കോഴിക്കോട് ജില്ലാ പഞ്ചായത്ത്
എഡ്യൂകെയർ സമഗ്ര പഠന പരിരക്ഷാ പദ്ധതി

അക്കാദമിക സഹായം:
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Support Material for SSLC Students - March 2021

പ്രസിദ്ധീകരിച്ചത് : 2021 ജനുവരി

ശ്രീമതി. വി.പി മിനി.
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വിഷയ ചുമതല: ദിവ്യ ഡി
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പ്രതീഷ്.പി.
എം.ഐ.എം.എച്ച്.എസ്.എസ്. പേരോട്.
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ജെ.എൻ.എം.ജി.എച്ച്. എസ്.എസ്. പുതുപ്പണം.
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ജി.എച്ച്.എസ്.എസ്. കോക്കല്ലൂർ
ജോബി.സി.എം.
സേവിയോ എച്ച്.എസ്.എസ്. ദേവഗിരി.
ശോഭിത് ആർ.പി.
ബി.ടി.എം.എച്ച്.എസ് എസ് തുറയൂർ.
സ്വപ്ന ജൂലിയറ്റ്.
ജി.എച്ച്.എസ്.എസ്. അഴിയൂർ.
ബിന്ദു റംസി.
ഫറോക്ക് എച്ച്.എസ്.എസ്.

ലേ ഔട്ട്, കവർ ഡിസൈനിംഗ് :
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സേതു സീതാറാം എ.എൽ.പി.സ്കൂൾ , ഏലത്തൂർ.

കോപ്പികളുടെ എണ്ണം: 1000

ജില്ലാ പഞ്ചായത്ത്, കോഴിക്കോട്

പ്രിയപ്പെട്ട കുട്ടികളേ,

ഒരു അതിസൂക്ഷ്മ വൈറസ് സൃഷ്ടിച്ച ഭയാശങ്കകൾ നിറഞ്ഞ ദിനങ്ങളിലൂടെയാണ് ലോകമിപ്പോൾ ഇടറി നീങ്ങുന്നത്. വിദ്യാഭ്യാസം, വിനോദം, തൊഴിൽ, വ്യാപാരം തുടങ്ങി ജീവിതത്തിന്റെ സമസ്തമേഖലകളെയും പ്രതിസന്ധിയിലാക്കി കോവിഡ് 19. എന്നാൽ പ്രതിസന്ധികൾക്കു മുമ്പിൽ പകച്ചുനിൽക്കുന്നവരല്ല, മറിച്ച് അവയെ വിവേകപൂർവം അഭിമുഖീകരിക്കുന്നവരാണ് ചരിത്രം നിർമ്മിക്കുന്നതെന്ന യാഥാർത്ഥ്യം സാക്ഷ്യപ്പെടുത്തുകയാണ് കേരളമിപ്പോൾ.

ഫസ്റ്റ് ബെൽ ഓൺലൈൻ ക്ലാസുകൾ സജീവമാണ്. സ്കൂൾ ദിനങ്ങൾ പതുക്കെ പൂർവസ്ഥിതി പ്രാപിക്കുക തന്നെ ചെയ്യും. എസ്.എസ്.എൽ.സി പരീക്ഷ വരുന്നു. ജീവിതം ക്രമേണ സാധാരണ നില കൈവരിയ്ക്കുന്നു. സഹവർത്തിത്വത്തിന്റെ ഗാഥകൾ പാടി നാം ഈ കോവിഡ് ഉയർത്തിയ പ്രതിസന്ധികളും മറികടക്കുകയാണ്.

2021 മാർച്ചിൽ നടക്കാനിരിക്കുന്ന എസ്.എസ്എൽ.സി പരീക്ഷക്കായി ഓരോ വിഷയത്തിനും ഊന്നൽ മേഖലകൾ (Focus Area) എസ്.സി.ഇ.ആർ.ടി നിജപ്പെടുത്തിയിരിക്കുകയാണ്. ഈ പശ്ചാത്തലത്തിൽ ഊന്നൽ മേഖലകൾ അടിസ്ഥാനമാക്കി കോഴിക്കോട് ജില്ലാവിദ്യാഭ്യാസ മിഷൻ നിർദേശിച്ചതനുസരിച്ച് ജില്ലാ പഞ്ചായത്ത് 'എഡ്യുകെയർ' പദ്ധതിയിലുൾപ്പെടുത്തി കുട്ടികൾക്കായി പ്രത്യേക പഠന പിന്തുണാസാമഗ്രികൾ (Support Materials) അച്ചടിച്ചു നൽകുകയാണ്.

ജില്ലാ വിദ്യാഭ്യാസ പരിശീലന കേന്ദ്രത്തിന്റെ (DIET) അക്കാദമിക പിന്തുണയോടെ തയ്യാറാക്കിയ ഈ പഠനസഹായികൾ കുട്ടികളിലേക്കെത്തിക്കുക മാത്രമല്ല അധ്യാപകർക്ക് ആവശ്യമായ പരിശീലനം നൽകുകയും ചെയ്യുന്നുണ്ട്. പൊതുവിദ്യാഭ്യാസ മേഖലയിൽ കോഴിക്കോട് ജില്ലയുടെ ഒരു തനതു മാതൃകയായി നമുക്കിത് വളർത്തിയെടുക്കാം.

കോവിഡ് സൃഷ്ടിച്ച പരിമിതികൾ മറികടന്ന് അഭിമാനകരമായ വിജയം കരസ്ഥമാക്കിയ കുട്ടികൾ എന്ന് 2020 - 21 എസ്. എസ് എൽ.സി ബാച്ചിനെ ചരിത്രം രേഖപ്പെടുത്തുക തന്നെ ചെയ്യും.

എല്ലാവർക്കും മികച്ച വിജയം ആശംസിക്കുന്നു.

കോഴിക്കോട്
12 - 01 - 2021

കാനത്തിൽ ജമീല
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കൺവീനർ, എഡ്യുകെയർ പദ്ധതി

വി.വി പ്രേമരാജൻ
പ്രിൻസിപ്പാൾ
ഡയറ്റ് കോഴിക്കോട്

പ്രിയപ്പെട്ട കുട്ടികളേ,

2020 - 21 അധ്യയനവർഷം ഇതുവരെയുള്ള അധ്യയന വർഷങ്ങളിൽ നിന്നും തികച്ചും ഭിന്നമാണ്. സാധാരണപോലെ സ്കൂളിൽ പോയി സഹപാഠികളോടൊപ്പമിരുന്ന് അധ്യാപകരുടെ നേതൃത്വത്തിൽ പഠന പ്രവർത്തനങ്ങളിൽ ഏർപ്പെടാൻ ഈ വർഷം കുട്ടികൾക്കാർക്കും സാധിച്ചിട്ടില്ല. പകരം സംസ്ഥാനതലത്തിൽ സംപ്രേഷണം ചെയ്യുന്ന വീഡിയോ ക്ലാസുകൾ വീട്ടിലിരുന്ന് കാണുകയും അധ്യാപകരുടെ സഹായത്തോടെ പഠനം മുന്നോട്ടു പോവുകയുമായിരുന്നു ഇതുവരെ. ഇനി കുട്ടികൾക്ക് സംശയങ്ങൾ പരിഹരിക്കുന്നതിനും പരീക്ഷയ്ക്ക് തയ്യാറെടുക്കുന്നതിനുമുള്ള സമയമാണ്. എസ്എസ്എൽസി പൊതു പരീക്ഷാഫലം എല്ലാവരും ഉറ്റു നോക്കുന്നതിനാൽത്തന്നെ കുട്ടികൾ ആശങ്കാകുലരാണ്. ഈ സാഹചര്യത്തിൽ ആത്മവിശ്വാസത്തോടെ പരീക്ഷയെ അഭിമുഖീകരിക്കുന്നതിന് അവരെ പ്രാപ്തരാക്കേണ്ടതുണ്ട്. പരീക്ഷയ്ക്ക് പാഠഭാഗങ്ങൾ ഒന്നും ഒഴിവാക്കിയിട്ടില്ലെങ്കിലും കൂടുതൽ ശ്രദ്ധിക്കേണ്ട പാഠഭാഗങ്ങൾ എസ്.സി.ഇ.ആർ.ടി നിർദ്ദേശിച്ചിട്ടുണ്ട്. ഓരോ വിഷയവും ഫലപ്രദമായി വിനിമയം ചെയ്യുന്നതിന് ആവശ്യമായ സവിശേഷമായ പഠനപ്രവർത്തനങ്ങളും അനുബന്ധ നിർദേശങ്ങളും കോഴിക്കോട് ഡയറ്റിന്റെ അക്കാദമിക നേതൃത്വത്തിൽ കോഴിക്കോട് ജില്ലാ പഞ്ചായത്തിന്റെ സഹായത്തോടെ തയാറാക്കി നല്കുകയാണ്. വിദ്യാർത്ഥികൾ സ്കൂളിലെത്തുന്ന സാഹചര്യത്തിൽ അധ്യാപകരുടെ സഹായത്തോടെ പഠന പ്രവർത്തനങ്ങളിൽ ഏർപ്പെടാനും സംശയനിവാരണം നടത്താനും ഇവ ഫലപ്രദമായി ഉപയോഗിക്കുമല്ലോ.

എല്ലാവർക്കും വിജയാശസംകൾ

കോഴിക്കോട്
12 - 01 - 2021

CHEMISTRY

Unit -1

PERIODIC TABLE AND ELECTRONIC CONFIGURATION

Concepts:

1. Shells and Subshells
2. The number of electrons in subshells
3. Filling of electrons in subshells
4. Peculiarity of the electronic configuration of chromium(Cr) and copper(Cu)
5. Subshell electronic configuration and blocks
6. The period and the group can be found out on the basis of subshell electronic configuration
7. The group number of s block elements
8. p block and d block elements
9. Characteristics of d block elements

Shells

According to Bohr model, in an atom electrons are arranged in various paths around the nucleus. These paths are called Shells. In shells electrons are filled in the increasing order of energy. Shells are named as K,L,M,N.

Eg: Electronic configuration of $_{3}Li$ is 2,1

Question.

Write the electronic configuration of $_{11}Na$

Subshells

According to new assumptions electrons in each energy level are arranged in its sub energy levels. Each sub energy level in a shell is called subshell. They are named as s,p,d,f respectively.

Sub shells present in each shell is shown below.

Shell No	1	2	3	4
Subshells	s	s,p	s,p,d	s,p,d,f

The number of electrons in subshells.

Subshell	s	p	d	f
Maximum number of electrons that can be accommodated	2	6	10	14

Filling of electron in subshells

When the electrons in an atom are distributed in subshells, they are filled in the increasing order of the energies of subshells. This is called subshell electronic configuration.

Increasing order of subshell energy level is represented below

1s<2s<2p<3s<3p<4s<3d<4p.....

Example.

$_3$Li Total number of electrons=3. Two electrons are filled in 1s and remaining electrons should enter the 2s subshell. The subshell electronic configuration of this element can be written as **$1s^2 2s^1$**

Peculiarity of the electronic configuration of Chromium and Copper

The d subshell can be accommodate maximum of 10 electrons. The completely filled(d^{10}) or half filled (d^5) of this subshell is more stable. If then identify the correct subshell electronic configuration of $_{24}$Cr

$1s^2 2s^2 2p^6 3s^2 3p^6 3d^4 4s^2$ ☐

$1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$ ☐

Question

Write the subshell electronic configuration of $_{29}$Cu

Subshell electronic configuration and blocks

Based on subshell electronic configuration elements are classified in to four blocks s,p,d and f in the modern periodic table.

