Grade 10 Science Tamil Nadu 2018

PART-I

Section-I

$15 \times 1 = 15$

Q1. The correct statement about Neanderthal man is:
(the first human like hominid, started agriculture, ate meat and walked erectly, buried the dead)

Solution:

The first human like hominid and buried the dead

Q2. is a viral disease.
(Typhoid, Leprosy, Rabies, Ringworm)

Solution:

Rabies

Q3. An endocrine gland found in the neck is
(adrenal gland, pituitary gland, thyroid gland, pancreas)

Solution:

Thyroid gland

Q4. In sexual reproduction of flowering plants, the first event involved is
(fertilisation, germination, regeneration, pollination)

Solution:

Pollination

Q5. Sensitive whiskers are found in
(Bat, Elephant, Deer and Cat)
Solution:

Cat

Q6. Nephridia are the excretory organ of
(Protozoans, Coelenterates, Flatworms, Annelids)

Solution:

Annelids

Q7. An example of water-borne disease is
(scabies, dracunculiasis, trachoma, cholera)

Solution:

dracunculiasis and cholera

Q8. A solution that contains water as the solvent is called an aqueous solution. If carbon-disulphide is a solvent in a given solution, then the solution is called
(aqueous solution, non-aqueous solution)

Solution:

Non-aqueous solution

Q9. Citric acid is present in lemon. Apple contains -
(Lactic acid, Malic acid, Tartaric acid, oxalic acid)

Solution:

Malic acid

Q10. Group 16 Elements are called (Carbon family, Chalcogen family, Halogen family, Nitrogen family)

Solution:

Chalcogen family

Q11. The IUPAC name of the first member of alkyne is (ethene / ethyne)

Solution:

Ethyne

Q12. The Screw Gauge is used to measure the diameter of (Crowbar, Thin wire, Cricket ball)

Solution:

Thin wire

Q13. If the radius of the earth is reduced to half-its present value,with no change in the mass, the acceleration due to gravity will be (double that of its original value, four times that of its original value, remains same, reduced to half of its original value)

Solution:

Four times that of its original value

Q14. 30 bulbs are connected in series. If one bulb is fused and the remaining 29 bulbs are connected in series and connected to the same supply, the light in the room will be (increased, decreased, remain the same)

Solution:

Increased

Q15. An electric current passing through a metallic conductor produces a around it (magnetic field, mechanical force, induced current)

Solution:

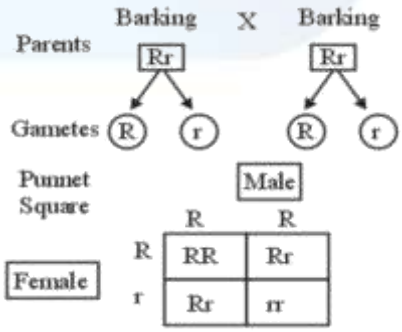
Magnetic field

Section-II

$$20 \times 2 = 40$$

Q16. In dogs the barking trait is dominant over the silent trait. Using Punnet Square work out the possible puppies born to two barking parents with genotype(Rr)

Solution:



RR- Barking

Rr- Barking

rr -Silent

Phenotypic ratio here is Barking: Silent $= 3:1$, while Genotypic ratio is $RR:\text{Rr}:r = 1:2:1$

Characteristics of Puppies:

3 Puppies will bark,

1 Puppy will be silent

Q17. Who proposed the theory of Natural Selection? Mention the two principles of this theory.

Solution:

Charles Darwin the great naturalist and philosopher of 18th century developed the theory of Natural Selection. He published his observations and conclusions under the name 'Origin of species' in 1859. The book of Darwin demonstrates the fact of evolution and elaborates on the theory of Natural selection for evolutionary transformation.

Meanwhile, two principles of the theory are given below:

i. Overproduction- Living beings have the ability to reproduce more individuals and form their own progeny. They have the capacity to multiply in a geometrical manner. This will increase reproductive potential leading to overproduction.

ii. Variations- a characteristic feature of all plants and animals. Small variations are important for evolution. According to Darwin, favourable variations are useful to the organism and unfavourable variations are harmful or useless to the organism.

Q18. What are monoclonal antibodies. Mention its use?

Solution:

Monoclonal antibodies (mAb or moAb) are laboratory produced molecules that are made by identical immune cells and serve as substitute antibodies that can restore, enhance and mimic the immune system's attack on the cancer cells.

