CBSE Class 09 Science
Sample Paper 06 (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. The valency of the of an element A is 4. Write the formula of its oxide.

OR

Write the atomicity of the following molecules:

(a) H_2SO_4

(b) CCl_4

2. A solution contains 40 g of common salt in 320 g of water. Calculate the concentration in terms of mass by mass percentage of the solution.
3. Which structure is called the little nucleus?
   a. Chromosomes
   b. Nucleolus
   c. Genes
   d. DNA
4. What is endocytosis?
5. Write the C.G.S unit of force.
6. What is the chemical composition of cell wall in plants and fungi respectively?

OR

Which kind of plastid is more common in flowers and fruits?

7. Name two diseases against which vaccines are available ?
8. Which law of chemical combination deals with the composition of compound?
9. Name the technique to separate butter from curd

OR

Define solubility.

10. Name the organelle which shows the analogy as a digestive bag of the cell.
11. What is the quantity which is measured by the area occupied below the velocity time graph?

OR

What is negative acceleration?

12. The weight of a man on the earth is 100 kg. Does this weight on the moon increase or decrease?
13. State the meaning of recoil velocity of a gun?
14. **Assertion**: The cells of sclerenchyma tissue are living.

    Reason: They are long and narrow as the walls are thickened due to the deposition of lignin.

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 first law of motion is also known as the law of inertia.

Reason: Newton's first law of motion states that a body at rest will remain at rest, and a body in motion will continue in motion in a straight line with a uniform speed unless it is compelled by an external force to change its state of rest or of uniform motion.

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: While catching a fast-moving cricket ball, a fielder in the ground gradually pulls his hands backwards.

Reason: The fielder increases the time during which the high velocity of the moving ball decreases to zero.

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:** Atomic mass number is the number of protons present in the nucleus of an atom.

Reason: All atoms of an element have the same atomic number.

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 questions:**

The simplest compounds, which are made up of two different elements are called binary compounds. While writing the chemical formulae for compounds, the constituent elements and their valencies are written. Then crossover the valencies of the combining

atoms. For the ionic compound, the symbol of cation written first followed by the symbol of the anion. Then their charges are criss-crossed to get the formula. The positive and negative charges must balance each other and the overall structure must be neutral. The molecular mass of a substance is the sum of the atomic masses of all the atoms in a molecule of the substance.

i. Which of the following statement correctly justifies that crystallisation technique considered better than simple evaporation to purify solid?

    a. Solid decompose or get charred on heating to dryness.

    b. Impurities may remain dissolved in the solution even after filtration

    c. Both Solid decompose or get charred on heating to dryness and Impurities may remain dissolved in the solution even after filtration

    d. Impurities are easily removed in solution.

ii. In magnesium chloride, _____ chloride ions for each magnesium ion.

    a. one

    b. two

    c. three

    d. four

iii. The molecular mass of HNO_3 is

    a. 63u

    b. 7u

    c. 54u

    d. 45u

iv. The formula unit mass of $CaCl_2$ is

    a. 111u

    b. 342u

    c. 213u

    d. 122u

v. The formula unit mass of a substance is:

    a. the sum of the atomic masses of all atoms.

    b. the sum of the atomic mass of only one atom

    c. both (a) and (b)

    d. none of these

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

Health and disease in human communities are very complex issues, with many interconnected causes. Cells are the basic units of organisms. Cells are made of a variety of chemical substances. A cell is a dynamic place. Something or the other is always happening inside them. In our organs or tissues, there are various specialized activities going on– the heart is beating, the lungs are breathing, the kidney is filtering urine, the brain is thinking. All these activities are interconnected. Health means a state of physical, mental and social well-being. The environment includes the physical environment. The manifestation of the disease depends on a number of factors one of the most obvious factors that determine how the disease is perceived is the disease duration. On the basis of duration, the disease may be chronic or acute.