The block to which the element belongs will be the same as the subshell to which the last electron is added.

Element	Subshell electronic configuration	block
$_4$Be	$1s^2 2s^2$	s
$_{18}$Ar	$1s^2 2s^2 2p^6 3s^2 3p^6$	p
$_{21}$Sc	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^1 4s^2$	d

Method for finding the period and group of an element from subshell electronic configuration

Period number - Number of shells

Group number for s block elements - Number of electrons present in the last subshell

Group number of p block elements - Add 12 to the number of p electrons

Group number of d block elements - The sum of electrons in the outer most s and preceding d subshell

Example:

$1s^2 2s^2 2p^6 3s^2 3p^6 \mathbf{3s^1}$ Period=3 Group=1 Block= s

$1s^2 \mathbf{2s^2 2p^3}$ Period=2 Group=15 Block= p

$1s^2 2s^2 2p^6 3s^2 3p^6 \mathbf{3d^6 4s^2}$ Period=4 Group=8 Block= d

Question:

Complete the table

Atomic number	Subshell electronic configuration	Period	Group	Block
25	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^2$	.....	.....	.....
.....	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$	.....	.....	.....
17	.....	.....	.....	.....

Characteristics of d block elements

* Show similarities in properties in groups and in periods
* Show variable oxidation states
* Most of them form coloured compounds.

Model Questions

1. Some subshells are given. Find out the subshells which are not possible.

(3s,1p,3f,3d)

2. Of the given two subshell electronic configuration of an element A (symbol is not real)

i) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^1$

ii) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$

a. Find the correct electronic configuration of the element "A"

b. To which block of the periodic table does this element belong ?

3.How many electrons can be accommodated in f subshell ?

(a) 10 (b) 6 (c) 7 (d) 14

4.Subshell electronic configuration of some elements are given(Symbols are not real)

A - $1s^2\ 2s^2\ 2p^4$

B - $1s^2\ 2s^2\ 2p^6\ 3s^1$

C - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$

D - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6\ 4s^2$

a. Find the atomic number of B

b. Which subshell in D has the highest energy?

c. Find the group and period number of D

5.Which of the following electronic configuration is that of a d block element?

a. $1s^2\ 2s^2\ 2p^4$

b. $1s^2\ 2s^2\ 2p^6\ 3s^2$

c. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6 3d^6 4s^2$

6. Some Characteristic of Manganese are given.

- There are 4 shells.
- Last 5 electrons enter in d subshell.

a. Write the subshell electronic configuration of manganese.

b. Write any two characteristics of the block to which this element belongs.

7. Complete the table.

Element	No of electrons	Subshell electronic configuration
$_{7}N$	7	.....
$_{13}Al$	13	.....
$_{11}Na$	.....	$1s^2 2s^2 2p^6 3s^1$
$_{18}Ar$	18	.....

Unit – 2

GAS LAWS AND MOLE CONCEPTS

Concepts

- Gas Laws
  - Boyle's law
  - Charles law
  - Avogadro's law
- Gram Atomic Mass (GAM)
- Gram Molecular Mass (GMM)
- Avogadro Number (N_A)
- Mole atom
- Mole molecule
- Molar volume
- Molar volume at STP

Explanations:

Boyle's law: At constant temperature the volume of a definite mass of gas is inversely proportional to its pressure.

PV = a constant

Eg: The size of the air bubbles rising from the bottom of an aquarium increases.

Charles law: At constant pressure the volume of a definite mass of gas is directly proportional to the temperature in kelvin scale

$\frac{V}{T}$ = a constant

Eg: A balloon kept in direct sun light bursts

Avogadro's law: At constant temperature and pressure, the volume of a gas is directly proportional to the number of molecules

Gram Atomic Mass (GAM): The mass of an element in grams equal to its atomic mass is called 1 gram atomic mass(1 GAM)
1 GAM of an element contains 6.022 x 10^{23} atoms
This number is known as Avogadro number and is represented as N_A
This is equal to 1 mole atom

Gram Molecular Mass (GMM): The amount of a substance in grams equal to its molecular mass is called gram molecular mass (GMM)
1 GMM of any substance contains 6.022 x 10^{23} molecules.
This is equal to 1 mole molecules.

Eg: GMM of some compounds
H_2O [H – 1, O – 16] = 1x 2 + 16 = 18g
CO_2 [C – 12, O – 16] = 12 + 2 x 16 = 44g

NH_3 [N – 14, H – 1] = 14 + 1x 3 = 17g
H_2SO_4 [H – 1, S – 32, O – 16] = 1x2 + 32 + 4 x 16 = 98g
$CaCO_3$ [Ca – 40, C – 12, O – 16] = 40 + 12 + 3 x 16 = 100g

Mole atom = $\frac{Given\ mass}{GAM}$
Number of atoms = mole atom x 6.022 x 10^{23}

Eg: 60g carbon.
Mole atom = $\frac{60}{12}$ = 5, Number of atoms = 5 x 6.022 x 10^{23}

Mole molecule = $\frac{Given\ mass}{GMM}$
Number of molecules = mole molecule x 6.022 x 10^{23}

Eg: 360g glucose ($C_6H_{12}O_6$) [C – 12, H – 1, O – 16]

GMM of glucose = 6 x 12 + 12 x 1 + 6 x 16 = 180g
Number of moles = $\frac{360}{180}$ = 2
Number of molecules = 2 x 6.022 x 10^{23}

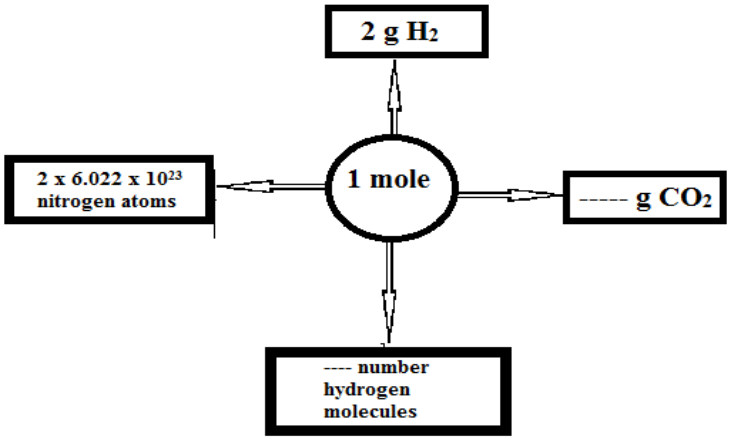
Molar volume: Volume of 1 mole of a gas is called molar volume
Molar volume of a gas at STP = 22. 4L

Model Questions:

1. Which of the following equation represents Charles law?
   [PV = a constant, V/n = a Constant, V/T = a constant]
2. Arrange the followings in the order of increasing number of molecules.
   a) 34g NH_3 b) 10g H_2 c) 1 mole carbon
3. What is the number of atoms present in 6.022 x 10^{23} molecules of nitrogen?
4. Calculate GMM of the following substances
   a) NaCl b) CO c) NO_2 d) H_2O
   [H – 1, C – 12, N – 14, O – 16, Na – 23, Cl – 35.5]
5. What is the mass of 6.022 x 10^{23} molecules of SO_2
6. Complete the following table

Substance	GMM	Given mass	No. of moles	No.of molecules	No. of atoms
NO_2	------	138g	3	------	------
CO	28g	14g	------	½ x 6.022 x 10^{23}	------
HNO_3	63g	------	2	------	10 x 6.022 x 10^{23}

7. Complete the following



Unit – 3

REACTIVITY SERIES AND ELECTROCHEMISTRY

Concepts

- Reactivity series and displacement reaction
- Galvanic cell
- Electrolytic cells
- Electrolysis of molten sodium chloride

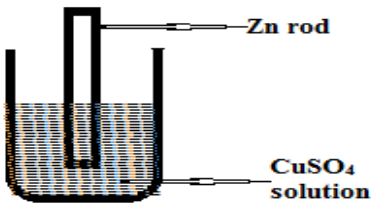
Explanations

Reactivity series and displacement reaction

* Reactivity of metals are not similar. The series in which metals have been arranged in the decreasing order of their reactivity is called reactivity series.

* When a more reactive metal comes in contact with metallic salt solution of a less reactive metal, the more reactive one replaces the less reactive one from its salt solution. This is called displacement reaction.

Eg:



(Here Zn is more reactive than Cu in $CuSO_4$ Solution)

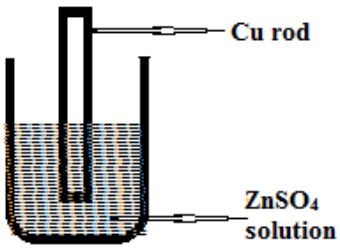
Reactions taking place,

$Zn \rightarrow Zn^{2+} + 2e^-$ (Oxidation for more reactive metal)

$Cu^{2+} + 2e^- \rightarrow Cu$ (Reduction for less reactive metal)

Over all reaction : $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

* These type of displacement reactions are Redox reactions.

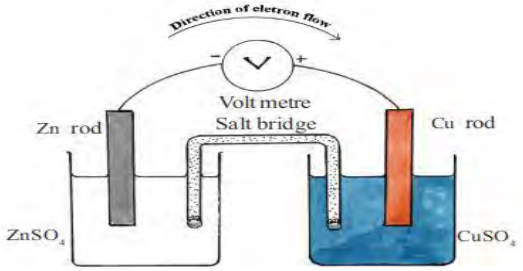


No displacement reaction takes place here.

Galvanic cell

- Galvanic cell is an arrangement in which chemical energy is converted to electrical energy by means of a redox reaction.
- Electrode that is more reactive undergoes oxidation and it is called anode, it attains negative charge Electrode that is less reactive undergoes reduction and it is called cathode, it gains positive charge.
- Salt bridge - U. tube filled with a paste of gel and salt like KCl,KNO3 etc. This maintains electrical neutrality of the cell.

In Zn - Cu galvanic cell



$Zn \rightarrow Zn^{2+} + 2e^-$ - Oxidation – Anode – negative charge

$Cu^{2+} + 2e^- \rightarrow Cu$ - Reduction – Cathode – positive charge

Redox reaction : $Zn + Cu^{2+} \longrightarrow Zn^{2+} + Cu$

In a galvanic cell, transfer of electrons by the redox reaction causes flow of electric current in cell
Direction of electron flow is from anode to cathode.

Cell	Anode	Cathode
Mg – Cu	Mg	Cu
Cu – Ag	Cu	Ag
Zn - Cu	Zn	Cu

Electrolytic cells

- The process of chemical change taking place in an electrolyte by passing electricity is known as electrolysis.
- Substances which conduct electricity in molten state or in aqueous solution and undergoes chemical charge are called electrolytes. Acids, alkalies and Salts are electrolytes in their molten state or in aqueous solution.
- Electrode in which oxidation takes place is anode, this is the positive electrode here.
- Electrode in which reduction takes place is cathode, this is the negative electrode here.
- During electrolysis,
- positive ions (cations) are attracted to cathode.
- Negative ions (anions) are attracted to anode.