Monoclonal antibodies can be used to detect antigens in fixed tissue sections, and they are also good possible treatment for cancer.

Q19. Assertion (A)-Expulsion of excess unused glucose in the blood through urine is observed in a diabetic mellitus person.

Reason (R)- Insulin is not produced in sufficient quantity by pancreas.

(a) Both (A) and (R) are true and (R) explains (A)

(b) Both (A) and (R) are true but (R) doesn't explain (A)

(c) Only (A) is true but (R) is false

(d) (A) is false but (R) is true

Solution:

Both (A) and (R) are true and (R) explains (A)

Q20. Copy and identify the types of neurons given below:

a. 

b. 

Solution:

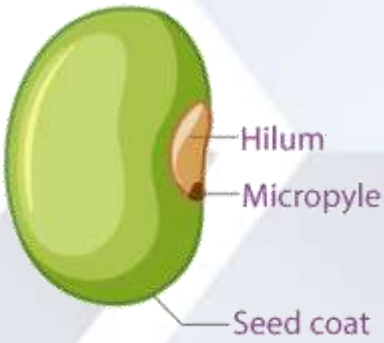
(a) Unipolar: Only one nerve process arises from the cyton, which acts as both axon and dendron. They are found in early embryos but not in adult.

(b) Bipolar Neurons- The cyton gives rise to many dendrons and an axon. They are found in cerebral cortex of brain.

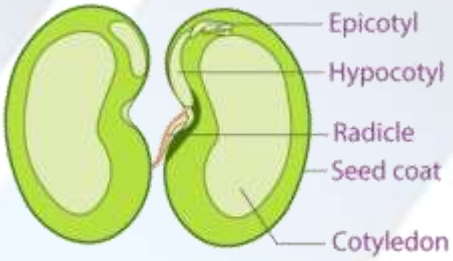
Q21. Draw the given diagram and label the parts.

Solution:

(a) Lateral view of a seed



(b) A mature embryo with its parts



Q22. Mention two unique characteristics of mammals.

Solution:

Mammals are warm-blooded animals who give birth to their younger ones. They also have mammary glands that help them produce milk to feed their younger ones. Two unique characteristics of mammals are:

i) Epidermal Hair

ii) Milk Producing glands

Q23. (a) What are the structural and functional units of a kidney?

(b) Arrange the organs of the human excretory system in the correct order, based on the passage of urine.

Ureter, urethra, kidney, urinary bladder

Solution:

(a) Nephrons are the structural and functional unit of the Kidney. Each kidney contains about 12 million nephrons

(b) The organs of the human excretory system arranged in the correct order, based on the passage of urine is Kidney → Ureter → Urinary Bladder → Urethra.

Q24. (a) What type of dentition is seen in Mammals?

(b) What are modified as tusks in Elephants?

Solution:

(a) Mammals exhibit a type of dentition called heterodont dentition. This means they have different types of teeth that are specialized for various functions. In mammals, the teeth are generally divided into incisors, canines, premolars, and molars, each adapted for different roles such as cutting, tearing, and grinding food. Meanwhile, Mammals have different type of teeth. There are four kinds of teeth in mammals viz. the incisors (I), canines (C), premolars (PM) and molars (M). Hence, the dentition found in mammals are either thecodont or heterodont.

(b) In mammals, actually, the enlarged and elongated canine teeth are the tusks. In the case of Elephants, their large incisors are modified as tusks.

Q25. Sugar is converted into alcohol

(a) In the above reaction, which kind of process takes place?

(b) Which micro-organism is involved in the above reaction?

Solution:

(a) When sugar is converted into alcohol, the fermentation process takes place. During the process of alcoholic fermentation, the glucose is converted into pyruvic acid, which is then transformed and the ethanol and carbon dioxide is formed.

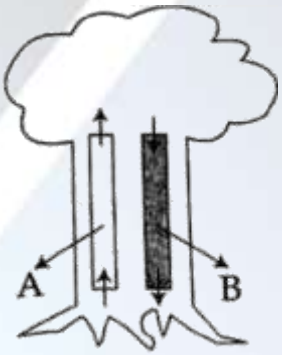
(b) Yeast the single-celled fungi which can perform anaerobic, alcoholic fermentation. They are used for the production of alcohol on a commercial scale.

Q26. A fish taken out of water cannot survive for a long time. Why?

