.

3. Determine if each of the following is an exact number or a measured quantity having uncertainties.

a. the mass of a rock sample collected from Mars

b. the number of students in a class

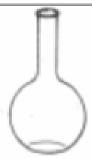
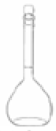
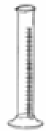
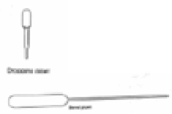
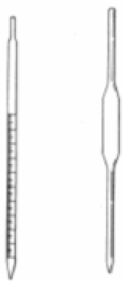
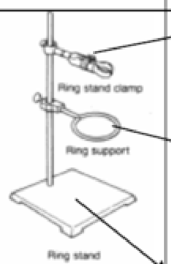
c. the distance of your house from your school is a method of using units in calculations to check for correctness.

4.4 Laboratory Apparatus

Experiments are vital in the field of science, hence it is also very important to chemists and scientists. They need to test their hypothesis and come up with a valid conclusion through experimentation. Knowledge of laboratory apparatuses and their functions makes experimentation easier. Thus, students of chemistry must also learn and understand the use of the different laboratory equipment's to avoid troubles in conducting experiments or test in the laboratory.

Most apparatus that you will find in the laboratory are made of borosilicate glass. This material can withstand heat and chemical attack. These properties of borosilicate glass make it useful as a component in laboratory apparatus for heating and mixing different chemicals.

Table below are the outlines of some apparatus commonly used in chemical laboratory.

Glassware	Function	Glassware	Function	Glassware	Function
 Beaker	Running reactions, mixing chemicals, heating chemicals	 Buret	Accurately measuring/ delivering liquids	 E. Flask	Running reactions, heating chemicals mixing chemicals – easier for mixing than beakers
 Filter Flask	Used in vacuum filtration	 Round Bottom Flask	Running reactions, heating chemicals mixing chemicals – easier for mixing than beakers	 Volumetric Flask	Used to mix chemicals to accurately determine concentration.
 Funnel	Used for filtering and for adding chemicals without spilling	 Graduated Cylinder	Used for accurately measuring the volume of liquids.	 Test Tube	Used for mixing and heating chemicals and running reactions– smaller quantities than beakers and flasks.
 Watch Glass	Holding Chemicals, covering beakers during heating	 Glass Stirring Rod	For stirring chemicals	 Sample Vial	For storing small amounts of chemicals
 Dropper Pipets	For adding small amounts of chemicals – usually by drops	 Buchner Funnel	Funnel used for vacuum filtration	 Evaporating Dish	Used to evaporate liquids
 Glass Pipets	Graduated Pipet and Volumetric Pipet are used to accurately measure liquids. ALWAYS USE A BULB. Graduated add varying amounts of liquids. Volumetric add the specified mount	 Polywash Bottle	Used to add chemicals or used to add solvents for cleaning of beakers and other glassware.	 Ring Stand with Utility Clamp and Iron Ring	Utility Clamp – used to hold objects on a ring stand. Iron ring – used to hold objects above a Bunsen burner flame. Ring stand – used to hold various objects.

https://images.app.goo.gl/fg8GVVyrUSmbdNj7A

4.5 Safety Precautions in the Laboratory

https://images.app.goo.gl/asfUsy2jowCJUszZ7

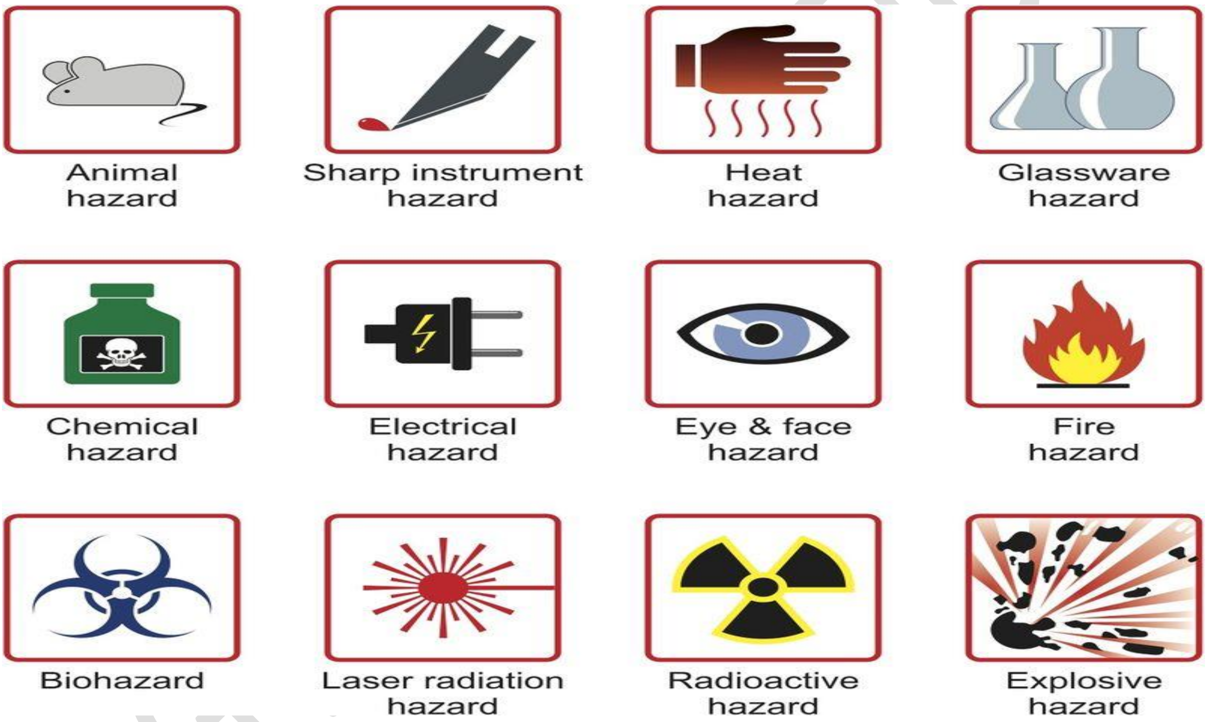
https://images.app.goo.gl/Kde2uVtF8b1h7jBX6

Chemistry Laboratory is an interesting place to witness the excitement of exploration through studying and adopting safety precautions.

