

CLASS IX (2019-20)
SCIENCE (CODE 086)
SAMPLE PAPER-6

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) The question paper comprises of three sections-A, B and C. Attempt all the sections.
- (ii) All questions are compulsory.
- (iii) Internal choice is given in each sections.
- (iv) All questions in Section A are one-mark questions comprising MCQ, VSA type and assertion-reason type questions. They are to be answered in one word or in one sentence.
- (v) All questions in Section B are three-mark, short-answer type questions. These are to be answered in about 50-60 words each.
- (vi) All questions in Section C are five-mark, long-answer type questions. These are to be answered in about 80-90 words each.
- (vii) This question paper consists of a total of 30 questions.

SECTION - A

1. A person is sitting in a travelling train and facing the engine. He tosses up a coin and the coin falls behind him. It can be concluded that the train is : [1]
 - (a) Moving forward and gaining speed.
 - (b) Moving forward and losing speed.
 - (c) Moving forward with uniform speed.
 - (d) Moving backward with uniform.

Ans : (a) Moving forward and gaining speed.

2. Ms. Shukla, a science teacher gave different mixtures to four groups of students to separate their components. Which group was not following the correct method? [1]
 - (a) Group 1 was separating a mixture of ethyl alcohol and water by using separating funnel.
 - (b) Group 3 was separating a mixture of iron pins and sand by using a magnet.
 - (c) Group 2 was separating a mixture of ammonium chloride and sodium chloride using sublimation.
 - (d) Group 4 was separating mud particles suspended in water using sedimentation and decantation.

Ans : (a) Group 1 was separating a mixture of ethyl alcohol and water by using separating funnel.**or**

What happens when graphite is burnt?

- (a) There will be remaining residue.
- (b) There will be no residue.
- (c) It will not catch fire.
- (d) It will turn into diamond.

Ans : (b) There will be no residue.

DIRECTION : For question numbers 3 and 4, two statements are given- one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

- (a) Both A and R are true and R is correct explanation of the A.
- (b) Both A and R are true but R is not the correct explanation of the A.

- (c) A is true but R is false.
- (d) Both A and R are false.

3. Assertion (A) : Electron microscope uses very high voltage electricity. [1]
 Reason (R) : An electron microscope uses electromagnets instead of glass lenses and beam of electrons instead of light.

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

4. Assertion (A) : If we push a massive truck parked along the roadside, it will not move. [1]
 Reason (R): Two opposite and equal forces acted on two bodies in contact cancel each other.

Ans : (c) A is true but R is false.

5. Calculate the number of moles 23.3 g of zinc. [1]

(a) 0.37 moles	(b) 0.36 moles
(c) 0.5 moles	(d) 0.53 moles

Ans : (b) 0.36 moles**or**

What is the full form of IUPAC?

- (a) International Union Power of Applied Chemistry.
- (b) International Union of Pure and Applied Chemistry.
- (c) Internal Union of Pure Applied Chemistry.
- (d) International Universal Pure and Applied Chemistry.

Ans : (b) International Union of Pure and Applied Chemistry.

6. The phenomenon of increase in concentration of non-biodegradable organic compounds with each trophic level in a food chain is called : [1]

(a) Biological evolution	(b) Biological fixation
(c) Bioenlargement	(d) Biomagnification

Ans : (d) Biomagnification.

7. The electronic configuration of elements A, B, C and D are (2, 8, 4), (2, 8, 5), (2, 8, 6) and (2, 8, 7) respectively. Which of them can make an ion with two

negative charges? [1]

- (a) A (b) B
- (c) C (d) D

Ans : (c) C

8. Select the incorrect match of disease and its vector/ carrier. [1]

- (a) Cholera - Housefly
- (b) Sleeping sickness - Tsetse fly
- (c) Typhus fever - Body louse
- (d) Chikungunya - Sandfly

Ans : (d) Chikungunya - Sandfly

9. If the change in the value of g at a height h above the surface of earth is same as at a depth d below it, then (both d and h being much smaller than the radius of the earth). [1]

- (a) $d = h/2$ (b) $d = h$
- (c) $d = 2h$ (d) $d = h^2$

Ans : (c) $d = 2h$

or

A sphere of mass 40 kg is attached by another of mass 15 kg when their centers are 0.2 m apart, with a force of $9.8 \times 10^{-7} \text{N}$. Calculate the constant of gravitation.

- (a) $9.2 \times 10^{-7} \text{Nm}^0\text{kg}^{-2}$ (b) $6.13 \times 10^{-11} \text{Nm}^2\text{kg}^{-2}$
- (c) $6.53 \times 10^{-18} \text{Nm}^2\text{kg}^{-2}$ (d) $6.53 \times 10^{-11} \text{Nm}^2\text{kg}^{-2}$

Ans : (d) $6.53 \times 10^{-11} \text{Nm}^2\text{kg}^{-2}$

10. What happens to collagen when boiled in water at normal pressure and temperature? [1]

- (a) Changes into gelatin (b) Changes into fibrine
- (c) Changes into elastin (d) No changes

Ans : (a) Changes into gelatin

11. An atom has mass number A and atomic number Z [1]

- (a) How many protons are present in the nucleus?
- (b) How many electrons revolve around the nucleus?
- (c) How many neutrons are present in the nucleus?

Ans :

An atom has mass number A and atomic number Z :

- (a) No. of protons = Z
- (b) No. of electrons = No. of protons = Z.
- (c) No. of neutrons = A - Z.