Solution:

Fish use the gills to breathe, instead of lungs. These, gills can function only in water. When the water passes through the fish's gills, it absorbs oxygen from the water and replaces it with carbon dioxide from the fish's bloodstream. The water flows out under the gill's cover and this process is repeated. Now, if the fish is taken out of water, the gills will not be able to function and the fish would stop breathing. Hence, the fish cannot survive for a long time, if taken out of water.

Q27. Types of vascular tissues are given, which are labelled as *A* and *B*



(a) Name A and B

(b) How do the materials in A move upwards to the leaves?

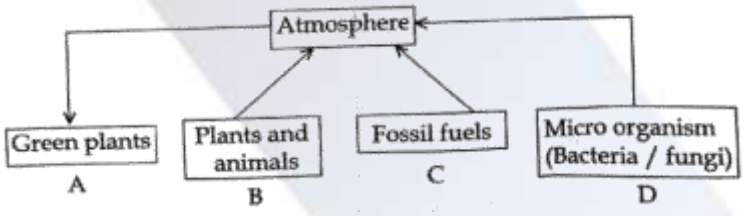
Solution:

(a) Here, in the picture for vascular tissues. A is the Xylem and B the Phloem.

(b) The materials in A (Xylem) move upwards to the leaves through a process called transpiration**.** Transpiration is the loss of water vapor from the aerial parts of the plant, primarily through the stomata in the leaves. This process creates a

negative pressure within the xylem vessels, pulling water and dissolved minerals upward from the roots to the leaves. Additionally, root pressure and capillary action also contribute to the upward movement of water in the xylem.

Q28. Observe the following bio-geo chemical cycle.



(a) Mention the nutrient in the given cycle?

(b) Write the activities from "A" to "D".

Solution:

(a) Carbon-di-oxide is the nutrient in the given cycle.

(b) The activities from A to D include Photosynthesis, respiration, combustion and decomposition. Carbon dioxide in the atmosphere is taken up by the green plants and other photosynthetic organisms and is converted into organic molecules that travel through the food chain. Carbon atoms are then released as carbon dioxide when organisms respire. The formation of fossil fuels and sedimentary rocks contribute to the carbon cycle for very long periods.

Q29. What is energy management?

Solution:

Energy management can be defined as a planned and organised management of energy use in a building or an organisation, to satisfy both the economic and the environmental requirements. Meanwhile, when it comes to energy saving, energy management is also the process of monitoring, controlling and conserving energy.

Q30. Correct the statements, if they are wrong:

(a) India is called the 'country of winds'

(b) Propane is the chief component of natural gas

Solution:

(a) Statement is incorrect. Denmark is called the 'country of winds'.

(b) Statement is correct. Methane is the chief component of natural gas.

Q31. Match the renewable and non-renewable sources

Sources	A	B	C
Renewable	Coal	Wind	Petroleum
Non-renewable	Hydrogen	Natural Gas	Solar Energy

Solution:

Sources	A	B	C
Renewable	Coal	Natural Gas	Solar Energy
Non-renewable	Hydrogen	Wind	Petroleum

Q32. Take 30 gm of common salt and dissolve it in 70 gm of water. Find the concentration of solution in terms of weight percent.

Solution:

Mass of solute (salt) = 30 g

Mass of solvent (water) = 70 g

Now, Mass of solution = Mass of solute + Mass of solvent = 30 g + 70 g = 100 g

Meanwhile, concentration of solution = (mass of solute / mass of solution) × 100 = (30/100) × 100 = 30%

Q33. Radha prepared a solution, which could be separated by filtration.

(a) Name the type of solution.

(b) Is the solution transparent or opaque?

(c) Mention the nature of the solution.

(d) Mention the size of the solute particle.

Solution:

(a) Suspension solution is the solution that can be separated by filtration

(b) Since the solute particles are insoluble in the solvent and remain suspended in the solution, we cannot see through them. Hence, the solution is opaque.

(c) Suspension solutions are heterogeneous mixtures and the solute particles are not uniformly distributed in the solvent.

(d) The suspension solutions have the biggest particles of the size greater than 2000 Å, while true solutions have the least particle size followed by colloidal solution particles.

Q34. Complete the table given below:

Element	Atomic mass	Molecular mass	Atomicity Number
Chlorine	35.5	71	
Ozone		48	3
Sulphur	32		8
Nitrogen	14		2

Solution:

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Element	Atomic mass	Molecular mass	Atomicity Number
Chlorine	35.5	71	2
Ozone	16	48	3

Sulphur	32	256	8
Nitrogen	14	28	2

Q35. If acetic and hydrochloric acid of same concentration are taken, which among the two is a stronger acid and why?