1. **Wear a protective laboratory gown or apron and hair before going inside the laboratory.**
2. **Wear your goggles, face mask and gloves when performing in the laboratory.**
3. **Wear your shoes or laboratory footwear while in the laboratory.**
4. **Do not eat or drink in the laboratory. Do not taste anything in the laboratory.**
5. **Always read instructions carefully. When in doubt or if you do not understand the instructions clearly, ask your teacher or the laboratory assistant.**
6. **Note the location of the fire extinguisher and other protective equipment.**
7. **Wait for the instructions of your teacher before doing any experiments. Never perform unauthorized experiments.**
8. **Keep the table tops clean.**
9. **Report all injuries or any spilling of chemicals to your teacher.**
10. **Handle the glassware with care.**
11. **Keep flammable materials away from the flame.**
12. **Keep everything in place before going out of the laboratory.**

It is really important to know and familiarize yourself with chemicals, symbols and their significance. When you see these symbols, take the appropriate precautions.

LABORATORY SAFETY SYMBOLS



https://images.app.goo.gl/wuxcm8E3yqX4NPAy5

KEY CONCEPTS AND SUMMARY

- The scientific method is a process for making a systematic inquiry.
- Scientific is not a procedure that is followed step-by-step in a definite sequence, making observation as the first step.

- Through observation, a tentative explanation or prediction is made called hypothesis.

- Law is the statement of general observation that is found to be true in many different systems.

- A theory is a well-tested hypothesis that provides a basis for making predictions about still unobserved phenomena.

- A very large or a very small numbers can be written in scientific notation. This is done using a standard format $N \times 10^x$, with N as the whole number coefficient with a value from 1 to 9.

- Dimensional analysis is used to convert one unit to another. This involves multiplying the value to be converted by a factor that enables one to cancel units other than the desired unit.

- In measurement, all digits that we are sure of plus the one that is uncertain is known as significant figures.

- In determining the number of significant figures, the following rules should be followed:
    - All non-zero digits are significant.
    - Zeros between nonzero digits are significant.
    - Zeros before the first non-zero digits are not significant. These are called leading zeros.
    - Zeros after the last non-zero digit may or may not be significant. These are called trailing zeros.
    - Exact numbers are considered to have an infinite number of significant figures. These are the numbers obtain by counting or multipliers in numbers that are part of a formula.
- The procedures for determining the number of figures to retain after calculations is as follows:
    a. When calculation involves addition and/or subtraction only, the digits we should pay attention to are those after decimal point.
    b. When calculation involves multiplication or division, the result should have the same number of significant figures as the number with the least number of significant figures.

- Familiarity with certain laboratory apparatus and observance of safety precautions in the laboratory are necessary to derive maximum benefit from the chemistry laboratory.

ASSESSMENT/ ENRICHMENT

I- A. Choose the letter of the correct answer.

1. Which does not belong to the group? Justify your answer.

a. m^3 c. m^2

b. mL d. kg

2. Which of the following is NOT true about the scientific method?

a. Scientific method is a systematic way of finding a solution to a problem.

b. The scientific method is done by the following step-by-step procedure in an exact sequence.

c. The scientific method may be followed even outside the laboratory.

d. Observation is the first step.

3. How many grams are there in 4.8×10^2 kg?

a. 0.48 g c. 0.048 g

b. 480 g d. 480 000 g

4. Which number is equivalent to 2.03×10^{-4}

a. 0.000203 c. 20300

b. 0.00203 d. 2030

5. The temperature in this room is 30°C. Express this temperature in °F.

a. 40. °F b. 62 °F c. 22°F d. 72 °F

I-B. Determine the number of significant figures in each quantity.

1.309.2m	3. 420.09L	5. 0.00900	7. 70.52 m/s	9. 6.89
2. 0.8003cm	4. 700.8 mL	6. 8100	8. 288 00 km	10. 0.046

III. Briefly answer the following.

1. Bottled water is commonly sold in many stores. Many buy bottled water even if it costs much more than the tap water. What hypothesis can be drawn from these observations?

2. Suppose your hypothesis is bottled water is better than tap water. How would you test your hypothesis so that you can have a better basis for deciding if you should buy bottled water or not?

IV. Moving /Oral Exam on the Laboratory apparatuses and its uses.

References:

Helmenstine, A. (2020, August 27). Table of Densities of Common Substances. Retrieved from https://www.thoughtco.com/table-of-densities-of-common-substances-603976

Ma. Cristina Padolina, Ph.D., et al. (2004).Conceptual and Functional Chemistry modular approach. Vibal Publishing House Inc.

Moore, J.; Stanitski, C. & Jurs, P. (2017). General Chemistry 1. JO-ES Publishing house, Inc.

Nacum, Z. (2017). General Chemistry 1 for Senior High School. C&E Publishing, Inc.

SI Units - https://www.bipm.org/en/measurement-units/base-units.html