# **Grade 10 Academic Science**

## Chemistry

## **Definitions:**

**Physical Property** -a description of a substance that does not involve forming a new substance; for example colour, texture, density, melting point, solubility, and physical state. Also these changes are easily reversed.

**Chemical Property** -a description of what a substance does as it changes into one or more new substances some indicators are a new colour appears, heat or light is produced, bubbles from a gas appear, a solid is formed when two liquids are mixed (precipitate). Also these changes are difficult to reverse.

**Period** -a row of elements on the periodic table of elements.<-> They also share the same amount of orbits.

**Group -** a column of elements on the periodic table of elements with similar properties.<sup>^</sup> They also share the same amount of valance electrons.

**Alkali Metals** -the elements (except for Hydrogen) in the first column in the periodic table of elements (group 1), they are all shiny, soft, highly reactive metals at standard temperature and pressure and readily lose their outermost electron to form cations with charge +1

**Alkaline Earth Metals** -the elements in the second column of the periodic able or elements (group 2), They are all shiny, silvery-white, somewhat reactive the as at standard temperature and pressure and readily lose their two outermost electrons of form cations with charge +2 **Halogens** -the elements in the 17th column of the penotic table of elements (group 17), these non metal are highly reactive, are available in all 3 states reach, gain their outermost electron to form anions with charge -1

**Noble Gases** -the clearests in the 18th column of the periodic table of elements (group 18), under no match conditions, they are all volumess, colourless, monatomic gases with very low chemical reactivity. Their valance orbit is full, thus make it stable and not having to form cations and anions.

**Element** -a pure substance that cannot be broken down into simpler substances.

**Compound** -a pure substance composed of two or more elements into a fixed ratio.

Pure substance - any matter made up of one type of element/atom

Mixture: any matter that is made up of more than one type of atom

**Ion** -a charged particle that results when a atom gains or loses one or more electrons

Cation -a positively charged ion (loses an electron) most of the time metals

Anion -a negatively charges ion (gains electrons) most of the time non metals

**Electrolyte** -a compound that separates into ions when it dissolves in water, producing a solutions that conducts electricity.

**lonic Bond** -the simultaneous strong bond attraction of positive and negative ions in an ionic compound.

**lonic Compound -**a compound made up of one or more positive metal ions (cations) and one or more negative non metal ions (anions).

**Polyatomic Ion** -an ion made up of more than one atom that acts like a single particle and is held together by ionic and covalent bonds.

**Covalent Bond** -a bond that results from the sharing of outer electrons between non-metals. **Molecule** -a particle in which atoms are joined by covalent bonds.

**Diatomic Molecule -**a molecule consisting of only two atoms of either the same or different elements.

-Repair: every day your body replaces its cells, when your skin dies new cells replace them and if you break a bone you body get rid of the old cells and heals the break with new cells.

Reasons why cells would not divide

-DNA is damaged

-the cell doesn't have the right amount of nutrient to divide

-outside signals tell the cell not to divide (old age, no damage)

-damage to the cell during interphase

## Cell Cycle

-cells move through a cycle made up of three main stages: interphase, mitosis and cytokinesis

#### Interphase:

-the process of interphase is the longest stage for most cells. The cell grows and carries out any specialized functions that the cell may have. During this stage, the genetic information (DNA) is very long, thin, and invisible strands. When the cell prepares for division, the strands are duplicated so that there are identical strands of the genetic material for mitosis.



#### Mitosis:

-the stage of the cell cycle in which the DNA in the nucleus is divided.

Prophase: in prophase the stands of DNA condense into a compact form and becoming visible under the microscope. Since the DNA was copied during interphase, each chromosome consists of two identical strands called sister chromatids, that are held together by a centromere. Also the nuclear membrane begins to dissolve.

Metaphase: During metaphase, the chromosomes line up in the middle of the cell. Also in the this stage spindle fibres now attach to the centromere.