Solution:

Acid that completely dissociates in water is the stronger acid. Hydrochloric acid is a stronger acid, which completely ionizes in an aqueous solution.

Q36. The pH values of certain familiar substances are given below:

Substance	pH Value
Lemon Juice	2.2 – 2.4
Tomato Juice	4.1
Coffee	4.4 – 5.5
Household Ammonia	12.0

Analyse the data given in the table and answer the following questions:

(a) Which substances are acidic in nature?

(b) Which substances are basic in nature?

Solution:

pH scale is for measuring the hydrogen ion concentration in a solution. Acids have pH less than 7 , while Bases have pH greater than 7 .

(a) Lemon Juice, Tomato Juice and Coffee are all substances that are acidic in nature

(b) Household Ammonia is basic in nature

Q37. Match the following:

Ore	Formula

(a)Bauxite	Fe_2O_3
(b)Cuprite	Cu_2O
(c)Haematite	$CuFeS_2$
(d)Copper pyrites	$Al_2O_3.2H_2O$

Solution:

Ore	Formula
(a)Bauxite	$Al_2O_3.2H_2O$
(b)Cuprite	Cu_2O
(c)Haematite	Fe_2O_3
(d)Copper pyrites	$CuFeS_2$

Q38. Assertion: In thermite welding aluminium powder and Fe_2O_3 are used.

Reason: Aluminium powder is a stronger reducing agent. Does the reason satisfy the assertion?

Solution:

Yes, thermite welding is a combination of aluminium powder and Fe_2O_3

Aluminium powder is used as it is a strong reducing agent. Thus, we can conclude that the reason does satisfy the assertion.

Q39. Read each description below and say whether it fits ethanol or ethanoic acid.

(a) It is a clear liquid with burning taste

(b) It is used to preserve biological specimens in laboratories

(c) It is used to preserve food and fruit juices

(d) On cooling, it is frozen to form ice-flakes, which look like a glacier

Solution:

(a) Ethanol is a clear liquid with burning taste

(b) Ethanol is used to preserve biological specimens in laboratories

(c) Ethanoic acid is used to preserve food and fruit juices

(d) On cooling, Ethanoic acid is frozen to form ice-flakes, which look like a glacier

Q40. Why does a spanner have a long handle?

Solution:

Moment of force = Force × perpendicular distance = $F \times d$

Spanner has a long handle, because it facilitates an increased torque with just a small application of force. So, in order to do the desired function only less force needs to be used.

Q41. If an angel visits an asteroid called B 612, which has a radius of 20 m and mass of 104 kg , what will be the acceleration due to gravity in B612 ?

Solution:

Given that the formula of acceleration due to gravity is given by, $g = GM/R^2$

G - Universal Constant $-6.67 \times 10^{-11} \mathrm{Nm^2/kg^2}$

M - Mass of asteroid $= 104$ kg

R - Radius of Asteroid - 20 m

Acceleration due to gravity $g = \frac{GM}{R^2}$

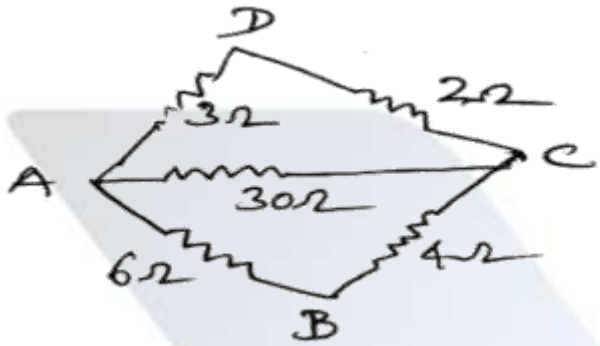
$$= \frac{6.67 \times 10^{-11} \times 104}{(20)^2}$$

$$= \frac{693.68 \times 10^{-11}}{400}$$

$$= 1.7342 \times 10^{-11}$$

$$= 1.73 \times 10^{-11} \ \mathrm{m/s^2}$$

Q42. Find the effective resistance across the end AC



Solution:

R1+ R2 = 3 + 2 = 5 Ohm

Also, R4+ R5=6+4=10 Ohm

Meanwhile, R3=30 Ohm

Now, all these are in parallel.

