CBSE Class 09 Science

Sample Paper 10 (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 did Berzelius assign symbols to the elements?

OR

How many atoms are present in a:
(i) H_2S molecule and
(ii) PO_4^{3-} ion?

2. What is meant by a substance?

3. Silver nitrate solution is used to study
   a. Mitochondria
   b. Golgi apparatus
   c. Nucleus
   d. Endoplasmic reticulum
4. Bacteria do not have chloroplast but some bacteria are photoautotrophic in nature and perform photosynthesis. Which part of the bacterial cell performs this?
5. Define electrostatic force.
6. Name the organelle which shows the analogy as control room of the cell.

OR

Name two cell organelles, which contain their own genetic material.

7. What are non-communicable diseases? Give examples.
8. Calculate the formula unit mass of $CaCl_2$.
9. Name the technique to separate:-
   (i) butter from curd
   (ii) salt from sea-water
   (iii) camphor from salt

OR

What is mass percentage of a solution?

10. Which organelle is the storage sac of solid and liquid materials?
11. Define the term "displacement".

OR

Define the term "distance".

12. Two objects kept in a room do not move towards each other as per the universal law of gravitation. Why?
13. Name the physical quantity that corresponds to the rate of change of momentum.
14. **Assertion:** Blood is a fluid connective tissue.
    Reason: It is composed of plasma, platelets, red blood cells, and white blood cells.
    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:** The sum of the momenta of two objects before the collision is equal to the sum of momenta after the collision.
Reason: There should be an external unbalanced force acting on the 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

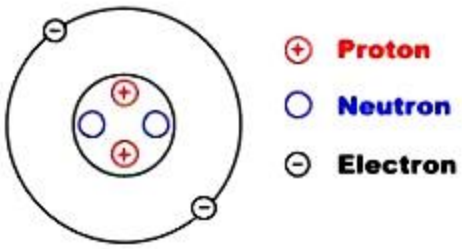
Assertion: When a gun is fired, it exerts a forward force on the bullet.
Reason: The bullet exerts an equal and opposite reaction force on the gun.
a. Both A and R are true and R is the correct explanation of assertion.
b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

16. **Assertion:** Rutherford's atomic model was that it could not explain the stability of atoms.
Reason: Any charged particle during acceleration would radiate energy, and while revolving, it would lose its energy and eventually fall into the nucleus.
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**
The chemical reaction equation indicates directly the number of atoms or molecules taking part in the reaction. Avogadro constant, N_A, when expressed in the unit mol^{-1} and is called the Avogadro number. The amount of substance, symbol n, of a system is a measure of the number of specified elementary entities. An elementary entity may be an atom, a molecule, an ion, an electron, any other particle or a specified group of particles. The mass of 1 mole of a substance is equal to its relative atomic or molecular mass in grams. The atomic mass of an element gives us the mass of one

atom of that element in atomic mass units (u).

Helium Atom



i. The word "mole" was introduced around 1896 by
   a. Wilhelm Ostwald
   b. John Dalton
   c. Ernest Rutherford
   d. J.J Thompson

ii. What is the number of moles of 52 g of He
   a. 16
   b. 13
   c. 15
   d. 19

iii. Mass of 0.5 mole of N_2 gas
   a. 16g
   b. 17g
   c. 14g
   d. 15g

iv. 1 g hydrogen has
   a. 6.022×10^{24} atoms of hydrogen
   b. 6.022×10^{23} atoms of hydrogen
   c. 6.022×10^{26} atoms of hydrogen
   d. 7.022×10^{24} atoms of hydrogen

v. The number of moles in 12.044×10^{23} number of He atoms is
   a. 6
   b. 5
   c. 2
   d. 5

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

There are two ways to treat infectious diseases. One would be to reduce the effects of the disease and the other to kill the cause of the disease. For the first, we can provide treatment that will reduce the symptoms. One way is to use medicines that kill microbes. Anti-viral medicines are harder than making antibacterial medicines. Prevention of diseases is also important. Airborne microbes, we can prevent exposure by providing living conditions that are not overcrowded. For water-borne microbes, we can prevent exposure by providing safe drinking water. Diseases are also prevented by immunization. Many such vaccines are now available for preventing a whole range of infectious diseases and provide a disease-specific means of prevention.

i. _____ is the basic key to prevent infectious diseases.
   a. Crowded place
   b. Mosquitoes breeding
   c. Public hygiene
   d. All of these

ii. Who discovers a vaccine for the first time?
   a. Edward Jenner
   b. Edward Snowden
   c. Edward Norton
   d. None of these

iii. Identify the figure given below.