i. The cell is made up of:
   a. protein
   b. carbohydrate
   c. fat and lipid
   d. all of these

ii. Which of the following is/are chronic diseases?
   a. Elephantiasis
   b. Common cold
   c. Dengue
   d. All of these

iii. Which of the following is an incorrect statement about chronic disease tuberculosis?
   I. It is caused by Salmonella
   II. It commonly affects the immune system
   III. Bacteria enter from the air via the nose, then enter in the lungs
   IV. Patient's sputum contains blood
   Choose the correct option among the following:
   a. (I) and (II)
   b. (II) and (III)
   c. Only (III)
   d. Only (IV)

iv. Which one of the following is not important for individual health?
   a. Living in a clean space
   b. Good economic condition

c. Social equality and harmony

d. Living in a large and well-furnished house

v. _____ disease continues for many days and causes affect on the body.

a. Chronic and long-term

b. Acute and short term

c. Communicable

d. Infectious

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:**

Plant cells, in addition to the plasma membrane, have another rigid outer covering called the cell wall. The cell wall lies outside the plasma membrane. The plant cell wall is mainly composed of cellulose. The nucleus has a double-layered covering called a nuclear membrane. The nuclear membrane has pores that allow the transfer of material from inside the nucleus to its outside, that is, to the cytoplasm. The nucleus contains chromosomes, which are visible as rod-shaped structures only when the cell is about to divide. Chromosomes contain information for the inheritance of characters from parents to the next generation in the form of DNA. The nucleus plays a central role in cellular reproduction, the process by which a single cell divides and forms two new cells.

i. Cellulose is a complex substance which provides:

a. mechanical support

b. structural strength to plants

c. both (a) and (b)

d. none of these

ii. Chromosomes are made up of:
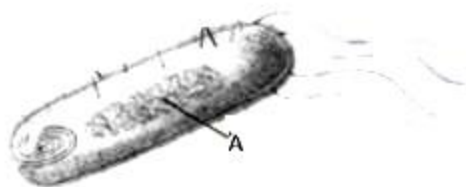   a. DNA
   b. Protein
   c. DNA and protein
   d. RNA

iii. Plasmolysis in a plant cell is defined as:
   I. breakdown (lysis) of the plasma membrane in hypotonic medium
   II. shrinkage of cytoplasm in hypertonic medium
   III. shrinkage of nucleoplasm
   IV. swelling of cytoplasm

   Choose the correct statement
   a. (I) and (II)
   b. (II) and (III)
   c. Only (II)
   d. (IV) and (I)

iv. Identify (A) in the given diagram

   a. nucleus
   b. nucleolus
   c. nucleic acid
   d. nucleoid

v. Select the odd one out.
   a. The movement of water across a semi-permeable membrane is affected by the number of substances dissolved in it.
   b. Membranes are made of organic molecules like proteins and lipids.
   c. Molecules soluble in organic solvents can easily pass through the membrane.
   d. Plasma membranes contain chitin sugar in plants.

Section B

21. A compound is regarded as a pure substance while the mixture is not. Give reason.

OR

What are the favorable qualities given to gold when it is alloyed with copper or silver for the purpose of making ornaments?

22. Give an example each for the mixture having the following characteristics. Suggest a suitable method to separate the components of these mixtures:
    i. A volatile and a non-volatile component.
    ii. Two volatile components with an appreciable difference in boiling points.
    iii. Two immiscible liquids.
    iv. One of the components changes directly from solid to gaseous state.
    v. Two or more coloured constituents soluble in some solvent.

23. Draw and identify different elements of phloem.

OR

Write the differences between xylem and phloem.

24. Write a short note on blood.

25. A stone is thrown in a vertically upward direction with a velocity of 5 ms^{-1}. If the acceleration of the stone during its motion is 10 ms^{-2} in the downward direction, what will be the height attained by the stone and how much time will it take to reach there?

26. i. The potential energy of a freely falling object decreases progressively. What happens to its
       a. Kinetic energy,
       b. total mechanical energy?
          State the law on which your answer is based.
    ii. A household consumes 1 kWh of energy per day. How much energy is this in joules?

Section C

27. How does the weight of an object vary with respect to the mass and radius of the earth? In a hypothetical case, if the diameter of the earth becomes half of its present value and its mass becomes four times of its present value, then how would the weight of any object on the surface of the earth be affected?