Electrolysis of molten sodium chloride

- In solid state sodium chloride can't conduct electricity as there is no freedom of movement for ions. But molten sodium chloride conducts electricity. When NaCl melts,

  $NaCl \rightarrow Na^+ + Cl^-$

Cathode	Anode
$Na^+ + 1e^- \rightarrow Na$ Na deposits at cathode	$2Cl^- \rightarrow Cl_2 + 2e^-$ Cl_2 liberates from anode

Practice questions

1. Among the following metals which one can displace Cu from its salt solution?
   (Ag, Au, Zn)
2. In Mg- Cu galvanic cell, which is anode?
3. When molten NaCl is electrolysed , Na will be deposited at------

Unit – 4
PRODUCTION OF METALS

Concepts:

- Minerals and ores
- Concentration of ores
- Extraction of metals from concentrated ore
- Refining of metals
- Industrial preparation of iron

Explanation:

Minerals and ores

- ❖ Minerals are the metallic compounds generally seen in earth crust.
- ❖ A mineral from which a metal is extracted is called ore.
- ❖ Characteristics of ore are,
    1. Abundance
    2. Easily and cheaply separable
    3. High metal content
    4. Low making cost

Metal	Ore
Aluminium	Bauxite
Iron	Haematite, Magnetite
Copper	Copper pyrites, Cuprite
Zinc	Zinc blende, Calamine

Concentration of ore

- ❖ The process of removing the impurities (Gangue) from the ore obtained from earth's crust.

Properties of ores	Properties of impurities	Method	Example
High density	Low density	Levigation or hydraulic washing	Oxide ores, ore of gold
Low density	High density	Froth floatation	Sulphide ore,

			Copper pyrates
Magnetic	Non-Magnetic	Magnetic separation	Magnatite, the ore of iron, Tin stone
Non-Magnetic	Magnetic		
Soluble in the solution	Insoluble in the same solution	Leaching	Ore of aluminium, Bauxite

Extraction of metals from concentrated ore

- ❖ Two stages in the extraction process are,
    1. Conversion of concentrated ore into its oxide.

Method	Process	Example
Calcination	Heating the ore in the absence of air at a temperature below its melting point.	Carbonates & hydroxides decompose to their oxides. $ZnCO_3 \rightarrow ZnO$
Roasting	Heating the ore in a current of air at a temperature below its melting point.	Sulphide ores are converted into oxides. $Cu_2S \rightarrow Cu_2O$

2. **Reduction of the oxide**
    - Extraction of the metal from its oxide is reduction.
    - Reducing agents like *carbon, carbon monoxide and electricity* are used for the reduction.

Refining of Metal

- ❖ The process of removal of impurities to get pure metal is refining.

Method	Characteristics	Example
Liquation	Melting point of the metal is less than the impurities.	Tin (Sn) , Lead (Pb)
Distillation	Boiling point of the metal is less than the	Zinc (Zn), Cadmium (Cd), Mercury (Hg)

	impurities.	
Electrolytic refining	Electrolysis of the salt solution of the metal.	Copper (Cu), Silver (Ag)

Industrial production of iron

Ore of the iron	Haematite (Fe_2O_3)
Raw materials fed into the blast furnace	Haematite, Limestone ($CaCO_3$), coke
Reducing agent	Carbon monoxide (CO)
Gangue	Silicon dioxide (SiO_2)
Flux	Calcium oxide (CaO)
Slag	Calcium silicate ($CaSiO_3$)

The reactions in the blast furnace are,

1. Formation of carbon monoxide
   $C + O_2 \rightarrow CO_2 + Heat$
   $CO_2 + C + Heat \rightarrow 2CO$
2. Reduction of haematite into iron
   $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
3. Decomposition of calcium carbonate
   $CaCO_3 \rightarrow CaO + CO_2$
4. Formation of slag
   $CaO + SiO_2 \rightarrow CaSiO_3$ (Flux + gangue →Slag)

Model questions

1. Identify the relation and fill up suitably.
   Iron : Haematite, Aluminium : ……
2. Select the appropriate method of concentration of the ores from the bracket.
   (froth floatation, leaching, levigation, magnetic separation)
   a) The ore is magnetic in nature and the impurities are non magnetic.
   b) Density of the impurity is higher than the ore.
3. Some minerals are given below, classify them based on the method of extraction used.
   Cu_2S, $ZnCO_3$, $Cu(OH)_2$, $CuFeS_2$

Calcination	Roasting

4. Match the following.

Metal	Refining method
Mercury	Electrolytic refining
Tin	Distillation
Copper	Liquation

5. Explain with the help of equations how the haematite is getting reduced in a blast furnace.

Unit - 5

COMPOUNDS OF NONMETALS

Concepts

1.Laboratory preparation of Ammonia
2.Properties-Physical and Chemical
3.Liquor ammonia and liquid ammonia
4.Uses of ammonia
5.Revesible reaction-Forward and backward reaction
6.Chemical equilibrium-characteristic properties
7.Lechatelier principle
9.Effect of concentration, pressure and temperature in equilibrium .

Explanation

Laboratory preparation-By heating ammonium chloride and Calcium hydroxide

$2NH_4Cl+Ca(OH)_2 \rightarrow CaCl_2+2H_2O+2NH_3$

- Formed ammonia is passed through quick lime(Calcium oxide) to remove water
- Due to less density Ammonia collected by inverted gas jar.
-

Properties

a) Easily soluble in water to form Ammonium hydroxide.
b) Pungent smell

c) Red litmus paper turn blue due to basic character
d) Density is less than air

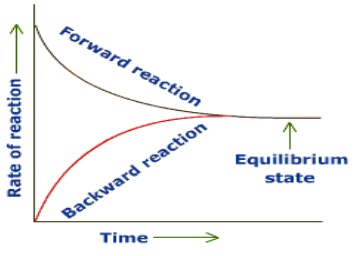
Liquor Ammonia
Highly concentrated aqueous solution of Ammonia
Liquid Ammonia
Ammonia liquified easily by applying pressure

Uses of Ammonia
a) For the manufacture of chemical fertilizers
b) As refrigerant in ice plant
c) To clean tiles and windows pans
d) As a laboratory reagent

Reversible reaction
- Taking place in both direction
- It involves forward and backward reaction

Forward reaction-reactant change in to product
Backward reaction-product change back in to reactant.
Forward Reaction
Eg. $NH_3+HCl \rightarrow NH_4Cl$
Backward Reaction
$NH_4Cl \rightarrow NH_3+HCl$
Irreversible reaction--Reactant give product only
Eg. $NaOH+HCl \rightarrow NaCl+H_2O$
Chemical equilibrium: Stage at which the rate of forward reaction become equal to backward reaction.
Characteristics of Chemical equilibrium
- Both reactant and product coexist
- Rate of forward and backward reaction become equal
- Dynamics at molecular level-because forward and backward reaction occur simultaneously at equal rate.
- Occur in closed system

Graph of a Reversible Reaction



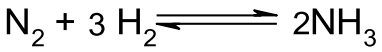
Attainment of equilibrium in a reversible reaction

Le – Chatelier principle

When the concentration, pressure or temperature of a system at equilibrium is changed, the system will readjust itself so as to nullify the effect of that change and attained a new state of equilibrium.

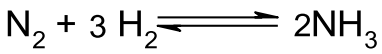
Influence of concentration in equilibrium

- When increase the concentration of reactant or decrease the concentration of product will increase the rate of forward reaction
- Increase the concentration of product increase backward reaction.

Eg 

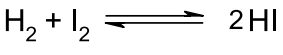
- To increase rate of forward reaction-increase the concentration of N_2 or H_2
- To remove ammonia from the system

Effect of pressure---Influence in the case of gases only
(Boyls law--. Pressure is inversely proportion to Volume)

Eg. 

4 → 2

Here total volume of reactant is 4 and that of product is 2
When pressure of system increases volume (number of molecule) decreases on forward direction. Hence forward reaction increases.
Pressure decreases volume increases (number of molecule increases) on backward direction. Hence backward reaction increases.

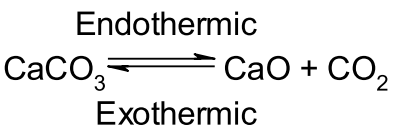
Eg. 

2 → 2

There is no change in total number of molecule of reactant and product. Hence pressure will not have any effect on equilibrium.

Effect of temperature

When temperature increases direction at which endothermic reaction increases.
Ie.,If forward reaction is endothermic when temperature increases forward reaction increases.



Here forward reaction is endothermic. When temperature increases forward reaction increases.
Temperature decreases backward reaction increases because it is exothermic.

Model Questions
1. Ammonia gas is collected in an inverted jar. Why?
2. Write factors that influence chemical equilibria
See the equation given below.

$$N_2 + 3\ H_2 \rightleftharpoons 2NH_3$$

Write 2 methods to increase the amount of ammonia.

Unit 6

NOMENCLATURE OF ORGANIC COMPOUNDS AND ISOMERISM

Concepts:

1. Hydrocarbons and their classification as Alkane, Alkene and Alkynes
2. General formula of Alkane, Alkene and Alkynes
3. writing the structures of Alkane, Alkene and Alkynes
4. Homologous series
5. Naming of Alkanes
   - With no branch
   - With one branch
   - with more than one same branch
6. Naming of alkenes
7. Naming of alkynes
8. Functional groups – Alcohols and ethers
9. Naming of alcohols and ethers
10. Isomerism
    - Chain
    - Functional
    - Position

Explanations:

Hydrocarbons:- Organic compounds containing carbon and hydrogen only
Classification: Alkanes – Saturated hydrocarbons **(C_nH_{2n+2})**
Alkenes – Unsaturated hydrocarbons with C – C double bond **(C_nH_{2n})**
Alkynes – Unsaturated hydrocarbons with C – C triple bond **(C_nH_{2n-2})**
Homologous series: The followings are the characteristics of homologous series

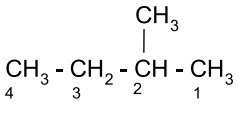
- They can be represented by a general formula
- The neighbouring members differ by – CH_2 group
- The chemical properties are similar
- Physical properties show a gradation

[Alkane is an example of homologous series. Alkenes and alkynes are other two examples of homologous series.]

Naming of alkanes with no branch :
Word root + ane

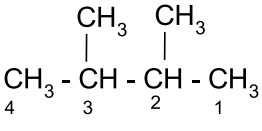
$CH_3 – CH_2 – CH_2 – CH_3$: But + ane (Butane)

Naming of alkanes with one branch :
Position number of branch + Name of branch + Word root + ane



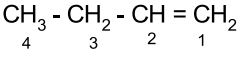
[2-Methylbutane]

Naming of alkanes with more than one same branch :
Position numbers of branches + di/tri/tetra + Name of branch + Word root + ane



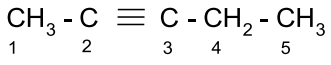
[2,3-Dimethylbutane]

Naming of alkenes :
Word root + Position numbers of double bond + ene



[But-1-ene]

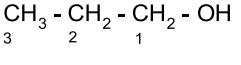
Naming of alkynes :
Word root + Position numbers of triple bond + yne



[Pent-2-yne]

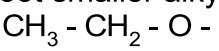
Function group : The atoms or groups of atoms which decides the physical and chemical properties of an organic compound is called functional group.
Functional group of alcohols : **– OH (Hydroxy)**
Functional group of ethers : **– OR (Alkoxy) [– OCH_3 (methoxy), – $OCH_2 CH_3$ (ethoxy)]**

Naming of alcohols :
Word root + Position numbers of – OH group + ol



[Propan-1-ol]

Naming of ethers :
Word root smaller alkyl group + oxy + word root of bigger alkyl group + ane



[Methoxyethane]

Isomerism: Compounds having same molecular formula but differ in their properties are called isomers and the phenomenon is called isomerism.