   a. Picture of Leishmania
   b. Picture of SARS

c. Picture of Staphylococci
d. Picture of Trypmosoma

iv. The first vaccine discovered was:
a. BCG vaccine
b. Tetanus vaccine
c. Smallpox vaccine
d. Hepatitis vaccine

v. Making anti-viral drugs is more difficult than making anti-bacterial medicines because:
I. Viruses make use of host machinery
II. Viruses are on the borderline of living and non-living
III. Viruses have very few biochemical mechanisms of their own
IV. Viruses have a protein coat

Choose the correct option among the following:
a. (I) and (III)
b. Only (III)
c. (II) and (IV)
d. Only (IV)

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

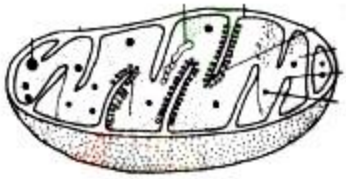
20. **Read the passage and answer any four questions:**

Lysosomes are membrane-bound sacs filled with digestive enzymes. These enzymes

are made by RER. Lysosomes are a kind of waste disposal system of the cell. Foreign materials entering the cell, such as bacteria or food, as well as old organelles end up in the lysosomes, which break complex substances into simpler substances. Mitochondria have two membrane coverings. The outer membrane is porous while the inner membrane is deeply folded. Mitochondria are strange organelles in the sense that they have their own DNA and ribosomes. Plastids are present only in plant cells. There are two types of plastids – chromoplasts and leucoplasts. Vacuoles are storage sacs for solid or liquid contents. Vacuoles are small-sized in animal cells while plant cells have very large vacuoles.

i. Which of the following statement marks a difference between a plant cell and an animal cell?
   I. Plant cells have a cell wall which animal cells do not.
   II. Plant cells do not have vacuoles while animal cells do have.
   III. Plant cells have only cell membranes while animal cells have both cell walls as well as cell membranes.
   IV. Plant cells have more plastids while animal cells have few plastids.
   a. (I) and (II)
   b. (II) and (III)
   c. (III) and (IV)
   d. Only (I)

ii. Mitochondria folds that are shown in the below diagram increases surface area for:



   a. ATP generating chemical reactions
   b. for synthesis of a protein
   c. for absorption
   d. none of these

iii. Organelle other than nucleus, containing DNA is:
   a. endoplasmic reticulum
   b. Golgi apparatus
   c. mitochondria

d. lysosomes

iv. Which out of the following is not a function of vacuole?

a. Storage

b. Providing turgidity and rigidity to the cell

c. Waste excretion

d. Locomotion

v. Chromoplasts that contain _____ are called chloroplasts.

a. green colour pigment

b. yellow colour pigment

c. starch

d. none of these

Section B

21. 36 g of sodium chloride is dissolved in 100 g of water at 293 K to make a saturated solution. Find its concentration at this temperature.

OR

A candle seems to lose its weight on burning. Explain this fact.

22. Which of the following will show "Tyndall effect"?

(a) Salt solution

(b) Milk

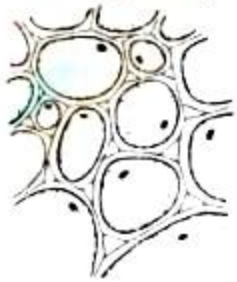
(c) Copper sulphate solution

(d) Starch solution.

23. i. A plant tissue is observed under a microscope, as shown in the figure below. Identify the tissue.

ii. State the characteristic features of these cells.

iii. Name any two parts of the plant, where such cells are present.



OR

Name the following:-

a. Tissue that stores fats in our body
b. Tissue present in the brain
c. Connective tissue with fluid matrix
d. Tissue that connects muscles to bones in humans

24. Why are plants and animals made of different types of tissue?
25. The distance between two stations is 200 km. A train travels for the first 100 km at a speed of 10 kmh^{-1}. How fast should the train travel the next 100 km so as to average 70 kmh^{-1} for the whole journey?
26. What is the relationship between the commercial unit and SI unit of energy?

Section C

27. A coconut is hanging on a tree at a height of 15 m from the ground. A boy launches a projectile vertically upward with a velocity of 20 ms^{-1}. After what time, the projectile will pass by the coconut. Explain the two answers that you get in this problem. (Take g = 10 ms^{-2})

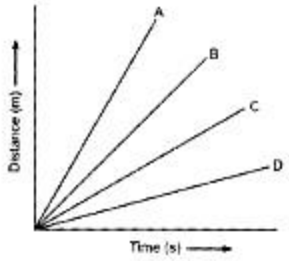
OR

On the moon's surface, the acceleration due to gravity is 1.67 ms^{-2}. If the radius of the moon is 1.74×10^6 m, calculate the mass of the moon.