Hence,

$$\frac{1}{Rp} = \frac{1}{3+2} + \frac{1}{30} + \frac{1}{6+4}$$

$$= \frac{1}{5} + \frac{1}{30} + \frac{1}{10}$$

$$= 6 + 1 + \frac{3}{30}$$

$$= \frac{10}{30}$$

$$= \frac{1}{3}$$

$$= 3\Omega$$

Therefore, $R_p = 3$ Ohm.

Q43. Complete the table choosing the right terms within the brackets (Zinc, Copper, Carbon, Lead, Lead Dioxide, Aluminium)

+ve electrode	Lead Acid Accumulator	
-ve electrode	Lechlanche	

Solution:

+ve electrode	Lead Acid Accumulator	Lead dioxide
-ve electrode	Lechlanche	Zinc

Q44. Match the following:

(a)Charge (Q)	$I^2 \times RX$
(b)Work done(W)	I X t
(c)Heat Energy(H)	R X I
(d) Potential Difference(V)	V X Q

Solution:

(a)Charge (Q)	$I \times t$
(b)Work done(W)	$V \times Q$
(c)Heat Energy(H)	$I^2 \times R \times t$
(d) Potential Difference(V)	$R \times I$

Q45. Fill in the blanks:

a. Motor : A Permanent magnet ; then Commercial magnet :

b. Focal length of a lens : metre ; Power of a lens :

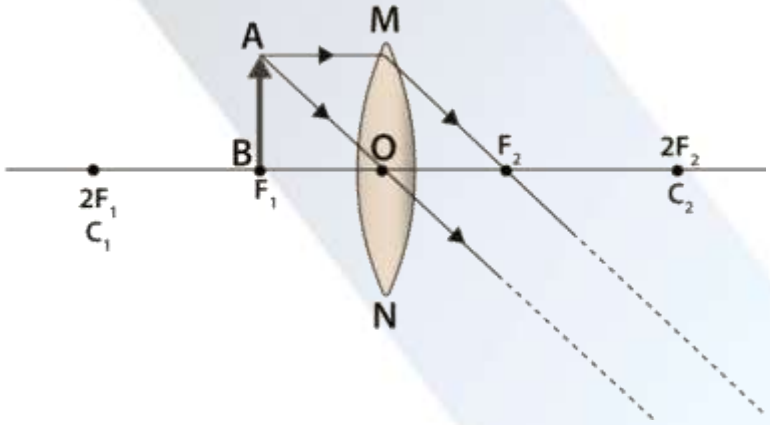
Solution:

(a) Electromagnets

(b) Dioptre $(-m)$

Q46. If an object is placed at the principal focus, F_1 of a convex lens, draw the ray diagram for the image formation.

Solution:



Q47. Light enters from air to kerosene having refractive index of 1.47. What is the speed of light in kerosene, if the speed of light in air is $3 \times 10^{\circ}\text{m/s}$?

Solution:

Speed of light in air $c = 3 \times 10^8 \text{m/s}$
Refractive index of kerosene $= \mu = 1.47$

$$\mu = \frac{c}{v}$$

$$1.47 = \frac{3 \times 10^8 0\text{m/s}}{v} \text{v} = \frac{3 \times 108.}{1.47}$$

$$= 2.04^2 \times 10^8 \text{m/s}$$

Therefore, Speed of light in kerosene is 2.04×10^8 m/s.

Section-III

$4 \times 5 = 20$

Part-I

Q48. (a) How is Tuberculosis transmitted?

(b) How does Tuberculosis affect our body?

(c) What is the causative agent of Tuberculosis?

(d) How can it be prevented? (any three)

Solution:

(a) Tuberculosis (TB) is transmitted through the air when a person with active TB disease in their lungs coughs, sneezes, speaks, or sings, releasing tiny droplets containing the bacteria into the air. Other people can then inhale these droplets and become infected.

(b) TB primarily affects the lungs (pulmonary TB), but it can also spread to other parts of the body such as the kidneys, spine, and brain (extrapulmonary TB). Symptoms of pulmonary TB include a persistent cough, chest pain, and coughing up blood or sputum. TB infection can lead to severe lung damage and if untreated, it can be fatal. In extrapulmonary TB, symptoms vary based on the affected organs but can include pain, swelling, and systemic symptoms like fever and weight loss.

(c) Humans are affected by the Mycobacterium tuberculosis, while another species Mycobacterium Bovis, affects the animals. Mostly, all infections are airborne and are caused due to inhalation of the droplet nuclei.

