CBSE Class 09 Science

Sample Paper 08 (2020-21)

Maximum Marks: 80

Time Allowed: 3 hours

General Instructions:

i. The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.
ii. Section–A - question no. 1 to 20 all questions and parts thereof are of one mark each. These questions contain multiple-choice questions (MCQs), very short answer questions and assertion - reason type questions. Answers to these should be given in one word or one sentence.
iii. Section–B - question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should in the range of 30 to 50 words.
iv. Section–C - question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should in the range of 50 to 80 words.
v. Section–D - question no. 34 to 36 are long answer type questions carrying 5 marks each. Answers to these questions should be in the range of 80 to 120 words.
vi. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
vii. Wherever necessary, neat and properly labeled diagrams should be drawn.

Section A

1. How many moles does 24 g of Mg contain?

OR

An element X has valency 3 while the element Y has valency 2. Write the formula of the compound between X and Y.

2. What is the nature the solution formed by mixing mustard oil and water?
3. We generally mount the material in the slide

a. In the centre of slide
b. On the right side of slide
c. On the left side of slide
d. Both On the right side of slide and On the left side of slide

4. In brief state what happens when **Rheo leaves** are boiled in water first and then a drop of sugar syrup is put on it?
5. Name the scientist who proved for the first time that objects move with constant speed when no force acts on them.
6. Name the organelle which show the analogy as packaging and dispatching unit of the cell.

OR

What is hypotonic solution?

7. Define carriers. Give two examples.
8. Name the Indian philosopher who proposed the theory of matter.
9. What is meant by a substance?

OR

Name the technique to separate:-
(i) butter from curd
(ii) salt from sea-water
(iii) camphor from salt

10. Plasma membrane is made up of which two components?
11. What is the simplest type of motion?

OR

When is an object in motion considered to be a point object?

12. Who found out the value of gravitational constant (G)?
13. What do you mean by an impact force?
14. **Assertion:** Parenchyma tissue consists of relatively unspecialized cells with thin cell walls and is usually loosely packed.
Reason: They do not have spaces between them.
a. Both A and R are true and R is the correct explanation of assertion.

b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

15. **Assertion:** Inertia is that property of the body due to which it resists a change in its state of rest or of uniform motion.
Reason: Heavy objects have less inertia than lighter objects.
a. Both A and R are true and R is the correct explanation of assertion.
b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

OR

Assertion: If we kick a football it will move a long way.
Reason: The inertia of an object is measured by its mass.
a. Both A and R are true and R is the correct explanation of assertion.
b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

16. **Assertion:** According to Octet's rule, the maximum number of electrons that the outermost shell of an electrically neutral and chemically stable atom can have is 2'.
Reason: Hydrogen and helium have only 2 electrons.
a. Both A and R are true and R is the correct explanation of assertion.
b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

17. **Read the passage and answer any four question**

Atoms are too small, or they are smaller than anything that we can imagine or compare with. Our entire world is made up of atom. Dalton was the first scientist to use the symbols for elements in a very specific sense.
When he used a symbol for an element he also meant a definite quantity of that element, that is, one atom of that element. In the beginning, the names of elements were derived from the name of the place where they were found for the first time. For example, the name copper was taken from Cyprus. Many of the symbols are the first one or two letters of the element's name in English. The first letter of a symbol is always written as a capital letter (uppercase) and the second letter as a small letter (lowercase)

i. 1m is equal to nm
   a. 10^{10}
   b. 10^{9}
   c. 10^{8}
   d. 10^{6}
ii. ⊕ is the symbol of
   a. sulphur
   b. iron
   c. silver
   d. mercury
iii. Who suggested the symbol of elements are made from one or two-letter of the atom?
   a. Proust
   b. Berzelius
   c. Boyle
   d. Robert
iv. Law of constant proportion is given by:
   a. Proust
   b. Lavoisier
   c. Dalton
   d. Berzelius
v. Full form of IUPAC

a. International Union of Pure and Applied Chemistry
b. International Unity of Pure and Applied Chemistry
c. Indian Union of Pure and Applied Chemistry
d. none of these