28. If a huge force acts on an object, but the displacement of the object is zero then what can we say about the work done?
29. Distinguish between homogeneous and heterogeneous mixtures.
30. If you go to hospital to meet your friend suffering from malaria, what are the chances of malaria spreading to you and your friends?
31. The average atomic mass of a sample of an element X is 16.2 u. What are the percentages of isotopes ${}^{16}_{8}X$ and ${}^{18}_{8}X$?
32. Verify by calculating that

    (a) 5 moles of CO_2 and 5 moles of H_2O do not have the same mass.

    (b) 240 g of calcium and 240 g of magnesium elements have a mole ratio of 3
33. Four cars A, B, C and D are moving on a leveled road. Their distance versus time graphs are shown in figure. Which car is the slowest.



Section D

34. What is momentum? Write its SI unit. Interpret force in terms of momentum. Represent the following graphically:
    i. Momentum versus velocity when mass is fixed.
    ii. Momentum versus mass when velocity is constant.

OR

    a. Define velocity and mention its SI units.
    b. Find the recoil velocity of a gun having mass equal to 10 kg, if a bullet of 50 gm acquires the velocity of 1000m/s after firing from the gun.

35. i. Describe adipose tissue with the help of diagram.
    ii. How is adipose tissue different from blood tissue?

36. What were the drawbacks of Rutherford's model of an atom?

OR

A number of electrons, protons, and neutrons in chemical species A, B, C, and D are given below.

Chemical species	Electrons	Protons	Neutrons
A	2	3	4
B	10	9	8
C	8	8	8
D	8	8	10

Now answer the following questions.

    i. What is the mass number of A and B?
    ii. What is the atomic number of B?
    iii. Which two chemical species represent a pair of isotopes and why?
    iv. What is the valency of element C? Also, justify your answers.

CBSE Class 09 Science

Sample Paper 10 (2020-21)

Solution

Section A

1. Berzelius assigned symbols to the elements by taking first one or two letters of the elements name in English and in some cases the symbols have been taken from the names of elements in different languages such as Latin, German, Greek etc.

   OR

   (i) 2 atoms of hydrogen + 1 atom of sulphur = 3 atoms. Hence 3 atoms are present in an H_2S molecule.

   (ii) 1 atom of phosphorus + 4 atoms of oxygen = 5 atoms. Hence 5 atoms are present in an ion.PO_4^{3-}

2. 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.
3. (b) Golgi apparatus

   Explanation: Silver nitrate is an inorganic, irritant, colourless, water-soluble, poisonous, clear, crystalline compound. It is used in photography and silver plating. Silver nitrate solution is used to study Golgi apparatus. Golgi apparatus is an organelle in eukaryotic cells.
4. Small vesicles that are associated with the plasma membrane are present in such bacteria. These vesicles contain pigments that can trap solar energy to produce food.
5. The force of attraction or repulsion of particles or objects because of their electric charge is known as electrostatic force.It is also known as Coulomb force or Coulomb interaction.
6. Nucleus is the organelle which shows the analogy as control room of the cell.

   OR

   Mitochondria and plastids are the two organelles that contain their own genetic

material. Both these organelles have their own DNA and ribosome.

7. Non-communicable diseases are those which cannot be spread from person to person. For example – Diabetes, cancer.
8. Atomic mass of Ca + (2 × atomic mass of Cl) = 40 + 2 × 35.5 = 40 + 71 = 111 u
9. **(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**

OR

Mass percentage of a solution is defined as the mass of a solute (in grams) present in one hundred gram of a solution.
Mass percentage = (Mass of solute / Mass of solution) x 100

10. Vacuoles
11. The shortest distance between the initial and final positions of the object in a particular direction.

OR

The length of actual path travelled by an object in the given time is called the distance travelled by the object.

12. The mass of the two bodies are very small. Therefore, the force of attraction between them is very small. So, both the objects do not move towards each other.
13. The physical quantity that corresponds to the rate of change of momentum is Force.
14. (b) Both A and R are true but R is not the correct explanation of assertion.
    Explanation: Blood is a fluid connective tissue. It consists of two components - fluid and corpuscles. It is composed of plasma, platelets, red blood cells, and white blood cells.
15. (c) A is true but R is false.
    Explanation: According to the law of conservation of momentum, the sum of momenta of two objects before the collision is equal to the sum of momenta after the collision, provided there is no external unbalanced force acting on the objects.