Anaphase: In anaphase, the single centromere that has held two chromatids together now splits into two independent chromosomes, each pair each has their own

## <u>Microscopes</u>

	eyepiece				
coarse focus adjustment					
	body tube				
fine focus adjust	ment revolving nosepiece				
arm	low-power objective				
stage clips	high-power objective				
inclination join					
	diaphragm				
base	mirror				
	©EnchantedLearn (1) color				
Microscope Section	Its function				
Course Adjustment	ourse Adjustment -moves the body ture up or down to get into fecus -used withhow power lens				
Fine Adjustment	<ul> <li>noves the tube to se the coject into sharp focus</li> <li>-is used wtb matical and high power</li> <li>-is used only after the object has been located, centred and focused under lower power magnification using the coarse-adjustment knob</li> </ul>				
Stage	-supports the microscope slide -has a central opening that allows light to pass through to the slide				
Clips	-holds the slide in position on a the stage and holds it from not moving				
Diaphragm	-controls the amount of light that reaches the object being viewed				
Objective Lenses	-magnify the object -have three possible magnifications: low (4x), medium (10x),and high (40x)				
Revolving Nosepiece	-hold the objective lenses -rotates, allowing the objective lenses to be changed				
Body Tube	-contains the eyepiece (ocular lens) -supports the objective lenses				
Eyepiece (Ocular Lens)	-is the part you look through to view the object -magnifies the object by 10x				
Light Source	-may be an electric light bulb or a mirror that can be angled to direct light through the object being viewed				

## Images in Concave Mirrors (Converging)



C = Centre of Curvature -the centre of the sphere whose surface has been used to make the mirror.

F = Focus -the point at which light rays parallel to the principal axis converge when they are reflected off a concave mirror.

V = Vertex -the point where the principal axis meets the mirror.

The line = Principal Axis -the line through the centre of curvature to the midpoint of the mirror.

Parallel Lines: a light ray parallel to the principal axis and reflects off the mirror and goes through the focus.

Through the Curvature: light ray through C is reflected back through itself.

Through the Focus: a light ray through F will reflect parallel to the principal axis.

Aimed At Vertex: a light ray aimed at the vertex will follow law of reflection the angle of incidence equals the angle of reflection.

С

01

F

\*arrows indicate the direction of reflection \*the point at which all lines meet is where the mage will be

Preview

## Refraction

-Refraction is the bending or change in direction of light when it travels from one medium to another.

-It is caused by the speeding up or slowing down as it changes media

-e.g. air to water, glass to air...

**Rules of Refraction** 

-incident ray, refracted ray, and the normal are all on the same plane, the incident ray and refracted ray are on opposite sides of the line that separates the two media. -when light travels to a fast medium to a slow medium it bend toward the normal and when it travels from a a slow medium to a fast medium it bends away from the medium.

#### Index of Refraction

-the index of refraction is a number that tells us how much the media has slowed down the light.

-the equation of this is

$$n=\frac{c}{v},$$

-n is the index of refraction

-c is the speed of light (3.00x10<sup>s</sup>m/s)

-v is the speed of light in a medium

-the index of refraction can also be calculated by using the sine of the two angles

n= sin∠i

ew from Notesate.co ew from 36 of 39 late the speed problem: calculate the speed of light in olive oil. Olive oils index of refraction is 1.48 v=3.00x10<sup>8</sup> m/s v=2.03x10<sup>8</sup> m/s n=c V=C 1.48 v n

#### Critical Angle and Total Internal Reflection

-when light travels from a slow medium to a fast medium, the result of this is that an angle of refraction bending away from the normal. the larger then angle of incidence the larger the angle of refraction will be and this continues. Eventually, the angle of refraction will become 90°, and this is called the critical angle. the critical angle is the angle of incidence that produces a refracted angle of 90°.

-if you increase the angle of incidence past the critical angle, the refracted ray will no longer exit the medium. instead it will be reflected back into the medium, this is called total internal reflection.

#### total internal reflection occurs when

- 1) light is travelling more slowly in the first medium than in the second
- 2) the angle of incidence is larger than the critical angle

### **Metric Conversion Chat**

Prefix	Symbol	Factor By Which Unit Is Multiplied	Example		
giga	G	1,000,000,000	1 000 000 000m = 1Gm		
mega	М	1,000,000	1 000 000m = 1Mm		
kilo	k	1,000	1 000m =1km		
hecto	h	100	100m = 1hm		
deca	da	10	10m = 1dam		
		1			
deci	d	0.1	0.1m = 1dm		
centi	С	0.01	0.01m = 1cm		
milli	m	0.001	0.001m = 111n		
micro	μ		0.000 001m = 1µm		
nano	n	01.000,0000,001	0.000 000 001m = 1nm		
Data Table and Graphs Page 39 of 39 Making a data table					

Making a data table

-always have a title at the top and have titles on the x and y axis

-always have the independent variable as the y axis and the dependent variable as the x axis -as have quantitate observations to put into the table