18. **Read the passage and answer any four questions:**

Many microbial agents can commonly move from an affected person to someone else in a variety of ways. Disease-causing microbes can spread through the air. This occurs through the little droplets thrown out by an infected person who sneezes or coughs. Someone standing close by can breathe in these droplets, and the microbes get a chance to start a new infection. Diseases can also be spread through water. This occurs if the excreta from someone suffering from an infectious gut disease. The sexual act is one of the closest physical contact two people can have with each other. Not surprisingly, there are microbial infections such as syphilis or AIDS. Many diseases will be transmitted by other animals. These animals carry the infecting agents from a sick person to another potential host.

i. The disease which spread from an infected person to a healthy person is called
   a. communicable disease
   b. non-communicable
   c. infectious diseases
   d. none of these

ii. Which of the following spread through the air
   a. Common cold
   b. Pneumonia
   c. TB

d. All of these

iii. AIDS cannot be transmitted by
   a. Sexual contact
   b. Hugs
   c. Breastfeeding
   d. Blood transfusion

iv. If you live in an overcrowded and poorly ventilated house, it is possible that you may suffer from which of the following diseases:
   a. cancer
   b. AIDS
   c. Air borne diseases
   d. Cholera

v. Which disease is not transmitted by mosquitoes?
   a. Dengue
   b. Malaria
   c. Brain fever
   d. Pneumonia

19. **Read the passage and answer any four question**

A more powerful vehicle would complete a journey in a shorter time than a less powerful one. The speed with which these vehicles change the energy or do work is a basis for their time to complete the journey. Power measures the speed of work done, that is, how fast or slow work is done. The power of an agent may vary with time. This means that the agent may be doing work at different rates at different intervals of time. If this machine is used continuously for one hour, it will consume 1 kW h of energy. Thus, 1 kW h is the energy used in one hour at the rate of 1000 J s^{-1}s-1. The energy used in households, industries, and commercial establishments are usually expressed in kilowatt-hour.

i. SI unit of power is
   a. watt
   b. joule
   c. newton
   d. meter

ii. Power is defined as

a. the rate of doing work
b. the rate of transfer of energy
c. both the rate of doing work and the rate of transfer of energy
d. neither the rate of doing work nor the rate of transfer of energy

iii. 1 watt is equal to work at the rate of

(I) 1 joule per second

(II) 1 joule per hour

(III) 1 joule per minute

(IV) 4 joule per hour

Choose the correct option among the following

a. Only (I)
b. (I) and (IV)
c. (II) and (III)
d. (II) and (IV)

iv. An electric bulb of 60 W is used for 6 h per day. Calculate the 'units' of energy consumed in one day by the bulb.

a. 0.76 unit
b. 0.36 unit
c. 0.98 unit
d. 0.76 unit

v. Which of the following statement are incorrect

(I) A bird sitting on tree possess potential energy only

(II) A stationary object may have energy

(III) A flying bird has kinetic energy only

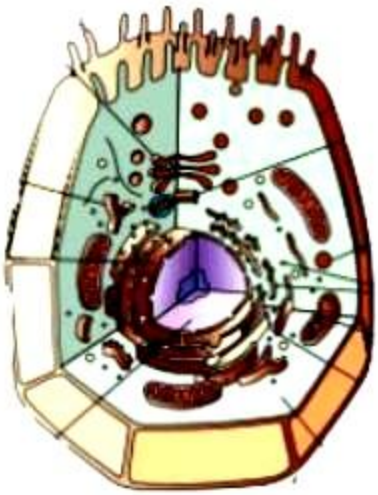
(IV) An aero plane running on the run- way possess kinetic & potential energy both

a. III and IV
b. I and III
c. II and III
d. II and IV

20. **Read the passage and answer any four questions:**

Cell organelles are enclosed by membranes. Cell organelles are the endoplasmic reticulum, Golgi apparatus, lysosomes, mitochondria and plastids. The endoplasmic

reticulum (ER) is a large network of membrane-bound tubes and sheets. It looks like long tubules or round or oblong bags. There are two types of ER rough endoplasmic reticulum (RER) and smooth endoplasmic reticulum (SER). RER looks rough under a microscope because it has particles called ribosomes attached to its surface. The ribosomes, which are present in all active cells, are the sites of protein manufacture. The Golgi apparatus, first described by Camillo Golgi, consists of a system of membrane-bound vesicles arranged approximately parallel to each other in stacks called cisterns.



i. Which of the following are covered by a single membrane?
   a. Mitochondria
   b. Vacuole
   c. Lysosome
   d. Plastid

ii. Which cell organelle plays a crucial role in detoxifying many poisons and drugs in a cell?
   a. Golgi apparatus
   b. Lysosomes
   c. Smooth endoplasmic reticulum
   d. Vacuoles

iii. The cell organelle involved in forming complex sugars from simple sugars are:
   a. endoplasmic reticulum
   b. ribosomes
   c. plastids
   d. golgi apparatus

iv. Find out the correct sentence about the Endoplasmic reticulum.