OR

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

Explanation: When a gun is fired, it exerts a forward force on the bullet. The bullet exerts an equal and opposite reaction force on the gun. This results in the recoil of the gun.

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

Explanation: Rutherford's atomic model could not explain how moving electrons could remain in their orbits. Any charged particle during acceleration would radiate energy, and while revolving, it would lose its energy and eventually fall into the nucleus. This means that the atom would be highly unstable. But, the matter is composed of stable atoms. Thus, the major drawback of Rutherford's atomic model was that it could not explain the stability of atoms.

17. i. (a) Wilhelm Ostwald
    ii. (b) 13
    iii. (c) 14g
    iv. (b) 6.022×10^{23} atoms of hydrogen
    v. (c) 2
18. i. (c) Public hygiene
    ii. (a) Edward Jenner
    iii. (b) Picture of SARS
    iv. (c) Smallpox vaccine
    v. (b) Only (III)
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. (d) Only (I)
    ii. (a) ATP generating chemical reactions.
    iii. (c) mitochondria
    iv. (d) locomotion
    v. (a) green colour pigment

Section B

21. Mass of sodium chloride (solute) = 36 g

Mass of water (solvent) = 100 g

Mass of the solution = 36 g + 100 g = 136 g

Therefore, mass percentage = (mass of solute / mass of solution) × 100

= (36 x 100) / 136

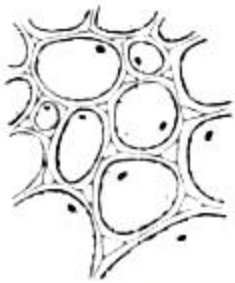
= 26.47 %

Therefore, the concentration of the solution at 293 K will be 26.47 %

OR

Since burning is a chemical change and candle wax (paraffin wax) is a hydrocarbon. It has a long chain of carbon surrounded by hydrogen. Therefore, while burning, carbon and hydrogen present in the candle gets converted to carbon dioxide and water vapour, which escape to the atmosphere. That is why candle seems to lose its weight.

22. Milk and starch solution have larger particles since they are not true solutions, so they will show Tyndall effect. Salt solution and copper sulphate solution are true solutions and the size of their particles is very small so as to scatter a beam of light.

23. 

i. It is parenchyma.

ii. It consists of thin-walled unspecialised cells, which are loosely packed, i.e. having intercellular spaces. Each cell has a prominent nucleus.

iii. a. Pith

b. Cortex

OR

(a)	Tissue that stores fats in our body	Adipose tissue
(b)	Tissue present in the brain	Nervous tissue
(c)	Connective tissue with fluid matrix	Blood

(d)	Tissue that connects muscles to bones in humans	Tendons

24. Plants and animals are two different types of organisms. Plants are autotrophic organisms. They prepare their own food by photosynthesis. Since plants are stationary or fixed organisms, they do not require as much energyas is required by animals. Most of the tissues in plants are therefore supportive in nature. Most of these tissues such as xylem, phloem, sclerenchyma and cork are dead tissues i.e., they do not contain living protoplasm. There are some tissues in plants which divide throughout life. They divide for the growth and reproduction of the plants. Animals on the other hand, are heterotrophic organisms (depend directly or indirectly on autotrophs for their nutrition) and use locomotion. They have to move in search of food, mate and shelter. They need more energy as compared to that required by plants. Most of the tissues in animals contain living protoplasm. In contrast to plants, growth in animals is uniform.
25. Given total distance travelled = 200 km

    Time taken for the first half = $t_1 = \frac{S}{V_1} = \frac{100}{50} = 2h$

    Time taken for the second half = $t_2 = \frac{S}{V_2} = \frac{100}{V_2}$

    Now v_{av} = 70 kmh^{-1}

    Therefore $V_{av} = \frac{Total\ distance\ travelled}{Total\ time\ taken} = \frac{S}{t_1 + t_2} = \frac{200}{\frac{100}{50} + \frac{100}{V_2}}$ = 116.6 kmh^{-1}

    Solving for v_2 we get 116.6 kmh^{-1}.
26. Commercial unit of energy= kilowatt hour i.e. kWh

    SI unit energy =Joule (J)

    We know that; 1 kWh = 1 kW × 1 h = 1000 W × 3600 s = 1000 Js^{-1} × 3600 s = 3600000 J = 3.6×10^6J

    Therefore, 1kWh = 3.6×10^6J

Section C

27. Height of coconut (S) = 15 m

    Acceleration due to gravity (g) = -10 ms^{-2}

    Time (t) = ?