OR

A stone is dropped from the edge of the roof. It passes a window 2m high in 0.1 s. How far is the roof above the window?

28. A mass of 10 kg falls from a height of 50 cm. Calculate (i) Velocity of the body (ii) Kinetic energy of body when it just reaches the ground level. Does the velocity depend upon the mass of the particle? Explain. (Take g = 10 ms^{-2})

29. You are given two samples of water labeled as 'A' and 'B'. Sample 'A' boils at 100°C and sample 'B' boils at 102 °C. Which sample of the water will not freeze at 0 °C? Comment.

30. Define and give two examples for each of the following.
    a. Acute diseases
    b. Chronic diseases
    c. Infectious diseases
    d. Non-infectious diseases

31. List any three distinguishing features between the models of an atom proposed by J.J. Thomson and Ernest Rutherford.

32. Raunak took 5 moles of carbon atoms in a container and Krish also took 5 moles of sodium atoms in another container of same weight.
    a. Whose container is heavier?
    b. Whose container has more number of atoms?

33. A ball starts from rest and rolls down 16 m down an inclined plane in 4 s.
    (a) What is the acceleration of the ball?
   (b) What is the velocity of the ball at the bottom of the inclined plane?

Section D

34. **Explain the following:**
    i. Why do we jerk wet clothes before spreading them on wire?
    ii. Why does dust flies off when carpet is hit with stick?
    iii. Why fruits fall off the branches in strong wind?
    iv. Why a pillion rider falls forward, when the driver of a two wheeler suddenly applies brakes?

OR

Derive the mathematical formula of conservation of momentum.

35. Briefly describe striated and smooth muscles with their functions.

36. The given figure depicts the atomic structure of an atom of an element 'X'. Write the following information about the element 'X'.
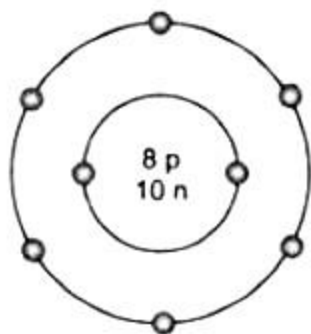
   a. Atomic number of 'X'
   b. Atomic mass of 'X'
   c. Valence electrons
   d. Valency of 'X'
   e. 'X' should be metal or non-metal.

OR

For the following statements, write T for True and F for False and give a reason.

   i. J.J Thomson's proposed that the nucleus of an atom contains only nucleons.
   ii. A neutron is formed by an electron and a proton combining together. Therefore it is neutral.
   iii. The mass of an electron is about $\frac{1}{2000}$ times that of a proton.
   iv. An isotope of iodine is used for making a tincture of iodine, which is used as a medicine.

Solution

Section A

1. The formula of the oxide is A_2O_4 or AO_2.

OR

Atomicity is the number of atoms present in one molecule of a substance.

(a) In H_2SO_4, 2 hydrogen atom, 1 sulphur atom & 4 oxygen atoms are present. Hence the atomicity of H_2SO_4 is 7.

(b) In CCl_4, 1 carbon atom & 4 chlorine atoms are present. Hence the atomicity of CCl_4 is 5.

2. Mass of solution (salt) = 40 g

   Mass of solvent (water) = 320 g

   We know,

   Mass of solution = Mass of solute + Mass of solvent

   = 40 g + 320 g

   = 360 g

   Mass percentage of solution

   $= \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$

   $= \frac{40}{360} \times 100 = 11.1\%$

3. (b) Nucleolus

   Explanation: The nucleolus is present in the nucleus of the cell. It is called the little nucleus of the cell.

4. Endocytosis is the ingestion of material by folding of the membrane around it for its engulfment as seen in Amoeba.

5. Dyne

6. Plant cell walls are composed of cellulose, while fungal cells walls are composed of chitin. Both are long-chain starches comprised of many glucose subunits.

The kind of plastid that is more common in flowers and fruits is Chromoplast.

7. Polio and tuberculosis.
8. Law of definite proportions.
9. The separation can be done by carrying centrifugation in a centrifugation machine.