I. Enzymes packed in lysosomes are made through RER.

II. Rough endoplasmic reticulum and smooth endoplasmic reticulum produce lipid and protein respectively.

III. The endoplasmic reticulum is related to the destruction of the plasma membrane.

IV. The SER helps in the manufacture of fat molecules or lipids.

choose a suitable answer from the following:

a. (I) and (II)
b. (II) and (III)
c. (III) and (IV)
d. (IV) and (I)

v. Which of these is not related to the endoplasmic reticulum?

a. It behaves as a transport channel for proteins between the nucleus and cytoplasm.
b. It transports materials between various regions in the cytoplasm.
c. It can be the site of energy generation.
d. It can be the site for some biochemical activities of the cell.

Section B

21. Why is it not possible to distinguish particles of a solute from the solvent in solution?

OR

Two miscible liquids A and B are present in a solution. The boiling point of A is $60^{o}C$ while that of B is $90^{o}C$. Suggest a method to separate them.

22. Explain the Colloid.
23. Why is epidermis important for the plants?

OR

Write about the functions of (a) Epidermis (b) Cork (c) Stomata

24. A person met with an accident in which two long bones of the hand were dislocated. What could be the reason?

25. The average time taken by a normal person to react to an emergency is one fifteenth of a second and is called the 'reaction time'. If a bus is moving with a velocity of 60 kmh^{-1} and its driver sees a child running across the road, how much distance would the bus had moved before he could press the brakes? The reaction time of the people increases when they are intoxicated. How much distance had the bus moved if the reaction time of the driver were 1/2 s under the influence of alcohol?
26. Give any two uses of kinetic energy.

Section C

27. A stone is thrown vertically upward with an initial velocity of 40 m/s. Taking $g = 10m/s^2$, find the maximum height reached by the stone. What is the net displacement and the total distance covered by the stone?

OR

A stone is dropped to a height of 100m from earth. At the same time, another stone is thrown vertically upwards from a ground with a velocity of 50m/s. At what height both the stones meet?

28. Justify giving proper reasoning whether the work done in the following cases is positive or negative
    a) Work done by a man in lifting a bucket out of a well by means of a rope tied to the bucket
    b) Work done by gravitational force in the above case.
29. How would you confirm that a colourless liquid given to you is pure water?
30. How can the disease be prevented?
31. Calculate the number of neutrons present in the nucleus of an element 'X' which is represented as $^{31}_{15}X$.
32. A sample of ammonia weighs 3.00 g. What mass of sulphurtrioxide contains the same number of molecules as are in 3.00 g ammonia?
33. A body travels along a circular path of radius 70 m. After travelling half a revolution in 20 s, find the
    (i) average velocity,
    (ii) average speed.

Section D

34. Derive the law of conservation of linear momentum from Newton's third law?

OR

Two identical bullets are fired one by a light rifle and another by a heavy rifle with the same force. Which rifle will hurt the shoulder more and why?

35. Diagrammatically show the difference amongst three types of muscle fibres.
36. What is the gold foil experiment? Name the scientist who performed this experiment. Write the conclusions and shortcomings of Rutherford's model of atom.

OR

i. Write two differences between isotopes and isobars.
ii. Write uses of Co-60 and U-235.

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Solution

Section A

1. Moles = $\frac{\text{Given mass of Mg}}{\text{Atomic mass of Mg}} = \frac{24}{24} = 1$ mol

   $\therefore$ 24 g of Mg contain 1 mole.

OR

The formula of the compound between X and Y is X_2Y_3.