    Initial velocity (u) = 20 ms^{-1}

    Using $S = ut + \frac{1}{2}at^2$ we have

$15 = 20 \times t + \frac{1}{2} \times (-10)t^2$. This is a quadratic equation in time.

Simplifying we have

$5t^2 - 20\,t + 15 = 0$ or $t^2 - 4t + 3 = 0$

$t = \frac{-(-4) \pm \sqrt{(-4)^2 - 4 \times 1 \times 3}}{2} = \frac{4 \pm 2}{2} = 1$ or 3 s = 1 or 3 s

Thus the projectile will pass the coconut 1s after it is thrown while moving in the upward direction and 3 s while moving in the downward direction on its return journey.

OR

Here, Acceleration due to gravity on moon's surface, g = 1.67 ms^{-2}, Radius of moon, R = 1.74×10^6 m and G = 6.67×10^{-11} Nm^2kg^{-2}

We know that $g = \frac{GM}{R^2}$ or $M = \frac{gR^2}{G}$

$\therefore M = \frac{1.67 \times (1.74 \times 10^6)^2}{6.67 \times 10^{-11}} = 7.6 \times 10^{22}$ kg

Therefore, mass of the moon =7.6×10^{22} kg

28. Work done on the body is defined as the force applied on the body producing a net displacement on the body.

Work Done = Force $\times$ Displacement

If the application of force produces no displacement the work done on the body is zero.

29.

Homogeneous mixture	**Heterogeneous mixture**
These are called as solutions	These are called as suspensions/colloids
Substances are Uniformly distributed	These substances are Unevenly distributed
These are not visible to the naked eye, but visible through the microscope	These are easily visible to the naked eye and also through microscope
The particles appear smaller in size	The particles are either smaller or larger in size
These are pure substances	These are not pure substances

They represent same physical properties	They do not possess same physical properties
Examples include milk, gasoline, sugar solution, corn oil, fog etc	Examples are mixture of mud & water, beach sand, vinegar, air cloud etc

30. Malaria is an infectious disease caused by a protozoan and is spread by Anopheles mosquito vector. It cannot spread by simply being with the patient or by contact.
31. Let the percentage of isotope ${}_{8}^{16}X$ in the sample be x %.
Then the percentage of isotope ${}_{8}^{18}X$ in the sample will be (100 − x) %.
Average atomic mass of element X = 0.01 [(Atomic mass of isotope ${}_{8}^{16}X$) (Percentage of isotope ${}_{8}^{16}X$) + (Atomic mass of isotope ${}_{8}^{18}X$) (Percentage of isotope ${}_{8}^{18}X$)]
Therefore, average atomic mass = $\frac{16\times x+18\times(100-x)}{100}$
or 16.2 = $\frac{16x+1800-18x}{100}$
or 1620 = 1800 – 2x
or 2x = 1800 – 1620
or x = 180 / 2
or x = 90
Percentage of X-16 isotope in the sample = 90 %
Percentage of X-18 isotope in the sample = 100 – 90 = 10 %
32. **1 Mole of molecules = Gram molecular mass**
(a) Gram molecular mass of CO_2 = (1 × atomic mass of carbon) + (2 × atomic mass of oxygen).
= (1 × 12) +(2 × 16) = 12+32 = 44g
CO_2 has molar mass = 44 g mol^{-1}
5 moles of CO_2 have molar mass =Gram molecular mass of CO_2 × 5 = 44 × 5 = 220 g
H_2O has molar mass = 18 g mol^{-1}
5 moles of H_2O have mass = 18 × 5 g = 90 g
Hence, 5 moles of CO_2 and 5 moles of H_2O do not have the same mass.
(b) Number of moles in 240 g Ca metal
Number of moles in 240 g of Mg metal
Ratio is 6:10
or, 3:5

33. Speed = Slope of distance - time graph. The smaller the slope, the smaller is the speed.

Section D

34. Momentum can be defined as "mass in motion". All objects have mass, so if an object is moving, then it has momentum, which means it has its mass in motion. It is the product of the mass and velocity of the body.

    It is denoted by p.

    Momentum, p = mv

    Where

    p = momentum, m = mass, v = velocity

    The equation illustrates that momentum is directly proportional to the mass of an object and directly proportional to the velocity of that object.