Chain Isomerism: Compounds having same molecular formula but differ in the structure of carbon chain are called chain isomers and the phenomenon is called chain isomerism.

$CH_3 - CH_2 - CH_2 - CH_3$ [Butane]

$CH_3 - CH(CH_3) - CH_3$ [2—Methylpropane]

Functional Isomerism: Compounds having same molecular formula but differ in the functional group are called functional isomers and the phenomenon is called functional isomerism.

$CH_3 - CH_2 - CH_2 - OH$ $CH_3 - CH_2 - O - CH_3$ [Propan-1-ol and Methoxyethane]

Position Isomerism: Compounds having same molecular formula but differ in the position of functional group are called position isomers and the phenomenon is called position isomerism.

$CH_3 - CH_2 - CH_2 - OH$ $CH_3 - CH(OH) - CH_3$ [Propan-1-ol and Propan-2-ol]

Model Questions:

1. Structures of some compounds are given below. Select the correct IUPAC name of each from those given in the box.

(i) $CH_3 - CH_2 - OH$ (ii) $CH_3 - CH_2 - CH(CH_3) - CH_2 - CH_3$

(iii) $CH_3 - O - CH_3$ (iv) $CH_2 = CH_2$

Methoxymethane, 3-Methylpentane, Ethanol, Ethene

2. Butane has 4 carbon atoms in a molecule.
   a) Write the structure of butane.
   b) Write the structure of chain isomer of this compound.
3. What is the functional isomer of alcohol? (Carboxylic acid, Ethers, Esters)

Unit – 7
CHEMICAL REACTIONS OF ORGANIC COMPOUNDS

Concepts

- Substitution Reactions.
- Addition Reactions.
- Polymerisation
- Combustion of Hydrocarbons
- Thermal cracking.

Explanation

Substitution Reactions :- One atom in a compound is replaced by another atom or group of atom.

Eg: $CH_4 + Cl_2 \xrightarrow{\text{Sunlight}} CH_3Cl + HCl$

Methane Chloromethane

Addition Reactions:- Unsaturated hydrocarbons. (double bond/triple bond) react with other molecules (H_2, Cl_2, HCl, HBr etc) to form saturated hydrocarbons.

Eg: $CH_2 = CH_2 + H_2 \xrightarrow{Ni} CH_3 - CH_3$

Ethene Ethane

Polymerisation:- Monomers combines to form polymers.

$nCH_2 = CH_2 \rightarrow \text{—}[CH_2 - CH_2]\text{—}_n$

Monomer	Polymer	Use
Ethene	Polythene	Making covers and bags.
Vinyl chloride	Poly vinyl chloride (PVC)	Making pipes and tapes.
Tetrafluro ethene	Teflon	Coating on the inner surface of non-stick cookware.
Isoprene	Natural rubber (Poly isoprene)	Making tubes and tyres.

Combustion of hydrocarbons: - Hydrocarbon combines with oxygen to form CO_2 and H_2O

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O + Heat$

methane.

Thermal cracking:- Some hydro carbons with high molecular masses, when heated in the absence of air undergo decomposition to form hydrocarbons with lower molecular masses.

Eg: $CH_3 - CH_2 - CH_3(C_3H_8) \rightarrow CH_2 = CH_2 + CH_4$

Propane Ethene Methane

MODEL QUESTIONS

1. Match the Suitably

Reactants	Products	Name of the reaction
$CH_3Cl + Cl_2$	$CO_2 + H_2O$	Addition reaction
$CH_3 - CH = CH_2 + H_2$	$CH_2Cl_2 + HCl$	Polymerisation

$nCH_2 = CHCl$	$CH_3 - CH_2 - CH_3$	Combustion
$C_2H_6 + O_2$	$-[CH_2 - CH]_n-$ Cl	Substitution reaction

2. Three reactions are given below

a) $CH_3 - CH_3 + Cl_2 \rightarrow CH_3 - CH_2Cl + HCl$

b) $nCF_2 = CF_2 \rightarrow [CF_2 - CF_2]_n$

c) $CH_2 + CH_2H_2 \xrightarrow{Ni} CH_3 - CH_3$

i) Identify the polymerization reaction.
ii) Name the monomer of Teflon.
iii) What is the name of reaction (i).
iv) Identify the unsaturated compound in reaction (iii).

3. Complete the following reactions

a) $CH_3 - CH = CH - CH_3 + HBr \rightarrow$ __(i)__

b) $CH_3 - Cl +$ __(ii)__ $\rightarrow CH_2Cl_2 + HCl$

c) $C_7H_{16} \xrightarrow{heat} C_4H_{10} +$ __(iii)__

d) $C_4H_{10} +$ __(iv)__ $\rightarrow CO_2 + H_2O$

PHYSICS

Chapter - 1

Effects of electric current

Focus Area

Energy change in electrical devices
Heating effect of electric current.
Joule's Law, Electric Power– Problems
Electric heating appliances.
Safety fuse.
Arrangement of Resistors in Circuits– Series Connection and Parallel Connection – Mathematical problems
Lighting effect of electric current – Incandescent lamps

Energy change in electrical devices

Activity 1

Names of some electrical devices are given in the table. Try to write down the energy changes taking place in each device.

Device	Energy change	Effects of electric current
Electric bulb	Electrical energy is converted to light energy	Lighting effect
Electric fan		
Electic cooker		
Electric stove		
Soldering iron		

Heating effect of electric current

When electricity passes through a resistor,electrical energy is transformed to heat energy.The following equations can be used to find the amount of heat produced

$H = Vit$

$H = I^2 Rt$
$H = V^2 t/R$

Joule's Law, Electric power

Activity 2

The heat generated in a current carrying conductor can be calculated using the formula given below.

$H=I^2Rt$

Write the units and complete the table.

H–Heat	Joule (J)
I–Current	
R–Resistance	
t–Time	

Activity 3

A heating coil of resistance 115 Ω works in 230 V

a . Calculate the current in the circuit.

b. write the equations to calculate the heat generated in a current carrying conductor.

c. Calculate the heat generated in 5 minutes

d. Write the equations to calculate the electric power.

e. Calculate the power of this device.

Electric heating appliances

Activity 4

Electric heating appliances have a main part in which electrical energy changes into heat energy.

a) Name that part

.....

b) Which material is used to make this part?

c) What are the peculiarities of this part?

.....

Safety fuse

Activity 5

Safety fuse is a device that works on the heating effect of electric current.

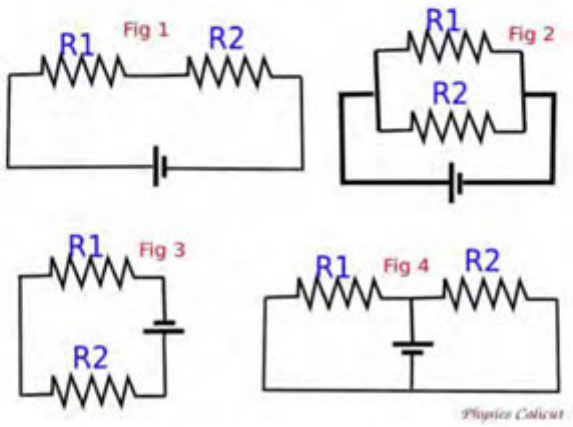
a) Which material is used as fuse wire in a saftey fuse?

b) What is the peculiarity of a fuse wire?

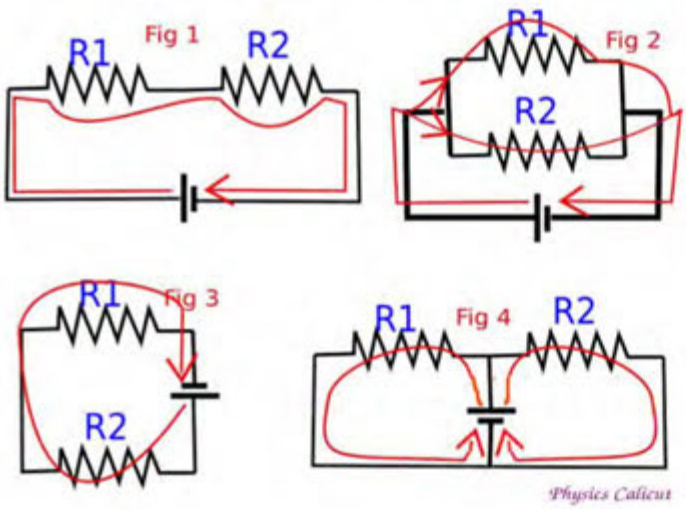
Arrangement of Resistors in Circuits- Series Connection ,Parallel Connection.

Activity 6

Oberve the circuits given below.Two resistors connected in two different ways are given here.Mark the path of current from positive to negative.



compare your answers with given figure below. In two figures we can see there are more than one path for current to complete the ciruit



Tabulate above figures ,as parralel or series connections

Parallel connections	Series connections

Merits of Parallel connections

*The potential difference in each resistors is the same.

* Current through each resistors are different.

* The effective resistance decreases.

*We can control each device using separate switches .

If resisistors of same value are connected in parallel,then R=r/n, where 'n' is the number of resistors ,and 'r' is the resistance of one resistor.

Activity 7

Two resistors of 2 Ω,3 Ω,6 V battery and connecting wires are given

a .Depict a figure of series connection using these components.

b . Calculate the effective resistance of series connection.

c. Calculate the current in the circuit.

d. Do the potential defference across each resistor is equal in series connection.

e. Depict a figure of Parallel connections.

f. Calculate the effective resistance, if resistors conneccted in parallel.

g. Calculate the current in the circuit.In parallel connection.

h. Calculate the current through each resistor when connected in parallel.

Lighting effect of electric current – Incandescent lamps .

Activity 8

Incandescent lamps make use of Lighting effect of electric current .Name the parts of a filament lamp?

Activity 9

a)Which is the material used as filament in incandescent lamps?

b)Why the bulb is filled with inert gas?

c)What properties of tungsten make it suitable for being used as a filament?

d)Why the the bulb is evacuated.?

e)The efficiency of incandescent lamp is less.Why?

****

Answer key

Activity 1

Device	Energy change	Effect of electric current
Electric bulb	Electrical energy is converted to light energy	Lighting effect
Electric Fan	Electrical energy is converted to mechanical energy	mechanical effect
Electric cocker	Electrical energy is converted to heat energy	Heating effect
Electric stove	Electrical energy is converted to heat energy	Heating effect
Soldering iron	Electrical energy is converted to heat energy	Heating effect

Activity 2

H-Heat	Joule (J)
I-Current	Ampere (A)
R-Resistance	Ohm (Ω)
t-Time	Second (s)

Activity 3

a) . $I=V/R=230/115=2A$

b). $H=VIt$, $H=I^2Rt$, $H=V^2t/R$

c). $H=VIt=230x2x300=230x600=138000J$

d.) $P=VI$. $P=I^2R$. $P=V^2/R$

e.) $P=VI=230 \times 2=460W$

Activity 4

a) Heating coil

b) Nichrome

c) High resistivity, High melting point

Activity 5

a)Alloy of tin and lead.

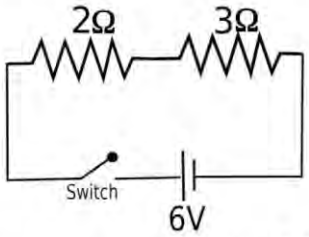
b) Low melting point

Activity 6

Series	Parrallel
Fig 1 Fig 3	Fig 2 Fig 4

Activity 7

a.)