2. It is a colloidal solution known as emulsion.
3. (a) In the centre of slide

   Explanation: In the centre of slide
4. When Rheo leaves are boiled in water first and then a drop of sugar syrup is put on it, osmosis does not occur due to the death of the cells of the leaf.
5. Galileo Galilei. (Galileo's law of inertia)
6. The organelle that shows the analogy as the packaging and dispatching unit of the cell is Golgi complex.

OR

A solution having solute concentration lower than that of the cell sap is called hypotonic solution.

7. Carriers are the organisms which harbor disease-causing germs without showing away sign of disease themselves, but have the ability to infect other healthy individuals. For Example – Housefly, female insect Anopheles.
8. Kanad proposed the theory of matter around 600 BC.
9. A substance can be defined as a kind of matter whose constituent particles cannot be separated from each other by any physical process since they are all similar in chemical properties.

OR

(i) Technique to separate butter from curd: **Centrifugation**

(ii) Technique to separate salt from sea-water: **Evaporation**

(iii) Technique to separate camphor from salt: **Sublimation**

10. Plasma membrane is made up of lipids and proteins.
11. Motion in a straight line.

OR

The object in motion is considered to be a point object if the distance it travels is very large as compared to the dimensions of the object.

12. Henry Cavendish
13. The force produced by the impact of a fast moving object on another is called impact force.In mechanics,an impact is a high force or shock applied over a short time period when two or more bodies collide.
14. (c) A is true but R is false.

    Explanation: Parenchyma tissue consists of relatively unspecialized cells with thin cell walls. They are live cells. They are usually loosely packed so that large spaces between them.
15. (c) A is true but R is false.

    Explanation: Inertia is that property of the body due to which it resists a change in its state of rest or of uniform motion. Heavy objects have more inertia than lighter objects. For example, if we kick a stone it will not move because of high inertia but if we kick a football, it will move a long way.

OR

(a) Both A and R are true and R is the correct explanation of assertion.

Explanation: Heavy objects have more inertia than lighter objects. For example, if we kick a stone it will not move because of high inertia but if we kick a football, it will move a long way. Thus the inertia of an object is measured by its mass.

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

    Explanation: The Octet rule states that the maximum number of electrons that the outermost shell of an electrically neutral and chemically stable atom can have is 8. However, there is an exception: If the atom has only one shell, it can hold only 2

electrons. For example, hydrogen and helium can have only 2 electrons (duplet).

17. i. (b) 10^9
    ii. (a) sulphur
    iii. (b) Berzelius
    iv. (a) Proust
    v. (a) International Union of Pure and Applied Chemistry
18. i. (a) communicable disease
    ii. (d) all of these
    iii. (b) Hugs
    iv. (c) Air borne diseases
    v. (d) Pneumonia
19. i. (a) watt
    ii. (c) both the rate of doing work and the rate of transfer of energy
    iii. (a) Only (I)
    iv. (b) 0.36 unit
    v. (a) III and IV
20. i. (b) Vacuole
    ii. (c) Smooth endoplasmic reticulum
    iii. (d) golgi apparatus
    iv. (d) (IV) and (I)
    v. (c) It can be the site of energy generation.

Section B

21. A true solution consists of a solute and a solvent. The diameter of solute particles is of the order of 1 nm or less. These particles like that of sugar or salt break down to almost molecular size and make the true solution homogeneous in nature. The solute and solvent particles are very small and cannot be distinguished from each other even under a microscope.

OR

The separation can be done by the process of simple distillation. The vapours of the liquid A will rise in the flask when heated to a temperature of 60^oC. They will pass through the condenser and will be collected as distillate. The liquid B with higher

boiling point will remain in the flask.

22. A colloid is a kind of heterogeneous mixture/solution in which the particle size is between 10^{-7}cm and 10^{-5}cm such that the solute particles neither dissolve nor settle down. Colloids have a dispersion medium and a dispersed phase. E.g. Smoke, milk, shaving cream, jelly, cheese, etc.
23. The outermost protective covering of the plants is called the epidermis. It is important for the plants due to its functions.

    a) The main function of epidermis is protection against water loss. In desert plants, epidermal cells secrete a waxy, water-resistant layer of cutin on the outer surface of the plants which reduces loss of water.
    b) It also consists of small pores called stomata which help in the exchange of gases with the atmosphere.
    c) The function of the epidermal cells of the roots is absorption of water from the soil.
    d) It also aids against mechanical injury and invasion by parasitic fungi.