OR

The maximum quantity of solute, which can dissolve in 100 gram of a solvent is called solubility of solute in that solvent, at a given temperature.

10. The organelle that shows the analogy as a digestive bag of the cell is the lysosome.
11. Displacement is the quantity which is measured by the area under velocity time graph.

OR

If the velocity of an object decreases, then the object is said to be moving with negative acceleration.

12. As the acceleration due to gravity on the moon is one-sixth that on the earth, hence the weight of the man will decrease on the surface of moon by 100/6 i.e. it becomes 16.66.
13. The velocity with which a gun moves backward after firing a bullet is called the recoil velocity of a gun.
14. (d) A is false but R is true.
    Explanation: The cells of sclerenchyma tissue are dead. They are long and narrow as the walls are thickened due to the deposition of lignin. The walls of cells are so thick that there is no internal space inside the cell.
15. (a) Both A and R are true and R is the correct explanation of assertion.
    Explanation: Newton's first law of motion states that a body at rest will remain at rest, and a body in motion will continue in motion in a straight line with a uniform speed unless it is compelled by an external force to change its state of rest or of uniform motion. All objects resist a change in their state of motion. The tendency of undisturbed objects to stay at rest or to keep moving with the same velocity is called inertia. This is why the first law of motion is also known as the law of inertia.

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

Explanation: While catching a fast-moving cricket ball, a fielder in the ground gradually pulls his hands backwards. While doing so, the fielder increases the time during which the high velocity of the moving ball decreases to zero. Thus, the acceleration of the ball is decreased and therefore the impact of catching the fast-moving ball is also reduced.

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

    Explanation: Atomic number is the number of protons present in the nucleus of an atom is the atomic number of that atom. It is represented by the symbol Z. All atoms of an element have the same atomic number. The number of protons and electrons in an atom is equal. Thus, the atom of an element is electrically neutral.

17. i. Both Solid decompose or get charred on heating to dryness and Impurities may remain dissolved in the solution even after filtration

    ii. (b) two

    iii. (a) 63u

    iv. (a) 111u

    v. (a) sum of atomic masses of all element

18. i. (d) all of these

    ii. (a) Elephantiasis

    iii. (a) (I) and (II)

    iv. (d) living in a large and well-furnished house

    v. (a) chronic and long term

19. i. (a) watt

    ii. 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) structural strength to plants

    ii. (c) DNA and protein

    iii. (c) Only (II)

    iv. (d) nucleoid

   v. (d) Plasma membranes contain chitin sugar in plants.

Section B

21. A compound is always a single substance in which two or more elements are combined chemically. A mixture is a combination of elements or compounds or both. Thus, a compound fulfils the definition of a pure substance but not a mixture. Moreover, a compound has a sharp melting or boiling point while a mixture does not have.

<div align="center">OR</div>

Pure gold (24-carat gold) is very soft. It is alloyed with silver or copper to impart strength while making ornaments. An alloy that contains 20 parts of gold and 4 parts of silver is called a 20-carat gold.

22. i. Water and acohol; can be separated by distillation.
    ii. Petroleum contains many volatile components and they can be separated by fractional distillation.
    iii. Water and kerosene oil; can be separated by separating funnel.
    iv. Salt and ammonium chloride mixture; can be separated by sublimation.
    v.   Ink; different pigments can be separated by chromatography.

23. **Elements of phloem:** Sieve tubes, companion cells, phloem fibers and phloem parenchyma.

Section of phloem
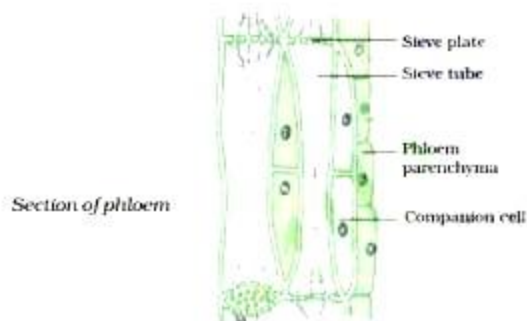
<div align="center">OR</div>

Xylem	Phloem
1. Xylem consists of tracheids, vessels, xylem parenchyma and xylem fibres.	1. Phloem is made up of sieve tubes, companion cells, phloem fibres and the phloem parenchyma.
2. Xylem mainly consists of dead cells (except the xylem	2. Phloem mainly consists of living cells (except

parenchyma).	phloem fibres).
3. It conducts water and minerals from roots to aerial parts of the plant.	3. It translocates food prepared by the plant from the leaves to storage organs and growing parts of the body.