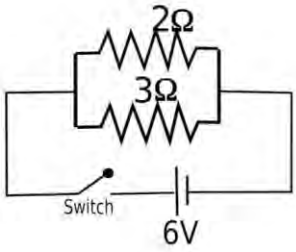


b.) Effective resistance when connected in series ,R=R1+R2=2+3=5 Ω

c.) I=V/R=6/5=1.2A

d.)No.The potential difference between the ends of each resistor will be different.

e.)



f.)R = (R1 x R2)/(R1 + R2)=(2 x 3)/(2+3)=6/5=1.2 Ω

g.)Current, I=V/R=6/1.2=5A

h.) Current through 2 Ω resistor = V/R=6/2=3A
Current through 3 Ω resistor = V/R=6/=2A

Activity 8

Activity 9

a) Tungsten

b) To reduce the vaporisation of filament.

c) High resistivity ,high melting point ,high ductility ,ability to emit white light in the white hot condition

d) To avoid oxidation of tungsten

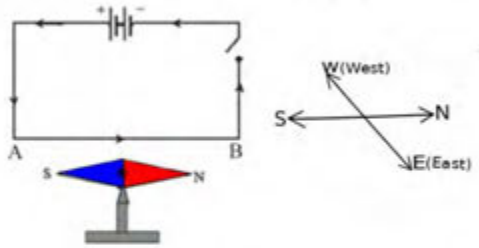
e)A major part of the electrical energy supplied to an incandescent lamp is lost as heat. Hence the efficiency of these devices is less.

Chapter - 2

Magnetic Effect of Electric current

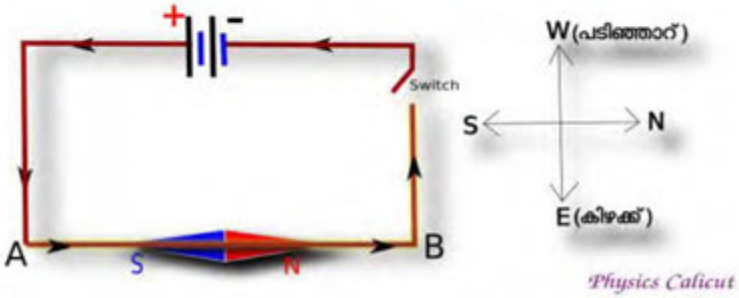
Activity 1

Observe the figure. Current is passed through a coductor placed above and close to a magnetic needle.(from A to B).What is the direction in which the North Pole(N) of the magnetic needle deflects?



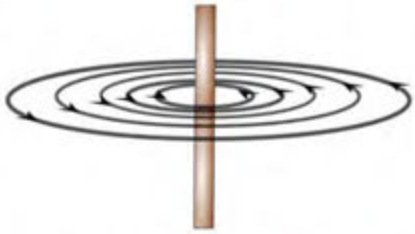
a)East b)North c)West d)South.

(The figure is taken from the text book.You can use the figure below also for more clarity.)

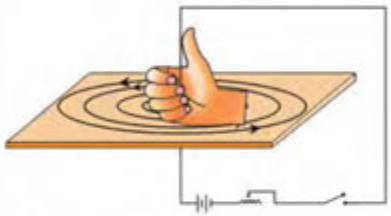


What are the concepts that we have to consider while answering this question?

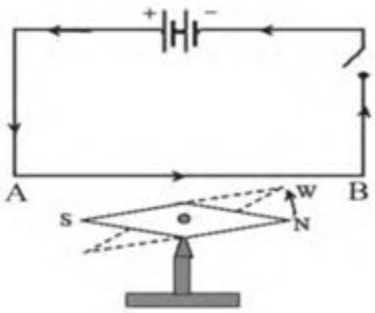
1.There will be a magnetic field around a current carrying conductor



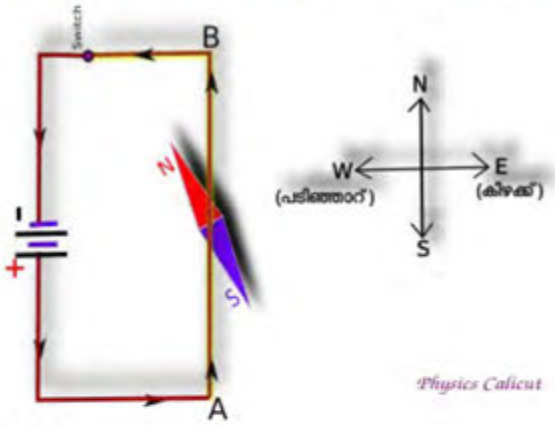
2.We can use Right hand thumb rule to find the direction of magnetic field.



3.The deflection of magnetic needle is due to the interaction between the magnetic field caused by the current carrying coductor and it's own magnetic field.

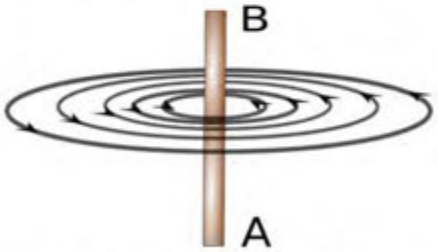


So the north pole of the needle is deflected towards west.



Activity 2

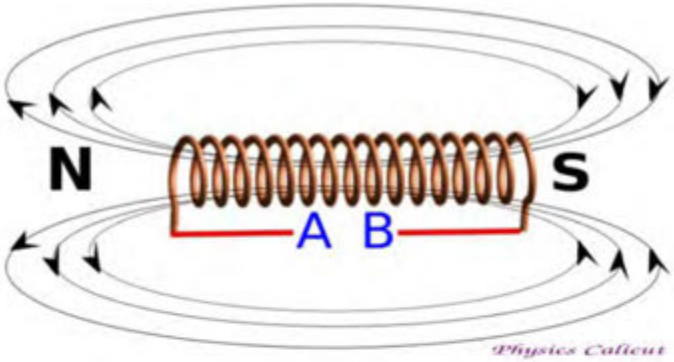
1)The magnetic field produced by a current carrying conductor is depicted in the figure. What will be the direction of electric current?



2)Write the law that can be used to find the direction of magnetic field produced by a current carrying straight conductor.

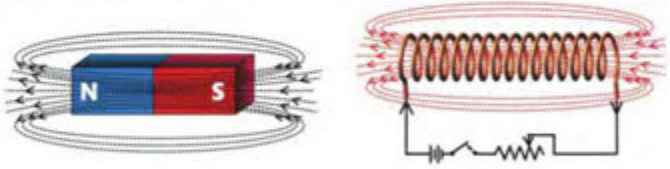
Activity 3

The magnetic field produced by a solenoid is shown in the figure. What will be the polarities of the battery at points A and B ?



What are the concepts that we have to consider while answering this question?

1) Magnetic field produced by a solenoid and magnetic field of a bar magnet are similar.



2) If North pole is induced at one end of a solenoid the direction of current will be in anticlockwise direction at that end.

Current in the clockwise direction

3) For current to be anticlockwise at the end of the solenoid where north pole is formed ,the terminal "A" must be negative.

4) If South pole is induced at one end of a solenoid the direction of current will be in clockwise direction at that end.

Current in the anti clockwise direction

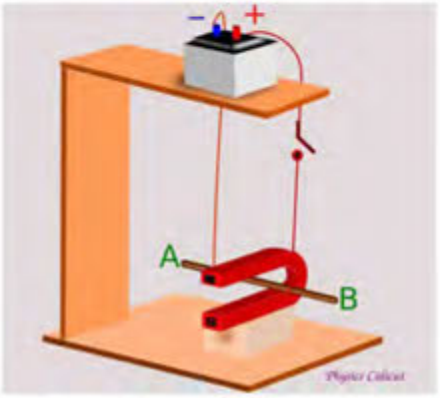
5) For current to be clockwise at the end of the solenoid where south pole is formed ,the terminal "B" must be positive.

Activity 4

Write any two factors that affect the strength of the magnetic field of a solenoid carrying current.

Activity 5

Observe the figure . **When the circuit is switched on ,the conductor AB moves outward.**

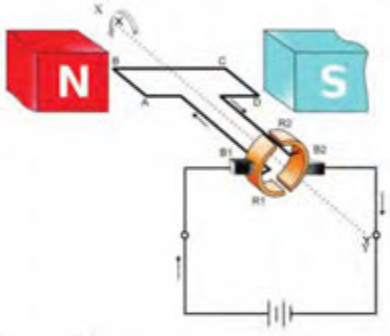


a)Write the principle behind this movement of the conductor .

b) Write the name of a device that make use of this principle.

Activity 6

Note the parts of an electric motor shown in the figure



Write the name of the parts represented by NS, ABCD, B1,B2, R1and R2 .

Activity 7

In the split ring commutator of a DC motor, semi circular rings are used.

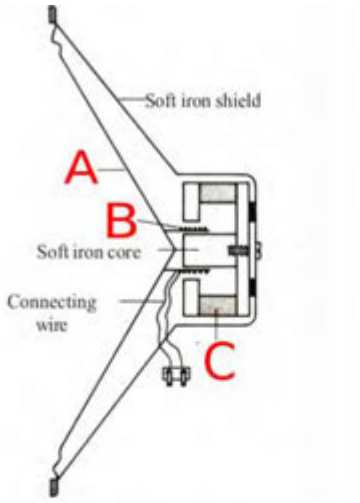
What is the need for this?

Activity 8

What is the energy transformation taking place in an electric motor?

Activity 9

Observe the picture showing the structure of a loud speaker.



Name the parts shown as A,B and C .

Activity 10

What is the energy transformation taking place in a moving coil loud speaker.

Answer Key

Activity 1

Ans) c)West

Activity 2

Ans) From A to B.

2) Right Hand Thumb Rule of James Clark Maxwell.

Imagine you are holding a current carrying conductor with the right hand in such a way, that the thumb points in the direction of the current. The direction in which the other fingers encircle the conductor gives the direction of the magnetic field.

Activity 3

Ans) A-Negative, B-Positive

Activity 4

Ans) Intensity of electric current , number of turns in the coil ,distance between the turns.

Activity 5

Ans) a)Motor principle. b)Electric motor, moving coil loud speaker.

Activity 6

Ans) NS -Magnetic poles ,ABCD -Armature, B1,B2 -Graphite brushes ,R1,R2 -Split rings.

Activity 7

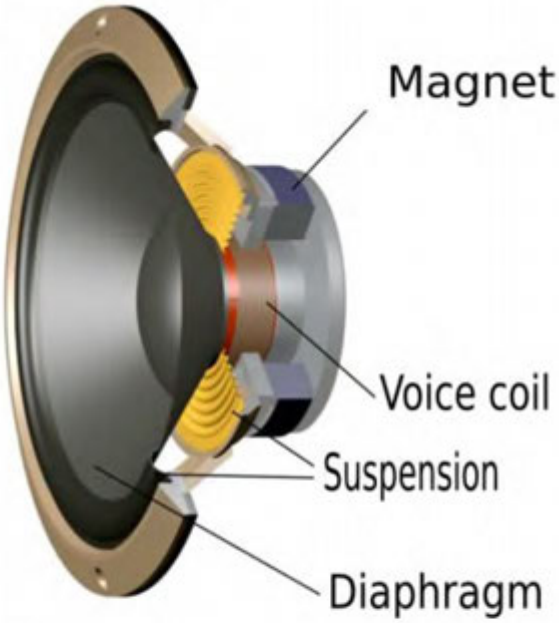
Ans) If the rotation of the armature is to be sustained the direction of current through the armature should continuously keep on changing. The split rings help to change the direction of current through the coil after every half rotation.