    OR

    (a) Epidermis – Epidermis is the outermost continuous layer of cells without intercellular spaces. Its main function is protection against water loss. In some plants like desert plants, epidermal cells secrete a waxy, water-resistant layer of cutin on the outer surface of the plants which reduces loss of water. It also aids against mechanical injury and invasion by parasitic fungi. Function of the epidermal cells of the roots is water absorption from the soil.
    (b) Cork – Cork or bark of the tree is protective in function. Cells of cork are dead and compactly arranged without intercellular spaces. They also have a chemical called suberin in their walls that makes them impervious to gases and water. It prevents desiccation, by preventing loss of water from the plant body. It also prevents infection and mechanical injury.
    (c) Stomata - Stomata are small openings in the epidermis of the leaves of a plant. Stomata help in the exchange of gases (CO_2 and O_2) with the atmosphere.

    Transpiration (loss of excess water in the form of water vapour) also takes place through the stomata.

24. Dislocation of the bones of hand may have been caused due to the breakage of the ligament. A ligament is a connective tissue that connects two bones and keeps them in place.

25. Given speed of the bus = 60 kmh^{-1} = $\frac{5}{18} \times 60$ = 16.7 ms^{-1}

    Time of reaction = $\frac{1}{15}$ s

    Time of reaction under the influence of alcohol = $\frac{1}{2}$ s

    i) Distance travelled by the bus in the first case distance = Speed × time = 16.7 × $\frac{1}{15}$ = 1.11m

    ii) Distance travelled by the bus in the second case distance = Speed × time = 16.7 × $\frac{1}{2}$ = 8.35m

26. Kinetic energy is the energy possessed by a body due to its motion. The two uses of kinetic energy are as follows:
    i. The kinetic energy of air is used to run windmills.
    ii. The kinetic energy of the running water is used to generate electricity.

Section C

27. Initial velocity of stone (u) = 40 m/s

    at maximum height stone will be at rest so v= 0

    v = u + gt

    $0 = 40 + (-10) \times t$

    10t = 40

    t = 40/10 = 4 s

    distance covered /maximum height

    $h = ut + \frac{1}{2}gt^2$

    $= 40 \times 4 + \frac{1}{2} \times (-10) \times 4 \times 4$

    = 160 - 80 = 80 m

    net displacement of stone = 0(thrown upwards then falls back to same place)

    Total distance covered by the stone = 80 + 80 = 160 m

OR

Let the two stones meet after t s. The distance travelled by a falling body is given by:-

u = 50m/s

g = 10m/s^2

Height covered by the stone thrown from the ground.

$h = 50t - 1/2\ gt^2$

$h = 50t - 5t^2$ .....(1)

Distance covered by the stone thrown downward in time t, since it falls from rest u=0

$100 - h = 1/2gt^2$

$100 - (50t - 5t^2) = 5t^2$

$50t = 100t$

$t = 2s$

Thus the stone will meet each other at 2s.

Height at which the particle meet is h.

$h = 50t - 5t^2$.

$h = 50(2) - 5(2)^2$

$h = 100 - 20 = 80m$.

$h = 80m$

28. a) Work done is positive as the bucket moves in the direction of force applied by the man.

    b) Work done by the gravitational force is negative, as the bucket moves upwards i.e. opposite to the gravitational force.

29. To check whether the given colourless liquid is pure water or not, the given liquid should be taken in a clean china dish and heated to evaporate the liquid:

    (a) If a residue remains in the china dish, it will be an indication that the liquid is not pure water but contains impurities.

    (b) If no residue remains in the china dish, it will indicate that the liquid is pure water.

30. Diseases can be prevented by –

    (a) By presenting exposure to disease causing microbes – For this, exposure to over crowded areas can be avoided, source of drinking water must be checked, and we must provide clean environments.

    (b) By consuming proper and sufficient food / balanced diet.

    (c) By immunization.

31. From the given symbol of 'X', we have mass number = 31 and atomic number = 15.

    No. of protons = Atomic number = 15 ... (1)

    Mass number = 31

or No. of protons + No. of neutrons = 31

or Number of neutrons = 31 - Number of protons

or Number of neutrons = 31 - 15 [From (1)]

or Number of neutrons = 16

The number of neutrons present in the nucleus of an element ${}^{31}_{15}X$ is **16**.