(d) Suggestions or precautions to follow in order to prevent tuberculosis are given below:

- Keeping oneself healthy and avoiding unsanitary conditions, overcrowding and poor-ventilation.
- Sunlight and fresh air are important agents that act as natural disinfectants, readily destroying the germs.
- Isolation of the patients and frequent sterilization of articles used by them are also important.
- Incineration (burning) of cloth / clothes containing droplets / the sputum of the patients can prevent infection.
- Immunization with BCG vaccine is an effective measure to prevent this disease.

- The patient should cover his/her mouth and nose while coughing and sneezing.

Q49. List out the various parts of the human brain and write notes on the functions.

Solution:

Major parts of the human brain includes the Forebrain, Midbrain and the Hindbrain.

Major Parts	Sub Divisions	Functions
Fore brain	Cerebrum	Intersensory associations, memory communication, imagination reasoning, hearing, speaking, seeing, tasting, smelling etc
	Thalamus	A major conducting center for sensory and motor signaling
	Hypothalamus	Control body temperature, urge to eat and drink, regulation of sexual behavior, emotional reaction like excitement, anger, fear, pressure and motivation
Mid brain	Corpora Quadrigemina	Control and regulates visual reflexes and optical orientation
Hind brain	Cerebellum	Regulates and coordinates the movements of voluntary muscles as in walking or running
	Pons	It relays the information from the Cerebrum to the Cerebellum, Controls sleep and respiratory centers
	Medulla oblongata	Regulation of heart beat, blood vessel contraction, breathing

Part-II

Q50. Write the two events involved in the sexual reproduction of a flowering plant.

(a) Discuss the first event and explain its types.

(b) Mention the advantages and disadvantages of the event.

Solution:

The two events involved in the sexual reproduction of a flowering plant are (i) pollination and (ii) fertilisation.

(a) First event that occurs is Pollination.

Pollination is the process of transferring pollen grains from the anther (male part) to the stigma (female part) of a flower.

Types of Pollination

- Self-Pollination (Autogamy)

Autogamy: Pollen from the anther of a flower is transferred to the stigma of the same flower.

Geitonogamy: Pollen from the anther of a flower is transferred to the stigma of another flower on the same plant.

- Cross-Pollination (Allogamy)

Entomophily: Pollination by insects.

Anemophily: Pollination by wind.

Hydrophily: Pollination by water.

Ornithophily: Pollination by birds.

(b) Advantage and disadvantage of the event

Advantages:

• Promotes genetic diversity, enhancing plant species' adaptability and survival.

• Minimizes inbreeding depression risks, resulting in stronger offspring.

• Enhances resilience against diseases and environmental changes.

Disadvantages:

• Dependence on external pollinators, making the process less reliable.

• Energy and resource intensive, requiring plants to produce attractants and structures.

• Less genetic variation, potentially making plants more vulnerable to diseases and environmental changes.

Q51. We are surrounded by smoke. Is this situation good for our health? Give reason.

Solution:

No the situation is not good for our health. Reason for this are given below:

- If the smoke is above a certain level in the then it can cause allergy and irritation to the eyes.
- This could also lead to respiratory infection such as bronchitis or pneumonia
- If you inhale the air containing pollutants from the smoke, it could be harmful for the body
- Smoke also causes lung cancer or heart disease and so on
- Smoke could result in difficulty in breathing, asthma, wheezing etc.

Part-III

Q52. Find how many moles of atoms are there in:

(a) 7 g of Nitrogen

(b) 4.6 g of Sodium

(c) 40 g of Calcium

(d) 14 g of Lithium

(e) 3.2 g of Sulphur

Solution:

(a) Number of moles = Number of moles $= \frac{\text{Given mass}}{\text{Atomic mass}} = \frac{7}{14} = 0.5$ mole

(b) Number of moles = Number of moles $= \frac{\text{Given mass}}{\text{Atomic mass}} = \frac{4.6}{23} = 0.2$ mole

(c) Number of moles = Number of moles $= \frac{\text{Given mass}}{\text{Atomic mass}} = \frac{40}{40} = 1$ mole

(d) Number of moles = Number of moles $= \frac{\text{Given mass}}{\text{Atomic mass}} = \frac{14}{7} = 2$ mole

(e) Number of moles = Number of moles $= \frac{\text{Given mass}}{\text{Atomic mass}} = \frac{3.2}{32} = 0.1$ mole

Q53. Organic compounds A and B are isomers with the molecular formula C_2H_0O. Compound A produce hydrogen gas with sodium metal, whereas compound ' B ' does not. Compound A reacts with acetic acid in the presence of concentrated

H_2SO_4 to form compound C with fruit flavour.