Activity 8

Ans) Electrical energy is converted to mechanical energy.

Activity 9

Ans) A - Diaphragm , B - Voice coil , C - Field magnet.



Activity 10

Ans) Electrical energy is converted to mechanical energy.

****

Chapter - 3

Electromagnetic induction

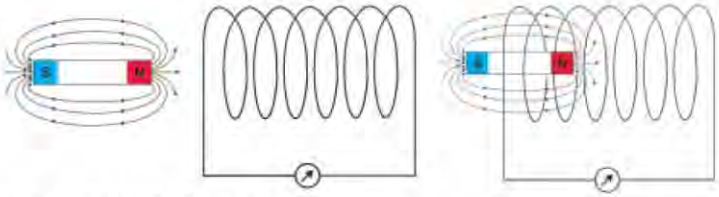
Focus area

Electromagnetic induction, factors influencing induced emf, power from AC generator, DC generator and cell, - features,graphic illustration .AC generator DC generator - structure, function, self induction, mutual induction, transformers - structure, function, moving coil microphone, high voltage power transmission, electric shock - precautions, first aid.

Activity 1.

Both ends of a solenoid are connected to a galvanometer. A bar magnet is moving in and out of this solenoid

a). Observe the figure. Figure conveys some information. What will you observe in the galvanometer ?



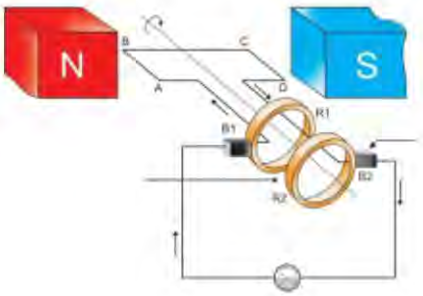
b). What is the reason for this phenomenon? Explain.

c). What change can be observed by increasing the speed of motion?

d). Suggest the methods increase the emf generated?

Activity 2.

Observe the figure ,



a. Name this device?

b. Draw the diagram and label the parts.

c. Draw the graph of the emf generated by this device.

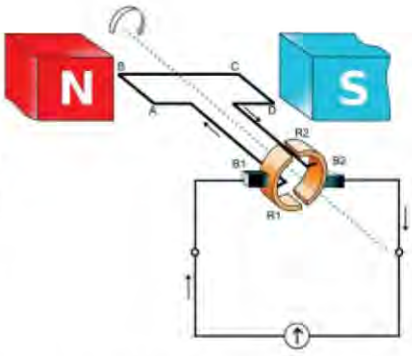
d. What is the name of power generated by this device ?

e. The number of cycles per second is termed as .....

f. What is the frequency of A C produced in India?

Activity. 3

Observe the figure,



1. Name this device.
2. What is the energy change taking place in it?
3. Draw a diagram showing the position of armature after half rotation (if rotated 180 degrees) from the current position and label its parts.
4. What is its working principle?
5. Draw the graph of emf generated from this device.
6. What are the changes to be made to get AC from this device? (2 possibilities)
7. How can we change this device into a motor?

Activity 4.

Cell.

a. Name the current flowing only in one direction?

b) Draw a graph of the emf produced by the battery

c. In which category does the current from a battery belong? (AC / DC)

Activity 5

Observe the figure,

a. Turn on the switch in the given circuit. After a while,turn off it.

a. What will be the observation?

b. Write the reason.

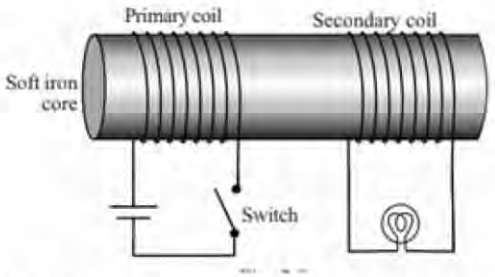
c. Name the coil in the input circuit ?

d. Name the coil in the output circuit ?

e. Which principle can explained by this experiment ?

f. Explain that principle.

g. What will be your observation ,if you replace the cell by an AC source ?

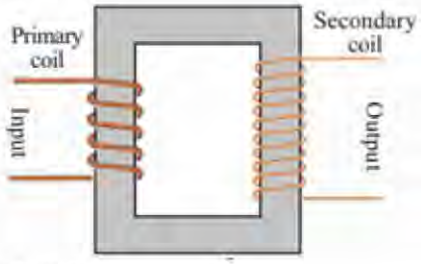


Activity 6.

Observe the figure,

1. Which device is given in the figure ?
2. Write the working principle?
3. What is the reason for using thick coil in its primary?
4. Number of turns in the secondary is more .why ?
5. In which stage , the step up transformer is used in power transmission ?
6. What should be the change in the structure to reduce the output voltage?

7 Draw its figure



Activity 7

The power of the bulbs, the number of turns and the input voltage in the following circuits are the same. A piece of soft iron is placed Inside the third solenoid .

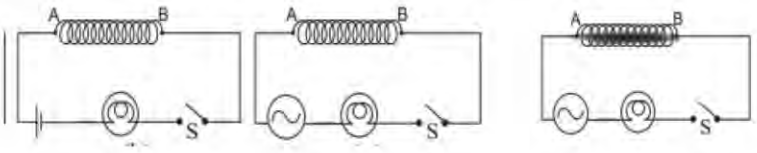


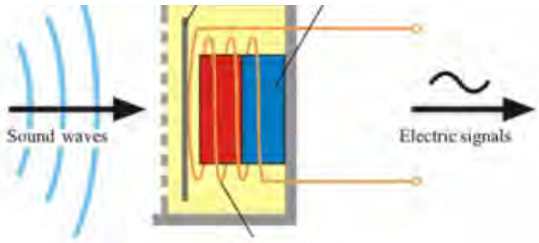
fig 1 fig 2 fig 3

a. Which bulb will glow with more intensity when switched on? Give reason?

b. Which bulb will glow with low intensity when switched on? Give reason?

c. What is the phenomenon in connection with this experiment? Explain?

Activity 8,



Observe the figure,

1. Name the device i given?
2. What is the energy change in it ?
3. Which is the working principle of this device ?
4. Label the main parts.
5. How does it work?
6. Compare this device with moving coil loudspeaker

Activity 9,

Power transmission

1. In which voltage electricity is produced in the power stations of India ?
2. What is the reason for converting this power to high voltage? Explain.
3. Which device helps for this?

Activity 10,

Electric shock

1. What are the precautions to be taken to avoid electric shock?
2. What are the first aid to be given to a person who has received an electric shock?

Electromagnetic induction

key

Activity 1
a .The needle will move
b. Electromagnetic induction + definition TB page 48
c. The amount of electricity will increase
d. Increase the number of turns, increase the magnetic strength, increase the speed of motion

Activity 2
a. AC generator
b. TB Image. 3.5b
c TB Image. 3.6 / table 3.5
d. Alternating current (AC)
e. Frequency
f. 50 Hz

Activity 3
1.DC Generator
2. Mechanical energy becomes electrical energy
3. TB image 3.7.b
4..Electromagnetic induction
5. TB table 3.5
6. Replace the slip ring instead of split ring, / rotate the magnet, keeping armature stationary
7. Replace the galvanometer with the cell / TB image.2.12

Activity 4.
a. Direct current (DC)
b. TB table 3.5
c. D.C.

Activity 5
a. The bulb glows only when the switch is turned on and off
b. The current induced in the secondary due to the difference in the current in the primary / Mutual induction
c Primary coil
d. Secondary coil
e. Mutual induction
f TB p 56 .
g The bulb glows continuously

Activity 6
1.Step up transformer
2 Mutual induction
3. There is more current. To reduce heat by reducing resistance .
4. To increase the voltage
5. At the power station
6. The number of secondary coil should be reduced compared to the primary
7. TB Image3.10 b

Activity 7

a. Figure 1.d c has no self-induction
b. Figure 3. a c has self induction. The iron core increases the magnetism and thus the back emf increase
c. Self Induction. Definition TB page 59

Activity 8
1 moving coil microphone
2 Mechanical energy to electrical energy
3. Electromagnetic induction
4. TB Image 60
5. TB Page.61
6. Similarities: There is a permanent magnet, a voice coil and a diaphrm
Differences:

	Moving coil microphone	Moving coil loud speaker
Energy change	Mechanical energy to electrical energy	Electrical energy to mechanical energy
principle	Electromagnetic induction	Motor principle

Activity 9
1. 11 k V (11000 v)
2. The current should be reduced to reduce the energy loss in the form of heat .Then the voltage should be increased to prevent power loss.
3. Step up transformer

Activity 10
1 TB Page: 69
2 TB Page:70

Chapter - 4

Reflection of Light

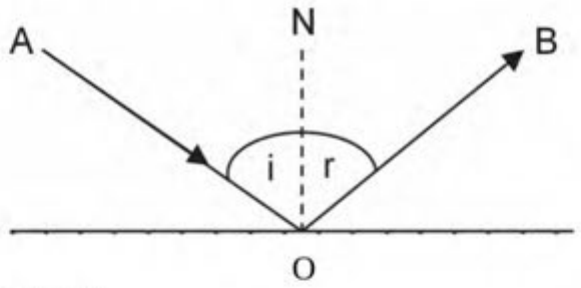
Focus Area

Reflection of light.
Laws of reflection.
Features of image formed by Convex and Concave mirrors
Mirror equations
New Cartesian Sign Convention
Magnification

Activity I

Light falling on the surface of an object comes back to the same medium . This is reflection of light. This occurs in accordance with the laws of reflection of light.

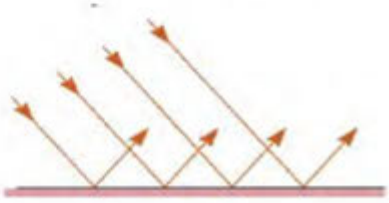
Observe the following figure which represents reflection of light and answer the questions.



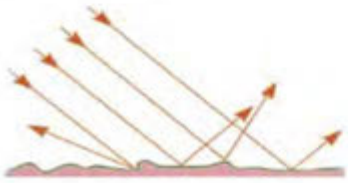
a) Which is the incident ray?
b) Which is the reflected ray?
c) If 'i' is the angle of incidence , 'r' is the angle of reflection and 'N' is the normal to the mirror at the point of incidence, is there any relation between the angle of incidence and the angle of reflection?
d) Are the incident ray, reflected ray and normal to the mirror at the point of incidence in the different planes?
e) On the basis of the answers write down the laws of reflection.

Activity II

Which of the following represents regular reflection



fig(a)



fig(b)

Activity III

The following figures represent plain mirror and spherical mirrors (convex and concave mirrors)
Identify the figure which represents Concave mirror and convex mirror.

Activity IV

While using a concave mirror, the position and nature of image changes in accordance with the change in the position of the object,

Analyse the following figures and complete the table.