32. Number of moles of ammonia in 3.00 g = 0.1764 mol

Molecular mass of SO_3=1 × 16u+3× 16 u=64 u

1 mole of SO_3 weight 64 g

Therefor, 0.1764 moles weight = 64 × 0.1764 g

= 11.29 g

33. (i) Average velocity = $\frac{\text{Total displacement taken}}{\text{Total time taken}}$

$= \frac{\text{Diameter of circle}}{20}$

$= \frac{2\times 70}{20}$

$= 7\ ms^{-1}$

(ii) Average speed = $\frac{\text{Total distance travelled}}{\text{Total time taken}}$

$= \frac{\text{Half circumference of circle}}{20}$

$= \frac{\pi r}{20}$

$= \frac{22\times 70}{7\times 20}$

$= 11\ ms^{-1}$

Section D

34. According to Newton's third law of motion, 'To every action there is an equal and opposite reaction; action and reaction forces act on different bodies.'

From law of conservation of momentum, for an isolated system, the total initial momentum for an event is equal to total final momentum.

Let

Mass of body A = m_A

Mass of body B = m_B

Initial velocity of Body A = u_A

Initial velocity of Body B = u_B

Final velocity of Body A = v_A

Final velocity of Body B = v_B

momentum of body A = $m_A u_A$ and momentum of body B= $m_B u_B$

Therefore, initial momentum of the system =$m_A u_A + m_B u_B$

Now, let the body A collide with body B.

So,final momentum of the system =$m_A v_A + m_B v_B$

Body A exerts a force of action F_{AB} on body B.

Body B exerts a force of reaction F_{BA} on body A.

Let the collision lasts for t seconds, then

F_{AB}= Rate of change of momentum of body A = $\frac{m_A(v_A - u_A)}{t}$

F_{BA}= Rate of change of momentum of body B=$\frac{m_B(v_B - u_B)}{t}$

From Newton's third law,

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

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

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

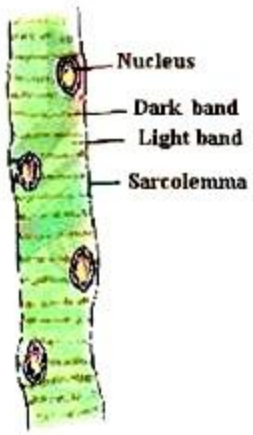
$\therefore$ Momentum of the system before collison=Momentum of the system after collsion.

This is the law of conservation of momentum.

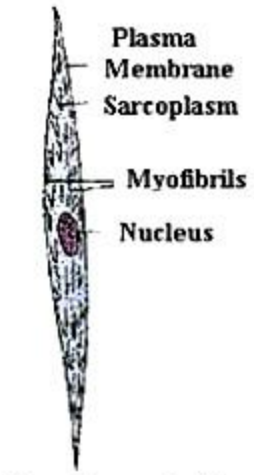
OR

According to law of conservation of momentum; the momentum of bullet forwad will be equal to the momentum of rifle backward . In case of light rifle; velocity will be more than the velocity of heavier rifle because of mass so that momentum (product of mass and velocity) for both shall not be equal. Due to this, the lighter rifle will hurt the shoulder more.In both cases it has been called recoied.

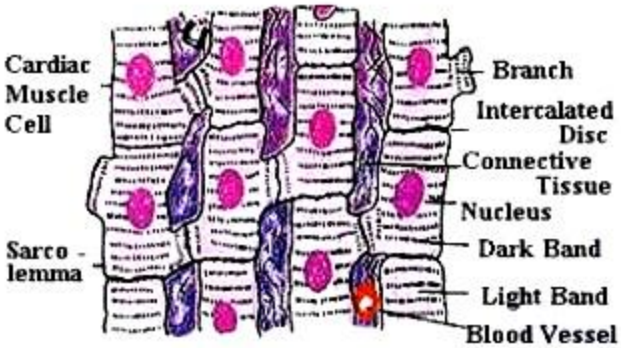
35.