    Its SI unit is kg-m/s.

    Force applied on an object of mass m moving with acceleration a,

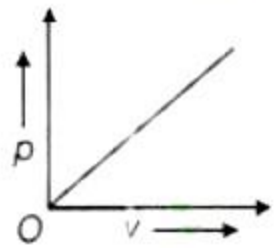
    $F = ma = m\frac{\Delta v}{\Delta t}$ [$\because$ acceleration = rate of change of velocity = $\frac{\Delta v}{\Delta t}$]

    = $\frac{\Delta p}{\Delta t}$

    $\therefore$ Force applied on an object is equal to the rate of change of momentum of the object.

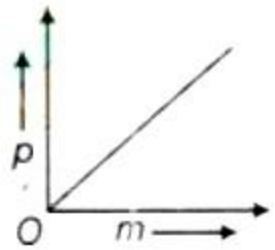
    i. Momentum versus velocity graph when mass is fixed.

    If m is fixed, then p $\propto$ v

    $\therefore$ Momentum versus velocity graph will be a straight line passing through the origin (if $v = 0$, then p = 0).

    ii. Momentum versus mass graph when velocity is constant.

    If velocity is constant, then p $\propto$ m.

    So, the momentum versus mass graph will be a straight line passing through the

origin (if $m = 0$, then $p = 0$).

OR

a. Velocity is the speed of an object moving in a definite direction. The SI unit of velocity is also metre per second.

b. Here given,

Mass of bullet (m_1) = 50 gm = 0.050 kg

Velocity of bullet before firing (u_1) = 0

Velocity of bullet after firing (v_1) = 1000 m/s

Mass of gun (m_2) = 10 kg

Velocity of gun before firing, (u_2) = 0

The velocity of the gun after firing = ?

We know that,

$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$

$\Rightarrow 0.050\ kg \times 0 + 10\ kg \times 0 = 0.050\ kg \times 1000 m/s + 10\ kg \times v_2$

$\Rightarrow 0 = 50\ kg\ m/s + 10\ kg \times v_2$

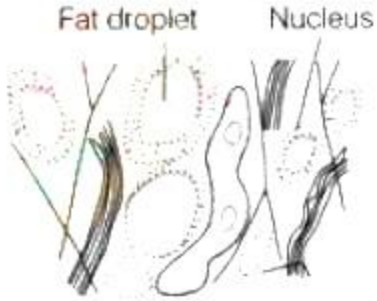
$\Rightarrow 10\ kg \times v_2 = -50\ kg\ m/s$

$\Rightarrow v_2 = \frac{-50}{10}$

$\Rightarrow v_2 = -5\ m/s$

Thus, recoil velocity of gun is equal to 5 m/s. Here negative (- ve) sign shows that gun moves in the opposite direction of bullet.

35. i. Digrammatic representation of Adipose tissue



Adipose tissue is a fat-storing connective tissue. Its matrix is packed with large oval fat cells or adipocytes. The fat cells are arranged into globules separated by collagen and elastic fibres. It mainly stores reserve fat. It acts as an insulator and

works as a shock absorber for visceral organs. It acts as shock-absorbing cushions around the heart, kidneys, eyeball, etc.

ii. Differences between adipose and blood tissue are as follows:

Adipose Tissue	Blood Tissue
1. Adipose tissue is a type of loose connective tissue located mainly beneath the skin.	1. Blood tissue is a fluid connective tissue containing the plasma, red blood cells (RBCs), white blood cells (WBCs) and platelets.
2. The matrix contains fibres.	2. The matrix does not contain fibres.
3. It stores and metabolises fats.	3. It helps in the transport of substances and respiratory gases.

36. Rutherford had proposed a model in which the electrons revolve around the nucleus in well-defined orbits. However, the orbital revolution of the electron was not expected to be stable. Any particle in a circular orbit would undergo acceleration and the charged particles would radiate energy. Thus, the revolving electrons would lose energy and finally fall into the nucleus. Revolution of electrons around the atom would make the atom highly unstable and the matter would not exist. But this is contrary to our common observations.

OR

i. Mass number of A = 3 + 4 = 7
   Mass number of B = 9 + 8 = 17

ii. The atomic number of B = Number of protons = 9

iii. C and D are isotopes as they have the same atomic number but different mass numbers.

iv. Electronic configuration of C : $\begin{matrix} K & L \\ 2, & 6 \end{matrix}$
   It needs two electrons to complete its octet.
   Hence, its valency is 2.