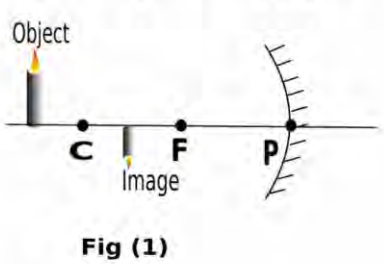


Fig (1)

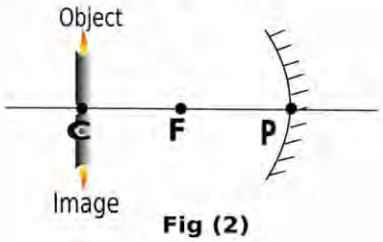


Fig (2)

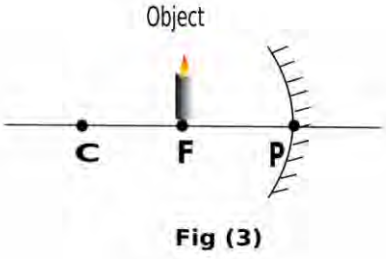


Fig (3)

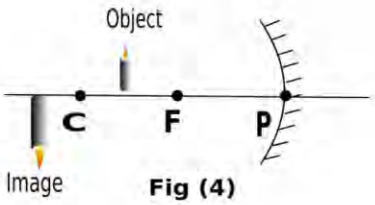


Fig (4)

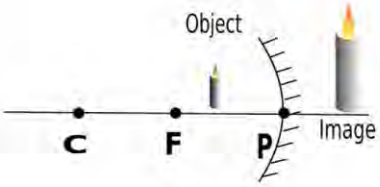


Fig (5)

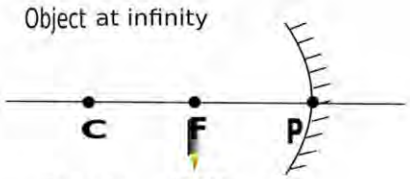


Fig (6)

C – Centre of curvature , F – Principle Focus, P – Pole

Concave mirror		
Position of the object	Position of the image	Nature of the image
Beyond C	Between C and F	Diminished, Inverted, Real
At C		
At F		
Between C and F		
Between F and P		
At infinity		

Activity V

The position of the object and the position of the image are related and the relation can be explained using an equation called mirror equation.

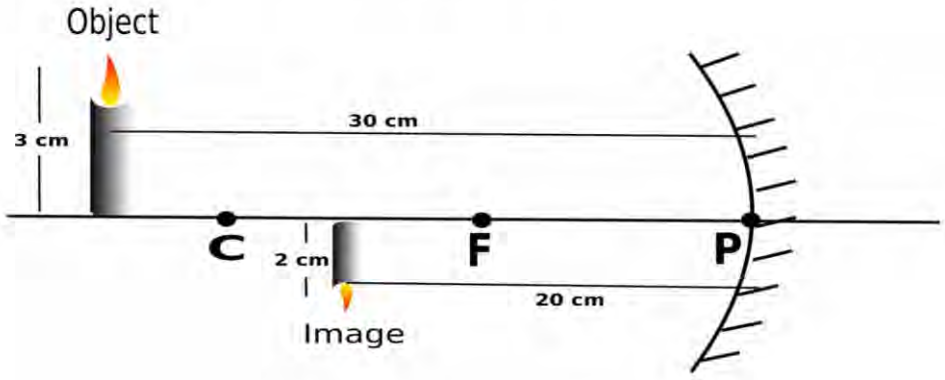
$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

Where

f = The focal length of the mirror (Distance of the principle focus from the pole)
u = The distance of the object from the pole
v = The distance of the image from the pole

For the calculation of f , u , or v certain sign convention has been formulated called **New Cartesian Sign Convention**

Analyse the following figure and answer the questions.



a) Distance to the object from the mirror (u) = ...
b) Distance to the image from the mirror (v) = ...
c) Height of object = ...
d) Height of image = ...
e) Find the focal length (f)

Activity VI

Magnification is the ratio of size of the image(h_i) to the size of the object(h_o) . Magnification 'm' can be calculated by using the following equations

$$m = \frac{h_i}{h_o} = \frac{-v}{u}$$

When an object of height 6 cm is placed in front of a concave mirror at a distance 10 cm away from it , an image is obtained 16 cm away, on the same side. Find out the height of image and magnification .

Activity VII

Identify the correct statements.

a) When magnification is 1, the size of the image and the size of the object are equal.
b) When magnification is more than 1, the size of the image is greater than the size of the object.
c) When magnification is less than 1, the size of the image is smaller than the size of the object.
d) When the magnification is positive, image is real and inverted.
e) When the magnification is negative, image is virtual and erect.

Activity VIII

Which type of mirror is used as rear view mirrors in vehicles ?

(Convex mirror / Concave mirror)

Activity IX

Which of the following statements are correct related to convex mirror ?

a) Image is formed between the centre of curvature and the principal focus.
b) Image is formed between the pole and the principal focus.
c) The image is diminished, virtual and erect
d) The image is enlarged, real and erect

Activity X

Which mirror always gives an erect and diminished image?

Answer Key

Activity I

a) AO
b) OB
c) i = r
d) No. All are in the same plane
e) When light is reflected from a smooth surface, the angle of incidence and angle of reflection are equal. The incident ray, reflected ray and normal to the surface are in the same plane.

Activity II

Fig(a)

Activity III

B-Concave , C and D - Convex

Activity IV

At C – Same size, Inverted, Real
No image (or at infinity)
Beyond C – Enlarged, Inverted, Real
On the other side – Enlarged, Erect, Virtual
At F – Diminished, Inverted, Real

Activity V

a) -30 cm, b) -20 cm, c) 3 cm, d) 2 cm
e)

$$f = \frac{uv}{u+v} = \frac{-30 \times -20}{-30 + -20} = \frac{600}{-50} = -12 \text{ cm}$$

Activity VI

h_o = 6 cm , u = -10 cm , v = -16 cm, **m** = $\frac{-v}{u}$ = -(-16) / -10 = **-1.6 .**

m =hi / ho . Therefore, **hi** = m x ho = -1.6 x 6 = **-9.6 cm**

Activity VII

a , b ,and c

Activity VIII

Convex

Activity IX

b and c

Activity X

Convex mirror

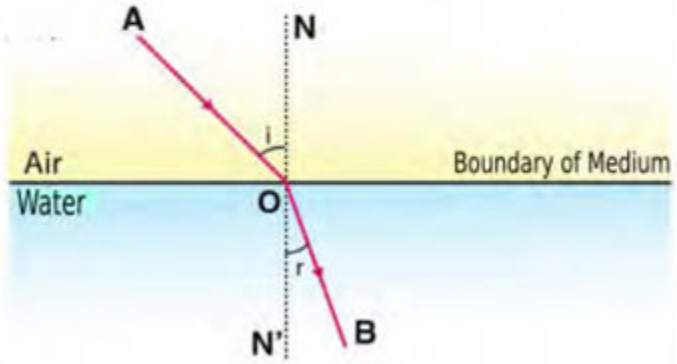
Chapter - 5

Refraction of light

Focus Area

- Refraction
- Speed of light and optical density
- Total Internal Reflection
- Lens-Important terms
- Formation of image using a lens
- Ray diagram of formation of images by lenses
- Characteristics of the image

1.



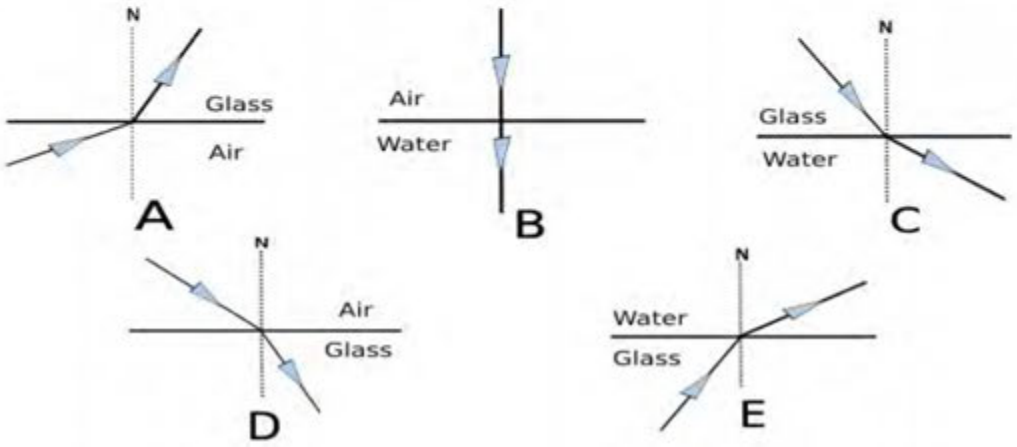
a. Which are the media that light passes
b. Which medium is given with greater optical density
c. What happens to the path of the light
d. Where does the deviation of the light take place
e. Name this phenomenon
f. What is the main reason of it

2. Some light conducting medium are given in the bracket

[Vacuum, Diamond, Water, Glass]

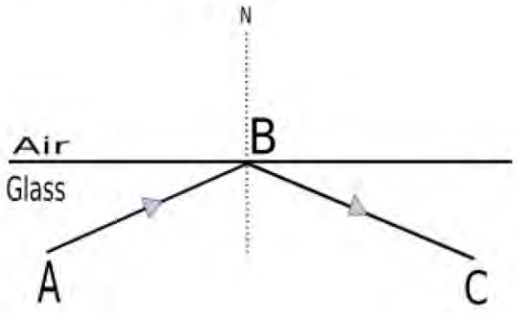
a. Which is of greater optical density
b. Arrange the media in the decreasing order of their speed of light
c. What is the relation between optical density and speed of light

3. Ray diagrams of a light ray passing through different media are depicted. Observe the figure and complete the given table



Situation	Figure
a) The refracted ray deviates away from the normal	
b) The refracted ray deviates towards the normal	
c) No deviation takes place in the light ray	

4. Observe the diagram and answer the following questions



a. What are the conditions for reflection of light ray AB in the direction BC

b. What is the phenomenon called

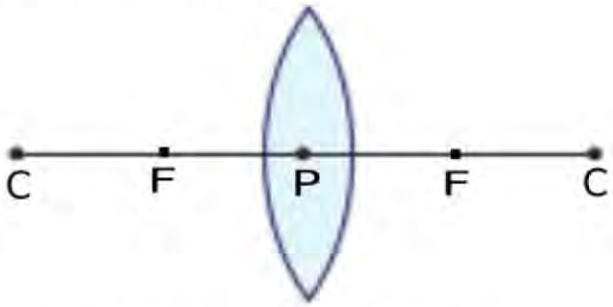
c. Write the practical applications of this phenomena in our daily life

d. If angle of incidence is 42° What is the angle of refraction at that time.