What are the isomers A, B and the compound ? Write suitable chemical equations.

Solution:

1. Organic compound A, ethyl alcohol or ethanol is C_2H_5OH and B is dimethyl ether ($CH_3 - 0 - CH_3$). These two are isomers with molecular formula C_2H_6O.

2. Ethanol reacts with the metal Sodium to form sodium ethoxide and hydrogen gas: $2C_2H_5OH + 2Na \rightarrow 2C_2H_5ONA + H_2$

3. Ethanol also reacts with ethanoic acid, and in the presence of conc. H_2SO_4, it forms ethyl ethanoate and water with fruity flavour

A- Ethyl Alcohol (Ethanol) - C_2H_5OH

B- Di methyl ether ($CH_3 - O - CH_3$)

C- Ethyl Ethnoate ($CH_3COOC_2H_5$)

Part - IV

Q54. State law of conservation of momentum and prove it.

Solution:

Law of conservation of momentum: 'In the absence of external and balanced force, the total momentum of the system of the objects remain unchanged.'

Let's consider two objects (Object A and Object B) interacting with each other in a closed system.

Before Interaction

Object A has mass m_A and initial velocity u_A.

Object B has mass m_B and initial velocity u_B.

The total initial momentum of the system is:

Initial Total Momentum $= m_Au_A + m_Bu_B$

After Interaction

Object A has final velocity v_A.

Object B has final velocity v_B.

The total final momentum of the system is:

$$\text{Final Total Momentum } = m_A v_A + m_B v_B$$

Interaction and Forces

During interaction, according to Newton's Third Law, the forces between the two objects are equal and opposite:

$$F_{AB} = -F_{BA}$$

Using Newton's Second Law, for the duration of interaction Δt :

$$F_{AB} = m_A \frac{(v_A - u_A)}{\Delta t}$$

$$F_{BA} = m_B \frac{(v_B - u_B)}{\Delta t}$$

Since $F_{AB} = -F_{BA}$:

$$m_A \frac{(v_A - u_A)}{\Delta t} = -m_B \frac{(v_B - u_B)}{\Delta t}$$

Simplifying:

$$m_A(v_A - u_A) = -m_B(v_B - u_B)$$

Rearranging terms:

$$m_A v_A + m_B v_B = m_A u_A + m_B u_B$$

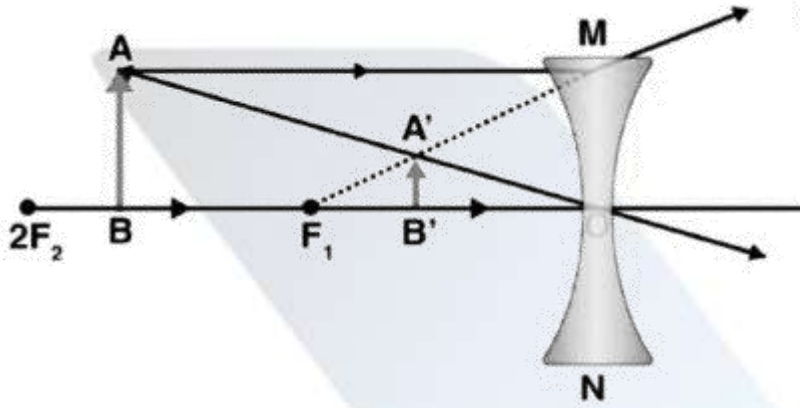
This equation shows that the total momentum after the interaction (left side) is equal to the total momentum before the interaction (right side), thus proving the law of conservation of momentum.

Q55. (a) The diagram shows an object ' O ', and its image 'I' formed by a lens. In the diagram, draw the lens and the rays to show how the image is formed. Mark focus F, of the lens. Name the lens.

(b) Mention any two achievements of Hubble Telescope.

Solution:

(a) Here, you can see that the image is erect and diminished, hence the concave lens have been used.



(b) Hubble telescope produces extremely sharp images with almost no background light The ultra deep field images by Hubble are the most visible light image. These are also the most detailed image, ever made of the universe's most distant object. Hubble telescope also revealed that black holes are common to the centres of the galaxies.