24. **Blood** is a type of connective tissue. It has a liquid matrix called **plasma**, in which the red blood cells (RBCs), white blood cells (WBCs) and platelets are suspended. The plasma contains proteins, salts and hormones. Blood flows and transports gases, digested food, hormones and waste materials to different parts of the body.

25. Given

Initial velocity, u = 5 ms^{-1}
Final velocity, v = 0

Acceleration in the downward direction = 10 ms^{-2}

Therefore acceleration in the upward direction a = -10 ms^{-2}
Height attained by stone, S = ?
Time taken to attain height, t = ?
i) Using the relation : v = u + at
0 = 5 + (-10) t or
t = $\frac{5}{10}$ = 0.5 s
ii) Using the relation : v^2 - u^2 = 2 as we have
$$S = \frac{v^2 - u^2}{2a} = \frac{0 - (5)^2}{2 \times (-10)} = 1.25 \text{ m}$$

26. i. a. As potential energy decreases with decreasing height, the speed of the object will increase and hence its kinetic energy will increase.
   b. Total mechanical energy will remain constant.
   It is based on the law of conservation of energy which states that energy can neither be created nor be destroyed/. It can only be transformed from one form to another.

   ii. 1 kWh = 3.6 × 10^6 J

Section C

27. A weight of an object is directly proportional to the mass of the earth (M) and inversely

proportional to the square of the radius of the earth (R), i.e.,

A weight of object $\propto \frac{M}{R^2}$

Original weight, W_o = mg = $mG\frac{M}{R^2}$ ....(1)

According to question, hypothetically, Mass of earth, M' = 4 M and Radius of earth, R' = $\frac{R}{2}$.

Now, New weight an object = W_n = mg' = $mG\frac{M'}{R'^2}$ ....(2)

Now, put the values of M' and R' in equation (2), we get.

Weight of an object, W_n = $mG\frac{4M}{\left(\frac{R}{2}\right)^2}$ = (16 mG)$\frac{M}{R^2}$ = 16 $\times W_o$

The weight will become 16 times.

<div align="center">OR</div>

Given:

Height of the window (h) = 2m

Acceleration due to gravity g = 9.8 m/s2

Time taken (t) = 0.1 s

The velocity of the stone when it reaches the top of the window is to be calculated.

Applying the II equation of motion,

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

$2 = u * 0.1 + \frac{1}{2} * 9.8 * (0.1)^2$

$2 = 0.1u + 4.9 * 0.01$

$2 = 0.1u + 0.049$

$0.1u = 2 - 0.049$

$0.1u = 1.951$

$u = \frac{1.951}{0.1}$

$= 19.51 m/s$

Thus, the velocity 19.51 m/s will be the final velocity of the stone when it is covering the distance between the roof and the window.

Initially the stone is at rest i.e., u = 0

$v = 19.51 m/s$

$g = 9.8 m/s^2$

Applying the III equation of motion we get

$v^2 - u^2 = 2gh$

$$(19.51)^2 - 0 = 2 * 9.8 * h$$
$$(19.51)^2 = 19.6 * h$$
$$h = \frac{19.51 * 19.51}{19.6}$$
$$= 19.42m$$

Hence the Distance between the roof and the window =19.42 m.

28. Given:

i) Initial velocity (u) = 0,

Final velocity (v) = ?

Distance (s) = 50 cm = 0.5 m

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

Using the equation of motion,

$v^2 - u^2 = 2gh$

$\Rightarrow v^2 = u^2 + 2gh$

we have

$V^2 = 0 + 2 \times 10 \times 0.5 = 10$

$v = \sqrt{10} = 3.16$ ms^{-1}

ii) Kinetic energy of the body = $\frac{1}{2} mv^2 = \frac{1}{2} \times 10 \times 10 = 50J$

iii) Velocity of the body does not depend upon its mass, because the earth attracts all bodies with same acceleration due to gravity.