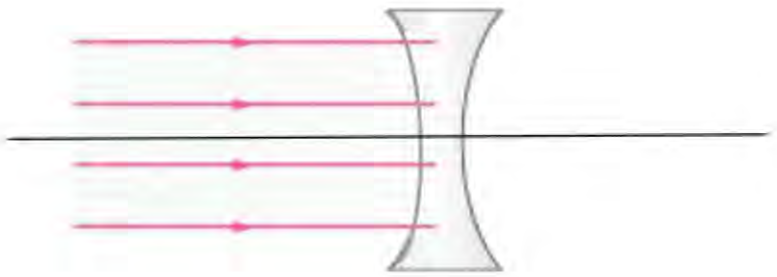
[Critical angle of water =48.6°, glass = 42°]

e. If angle of incidence is 35° at B .What are the phenomenon take place here

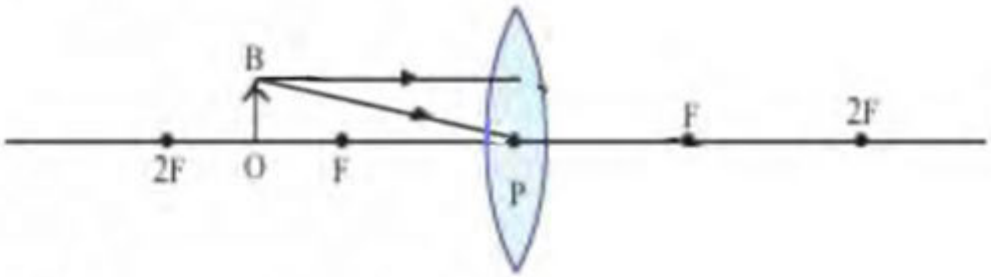
5. Write the name of the points depicted in the below diagram



6. Complete the given ray diagram and mark the principal focus of the convex lens



7. OB is an object placed in front of a convex lens



a. Draw the ray diagram showing the image formation

b. What is the position of image

c. Write two features of image

d. Where should the object be placed for getting an image having the same size of the object

e. For getting virtual image where should the object be placed

ANSWER KEY

1. a) Air,Water

   b) Water

   c) Path of light deviated

   d) Boundary of mediums

   e) Difference in densities of medium through which light ray passes

2. a) Diamond

   b) Vacuum,Water,Glass,Diamond

   c) Speed of light decreases with increasing optical density of the medium

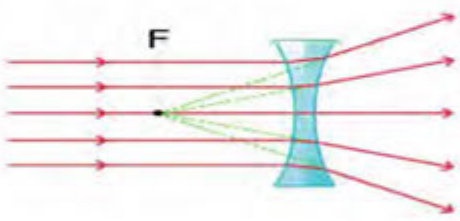
3. a) C,E,b) A,D c) B

4. i) Light ray should obliquely incident from denser medium to rearer medium

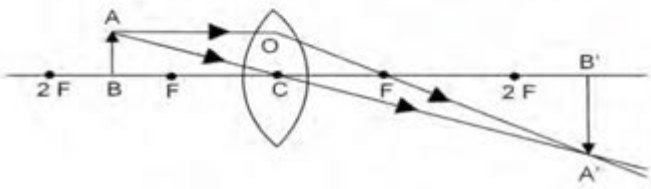
   ii) Angle of incidence should be greater than critical angle
   iii) In Medical field – Endoscope,In Telecommunication - Optical fibre cable
   iv) 90°
   v) Reflection, Refraction

5. P - Optic Centre, F - Principal focus,C - Centre of curvature

6.



7. a.



   b. Beyond 2F
   c. Real, Inverted ,Larger than object
   d. Position of object - At 2F
      Position of image - At 2F
   e. Between focus (F) and Pole(P)

Chapter - 6

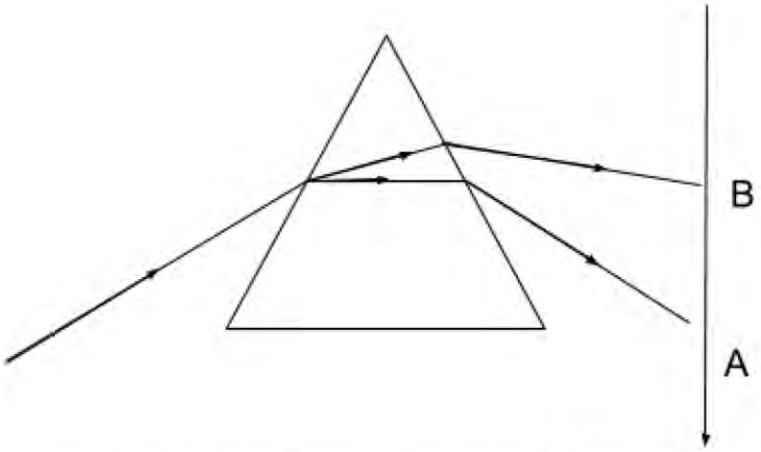
Vision and the world of colours

FOCUS AREA
Dispersion of light,Recombination of colours,Rainbow,Persistence of vision,Scattering of light,Scattering and wavelength

Dispersion of light

- Any light that is composed of more than one colour is a composite light.
- Dispersion is the phenomenon of splitting up of a composite light into its constituent colours.
- The regular array of colours formed by dispersion is the visible spectrum.
- The wavelength is different for different colors. Less violet and more red
- As the wavelength decreases, the deviation due to refraction increases

1 Sunlight splits into components as a result of passing through a prism



a) Which phenomenon is mentioned in the given figure?
b) A light is composed of more than one colour is
c) which are the colours represent A to B
d) what may be the reason behind difference in deviation of colors

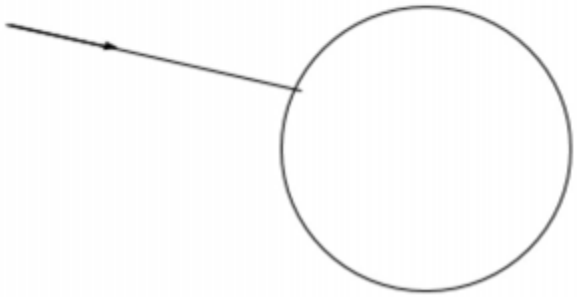
Rainbow

- Sunlight, when it passes through water droplets, undergoes

refraction and internal reflection.

- The light ray emerging from the water droplets which make the same angle with the line of vision have the same colour. These droplets appear in the form of an arc of a particular colour.
- Thus there is red colour at the upper edge and violet colour at the lower
- edge.
- All the other colours are seen in between, depending on their wavelengths.
- When seen from an aeroplane, the rainbow is seen as a circle.

2 Diagram of white light falling on water drop is given below



a) complete the diagram
b) How rainbow occur
c) which are the colours that can be observed in the outer and inner edge of the rainbow.
d) what is the shape of rainbow when we seen from an aeroplane

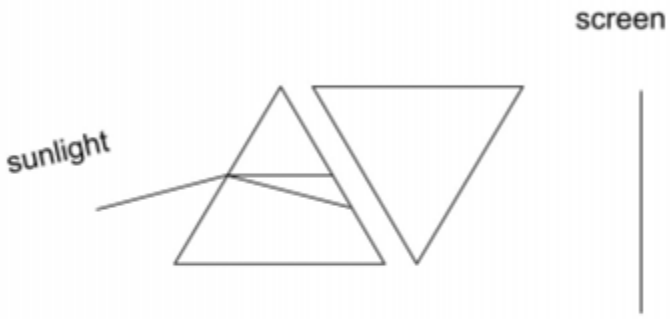
Recombination of colours

- When the constituent colors of white light are added, white light is obtained again.

Persistence of vision

- When an object is viewed by a person, its image remains in the retina of the eye for a time interval of 0.0625s (1/16 s) after seeing it
- The Newton's colour disc appeared white while rotating due to persistence of vision.,
- A torch rotated rapidly appears as an illuminated circle-eg:

3 consider two prism places as in fig.



a) What is the color (colors) that fall on the screen?
b) Why does Newton's colour disc become white when rotating fast.?explain
c) Find out examples of persistence of vision

Scattering of light,Scattering and wavelength

- Scattering is the change in direction brought out by the irregular and partial reflection of light when it hits the particles of the medium.
- As the wavelength decreases, the scattering increases
- Colours like violet, indigo and blue have the smallest wavelengths in sunlight.They undergo maximum scattering while interacting with atmosphere particles.
- Red has comparatively greater wavelength and it can overcome small obstacles and hence scattering is low. As a result they travel greater distances.

4 Even through light travels in straight line we get light in our classrooms

a) What is scattering of light
b) Which colour of light undergoes maximum scattering ? Why
c) During sunrise and sunset the sun becomes red why?
d) Why red colour has been given to tail lamp / signal lights
e) If atmospheric pollution increases near factories , the sky becomes dark .why?

ANSWER KEY

a) Scattering
b) composite light.
c) VIBGYOR
d) The change in direction due to refraction depends on the wavelength. The viollet with the shortest wavelength has greater variation.

2
a) Tb Figure 6.10
b) Sunlight hits the water droplets in the atmosphere and undergoes refraction and total internal reflection. As a result, sunlight is converted into components .This is how the rainbow is formed

c) Violet on the inner edge and red on the outer edge
d) Circular.
3
a white light
b Persistence of vision
TB Page 141
c Raindrops look like a glass rod, the film is made with continuous stills.
4 a) Scattering is the change in direction brought out by the irregular and partial reflection of light when it hits the particles of the medium.
b) Violet - Due to its short wavelength, even small obstacles cannot be overcome.
c) At sunrise, sunlight has to travel farther through the atmosphere, so short-wavelength colors are lost due to scattering.
d) Reds with longer wavelengths have less scattering, so they travel longer distances.
e) As the air pollution increases, the number and size of the particles in the atmosphere increase, causing scattering and loss of all colors.

Chapter - 7

Energy Management

FOCUS AREA

Fossil fuels-coal
CNG,LNG,LPG.LPG and safety
Green energy,Brown energy
Energy crisis-reasons and solutions

1.Fossil fuels are used in industries and vehicles
a)How fossil fuels are formed ?
b)Which is the most abundant fossil fuel on the earth ?
c)Based on the carbon content coal is classified into four groups. Which are them ?
d)Which are the substances obtained by the distillation of coal in the absence of air.
2. You may be using cooking gas in your houses.
a)Which is the fuel using as cooking gas ?
b)LPG is a colourless odourless gas but it produces an odour when there is leakage of LPG.Give reason.
c)It is marked D22 on a LPG cylinder.What do you understand from this?
d) BLEVE is an activity connected with leakage of LPG.What does it mean ?
e) Write two precautions to be taken to avoid accidents due to leakage of LPG
f) What are the disaster management measures to be taken in case of LPG leakage.
3.Find the relationship with the first pair and complete the second pair
a) Kerosene : Petroleum
Ammonia : ……
b) LPG : Butane
CNG :……..
4.Prime Minister dedicated Cochin-Mangalore natural gas pipeline to the Nation-News
a)Which fuel is mentioned in the News ?select from the bracket (CNG,LNG,LPG)
b)What is the significance of this fuel compared to others.
5.Wind Energy is considered as Green Energy.
a)What is meant by Green Energy?
b)What must be done to ensure utilization of Green Energy while constructing a house.
c)Nuclear Energy is considered as Brown Energy. Justify
d)Classify energy from the following sources as Brown Energy and Green Energy
Atomic Reactor, Solar cells,Hydro electric Power, Diesel Engines
6.a)What is meant by Energy crisis.
b)Suggest four ways to reduce Energy Crisis.

7.ENERGY MANAGEMENT .. Answer key

1.a)TB Page 150
b)Coal
c) peat,lignite,anthracite,bituminous coal
d)ammonia,coal gas,coal tar,coke
2.a)LPG
b)Ethyl mercaptan is added as indicator to detect gas leakage.
c)This cylinder has maturity period upto December 2022.
d)When LPG becomes gas ,the container can not accommodate the entire gas.This increases the pressure to a very high level causing a huge explosion.
e) Examine the rubber tube at regular intervals and ensure that it does not have a leakage,turn on the knob of stove only after the regulator is turned on.
f) TB Page 153
3.a) Coal
b)methane
4.a)LNG

b)LNGis liquefied natural gas. It can again be converted to gaseous form at atmospheric temperature and distributed through pipe lines.

5.a)TB Page 165

b)TB Page 166

c) Cause environmental problems including global warming.

d) Green Energy – solar cell,hydro electric power

Brown energy –Atomic Reactor,Diesel engine

6.a) Energy crisis is the consequence of increasing demand but decreasing availability.

b)TB Page 167