Striated muscle fibre

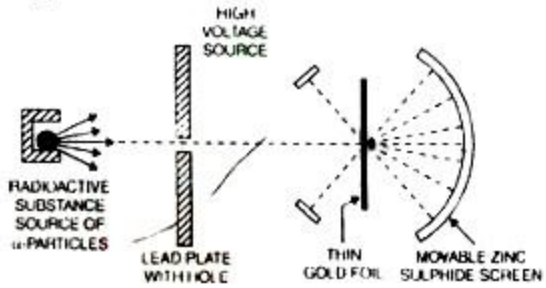


Smooth muscle fibre



Cardiac muscle fibres

36. **Rutherford's α-particles scattering Experiment:** In 1911, Rutherford performed the gold foil experiment. He bombarded a stream of α-particles on a gold foil, a thin sheet which was 0.00006 cm thick in an evacuated chamber. An α-particle is a positively charged helium ion (He^{2+}). A simplified picture of this experiment is shown in the figure.

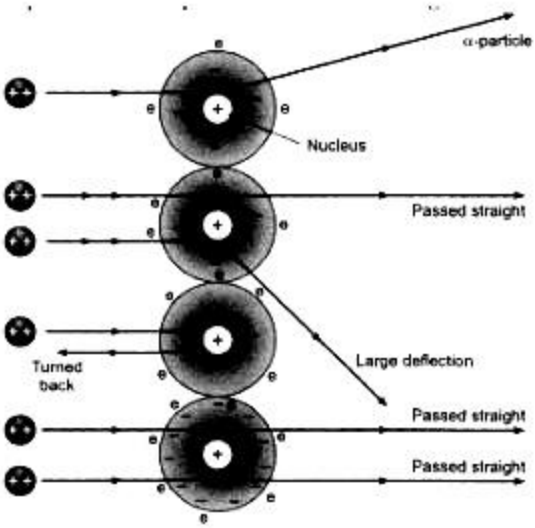


Observation:

i. Most of the α-particles passed straight through the foil without any deflection.

ii. A few α-particles were deflected through a small angle and few through larger angles.

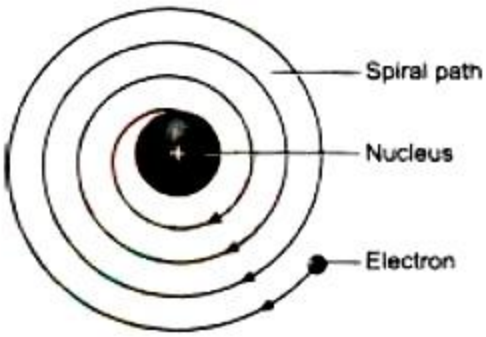
iii. The number of α-particles which bounced back was very small.



Conclusion:

i. The most of the space inside of an atom is empty.
ii. The heavy positively charged 'core' is present at the centre of atom named as nucleus.
iii. The volume of the nucleus is very small in comparison to the total volume of the atom.

Structure of atom: On the basis of gold foil experiment, Rutherford concluded that an atom consists of nucleus which has positive charge and it is surrounded with electrons which are moving around the nucleus. The number of electrons and protons are equal and the entire mass of the atom is concentrated at its nucleus. He compared the model of an atom with solar system, in which sun as a nucleus is at center and planets as electrons revolve around the sun.



Drawbacks in the Rutherford's model :

i. According to classical electromagnetic theory, a moving charged particle, such as an electron under the influence of attractive force loses energy continuously in the form of radiations. As a result of this, electron should lose energy and therefore,

should move in even smaller orbits ultimately falling into the nucleus. But the collapse does not occur.

ii. Rutherford did not specify the number of orbits and the number of electrons in each orbit.

OR

i. Difference between isobars and isotopes:

Isotopes	Isobars
These are the atoms of the same element having the same atomic number but different mass numbers	These are the atoms of the different elements having the same mass number but different atomic numbers
They have identical chemical properties and different physical properties. e.g. ${}_{1}^{1}\mathrm{H}$, ${}_{1}^{2}\mathrm{H}$, ${}_{1}^{3}\mathrm{H}$	They have different chemical properties and different physical properties because these are the atoms of different elements. e.g. ${}_{18}^{40}\mathrm{Ar}$ and ${}_{20}^{40}\mathrm{Ca}$

ii. An isotope of cobalt (Co-60) is used in the treatment of cancer.
An isotope of uranium (U-235) is used as fuel in a nuclear reactor.