29. Sample 'B' will not freeze at 0 °C because may contain impurities. At 1 atm, the boiling point of pure water is 100 °C and the freezing point of pure water is 0 °C.

30. a. Acute disease cast for a short period of time and do not cause long term effect, e.g., cold and cough.

b. Chronic disease is a disease in which it takes years and years to cure but sometimes it can be life-long

c. Infectious diseases are caused by the attack of pathogens and can pass from one person to another.

e.g., malaria and chickenpox.

d. Non-infectious diseases are caused by factors other than living pathogens and are not transmitted.

e.g., diabetes and goitre.

31.

J. J.Thomson Model of Atom	Rutherford's Model of Atom
1. Positive charge forms a kernel.	1. Nucleus (dense positive charge) is in the centre of the atom.
2. Electrons are present (embedded in positive charge) throughout the atom.	2. Electrons revolve around the nucleus in orbits.
3. No space inside the atom is empty. Thomson likened an atom to a pudding or a watermelon.	3. According to Rutherford, most of the space inside the atom is empty.

32. We know that, 1 mole = Gram atomic mass = Avogadro's number

a. Mass of sodium atoms carried by Krish = (5 × 23) g = 115 g

Mass of carbon atoms carried by Raunak = (5 × 12) g = 60 g

Thus, Krish's container is heavier than Raunak's container .

b. Both the bags have same number of atoms as they have same number of moles of atoms.

33. u= initial velocity =0 (body starts from rest)

S= distance = 16m

T= time = 4s

(i) From, s= ut+at^2

$16 = 0 \times t + \frac{1}{2} \times a \times (4)^2$

$16 = \frac{1}{2} \times a \times 16$

$\frac{16 \times 2}{16}$

a = 2m/s^2

(ii) From, v = u +at

$v = 0 + 2 \times 4$

v= 8m/s

Section D

34. i. In the beginning water and clothes are in the state of rest. When the wet clothes are jerked, the particles of water tend to continue in its state of rest because of inertia of rest. Therefore the removal of water helps wet clothes to dry quickly because the droplets of water fall off from the clothes.

ii. When a carpet is hit with a stick, the carpet moves, but dust on account of inertia of rest flies off because of the sudden movement. It is in fact the carpet which comes out

of the dust.

iii. In the beginning the fruits on the branches are in the state of rest. On account of inertia of rest, the fruits tend to continue in their state of rest, but due to strong wind the fruits fall off the branches.

iv. At first the pillion rider and driver are in a state of motion. When the driver applies brakes, the body of pillion rider continues moving forward on account of inertia of motion. Hence the pillion rider falls forward.

OR

To explain the conservation of momentum, let us take the following example. Consider two balls A and B having masses m_1 and m_2 respectively. Let the initial velocity of ball A be u_1 and that of ball B be u_2 $(u_1 > u_2)$. Their collision takes place for a very short interval of time t and after that A and B start moving with velocities v_1 and v_2 $(v_1 < v_2)$ respectively as shown in Figure.

Before collision $(u_1 > u_2)$ After collision $(v_1 < v_2)$

(a)   (b)
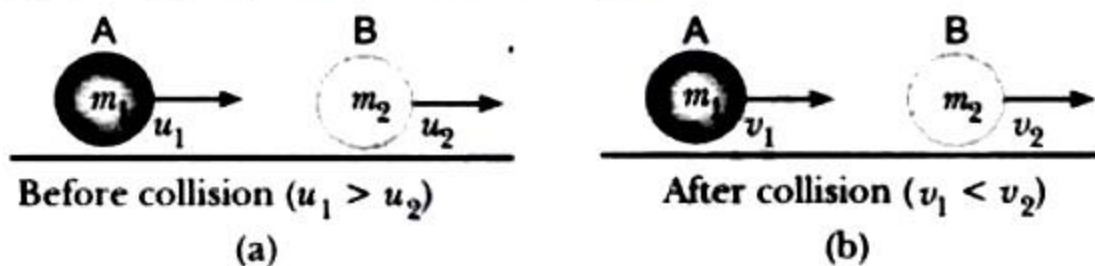
The momentum of ball A before and after the collision is $m_1 u_1$ and $m_1 v_1$ respectively. Similarly, the momentum of ball B before and after the collision is $m_2 u_2$ and $m_2 v_2$.

If there are no external forces acting on the body, then the rate of change of momentum of ball A, during the collision will be

$$= \frac{m_1(v_1 - u_1)}{t}$$

and, similarly the rate of change in momentum of ball B

$$= \frac{m_2(v_2 - u_2)}{t}$$

Let F_{12} be the force exerted by ball A on B and F_{21} be the force exerted by ball B on A. Then, according to Newton's second law of motion

$$F_{12} = \frac{m_1(v_1 - u_1)}{t} ; F_{21} = \frac{m_2(v_2 - u_2)}{t}$$

According to Newton's third law of motion, we have

$$F_{12} = -F_{21}$$

$$\implies \frac{m_1(v_1 - u_1)}{t} = -\frac{m_2(v_2 - u_2)}{t}$$

$$\implies m_1v_1 - m_1u_1 = -m_2v_2 + m_2u_2$$
$$\implies m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$$

i.e., Total momentum before collision =Total momentum after the collision

Thus, we find that in a collision between the two balls the total momentum before and after the collision remains unchanged or conserved provided no net force acts on the system. This result is the law of conservation of momentum.

35. The cells of striated muscle fibres are long or elongated, non-tapering and cylindrical and unbranched. These cells have a number of nuclei. These muscle fibres show alternate dark and light bands or striations (under the microscope) and hence, they are called striated muscles. Striated muscles occur in muscles of limbs, body wall, face, neck, etc.

Functions of striated muscles are as follows:

(i) Striated muscles are powerful and undergo rapid contraction. They are also called skeletal muscles.

(ii) Striated muscles provide the force for locomotion and all other voluntary movements of the body. Hence, they are also called voluntary muscles.

On the other hand, some muscles do not bear any bands, stripes or striations across them (under the microscope) and hence, they are called smooth or unstriated muscles. The cells of these muscle fibres are uninucleate. Smooth muscles occur as bundles or sheets of elongated fusiform or spindle-shaped cells or fibre. They are held together by loose connective tissues. These muscles are found in the walls of internal organs such as the alimentary canal, stomach, intestine, ureters, bronchi, iris of the eye, ducts of glands and blood vessels.

Functions of unstriated or smooth muscles are as follows:

(i) Smooth muscles do not work according to our will, so they are also called involuntary muscles. Movement of food in the alimentary canal or the contraction and relaxation of blood vessels are involuntary movements.

(ii) Smooth muscles contract slowly but can remain contracted for a long period of time. The ingested food passes to the next step of digestion in the alimentary canal due to this characteristic.

36. a. Atomic number of 'X' = Number of protons in 'X' = 8

   b. Atomic mass of 'X' = Number of protons in 'X' + Number of neutrons in 'X' = 8 + 10 = 18 u

   c. Valence electrons = Electrons in outermost shell = 6

d. Valency = Number of valence electrons (for 4 or lesser valence electrons); Valency = 8 - Number of valence electrons (for more than 4 valence electrons)

   Therefore, valency of 'X' = 8 - 6 = 2

e. 'X' should be non-metal because there are six valence electrons, hence it will tend to gain two more electrons to complete its outermost shell in order to achieve a noble gas configuration.

<div align="center">OR</div>

i. (F) because in J.J Thomson's model, the nucleus was not present.

ii. (F) Neutron is a fundamental particle (a subatomic particle) of the atom of an element, thus cannot be made by combining an electron and a proton. It is neutral, as it carries no charge.

iii. (T) mass of an electron is $\frac{1}{1840}$ times, which is nearly about $\frac{1}{2000}$ times that of a proton.

iv. (T) Tincture of iodine is made by dissolving an isotope of iodine in alcohol (I-131).