12. If wavelength of a sound wave in a medium is reduced by 50%, then what is the percentage change in its frequency? [1]

Ans :

We know, $u = \gamma\nu$

As λ is reduced by 50%. Then, frequency is proportional to wavelength inversely $\frac{v_1}{v_2} = \frac{\lambda_1}{\lambda_2}$

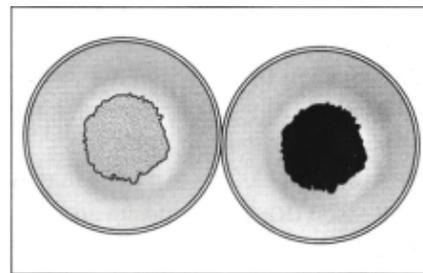
$$\frac{v_2}{v} = \frac{\lambda}{0.5\lambda}$$

$$v_2 = 2v$$

So, frequency will also increased by 100%.

13. Answer question numbers 13.1–13.4 on the basis of your understanding of the following paragraph and the related studied concepts.

Aaron went to the chemical laboratory in his school to do an experiment on iron filings and sulphur. First he took 3 g of sulphur powder and 5 g of iron filings. He put them on a china dish and heated it till the mixture became red hot. Then he let the mixture cool and weighed the mixture. The quantity seemed less to the naked eyes, but after he saw the weight he was surprised.



13.1 How much did the mixture weight at the end? [1]

Ans : 8 g.

13.2 Which law is applicable here? [1]

Ans : **Law of conservation of mass** : Mass can neither be created nor destroyed.

13.3 State one property of a compound. [1]

Ans : The property of a compound is totally different than the properties of the individual elements it is formed from.

13.4 What is the name of the compound formed? [1]

Ans : The compound formed here is FeS (ferrous sulphide)

14. Questions 14.1 to 14.4 are based on the Table A. Study this table and answer the following questions.

Table A: Cell size and number of chromosomes

Cells	Size (pm)	Number of chromosomes
Cell A	5	3
Cell B	26	2
Cell C	12	4
Cell D	2	1
Cell E	45	6

14.1 Can you find any discrepancy in the above given (Table A) table? [1]

Ans : Cell A's size is 5 pm, which means it is a prokaryotic cell but it has more than one number of chromosome which is a characteristic of an eukaryotic cell.

14.2 Find out the eukaryotic cells from the given table. [1]

Ans : Cell B, C and E (cell size is between 5 -100 pm) are eukaryotic cells.

14.3 State two differences between prokaryotic cell and eukaryotic cell. [1]

Ans :

- (i) Nuclear region is not well defined in prokaryotes while in eukaryotes it is properly defined. The nuclear region is surrounded by a nuclear membrane in the prokaryotes.
- (ii) Membrane bounded cell organelles are absent in prokaryotic cell.

- 14.4 Give two examples of an eukaryote. [1]
Ans : Human beings, reptiles.

SECTION B

15. (a) A bat can hear sound at frequency upto 120 kHz. Determine the wavelength of sound in air at this frequency. Take speed of sound as 344 m/s.
 (b) How are the wavelength and frequency of a sound wave related to its speed?
 (c) How does sonic boom occur? [3]

Ans :

- (a) Frequency,

$$v = 120 \times 1000 \text{ Hz}$$

Initial velocity, $u = 344 \text{ m/s}$

Wavelength, $\lambda = \frac{u}{v} = \frac{344}{120 \times 1000}$

$$\lambda = 2.86 \times 10^{-3}$$

- (b) Speed of sound wave = wavelength x frequency
 (c) When an aircraft travels at a greater speed than that of sound, it is said to have supersonic speed. This produces shock waves with large energy in the surroundings. This is called sonic boom.
16. With the help of an activity show that gases are more easily compressible than liquids and solids. [3]

Ans :

Material Required : Three 10ml syringes, cork, water.

Procedure:

1. Take three 10 ml syringes and close their nozzle by inserting them in a rubber cork.
2. Remove the piston from all the syringes.
3. Allow the common salt to fill space inside the first syringe.
4. Fill the second syringes with water.
5. Third Syringe with air.
6. Now insert the pistons back into the syringes after applying a little of vaseline for smooth movement.
7. Now try to compress by applying pressure on the piston of each syringe and record observations.

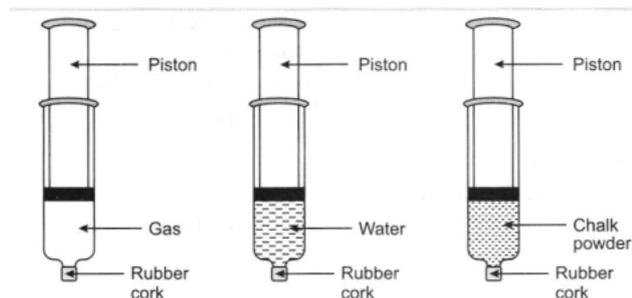
Observations:

The piston moves easily in third syringe in which air is filled as shown in Figure.

The piston does not move easily in second syringe in which water is filled. The piston moves very slowly in the first syringe in which solid common salt is filled.

Inference

Gases are more easily compressed as compared to liquids and liquids are compressed more easily than solids.



17. (a) Why mitochondria are able to make some of their own proteins?
 (b) For what reason do we need to stain bacteria?[3]

Ans :

- (a) The mitochondrion is a double membrane bound organelle that is found in most eukaryotic organisms. Some cells in some multicellular organisms may however lack them. They are able to make their own proteins because they have their own ribosomes and DNA and ribosomes synthesizes proteins. Mitochondria has their own DNA and Ribosomes, thus it has its own proteins too.
 (b) The purpose of staining bacteria is to see, for example, how thick of a layer of peptidogly can their cell wall has. In the gram stain, gram-negative bacteria will stain red or pink because the rinse took out the primary dye and the Safrinin (secondary dye) took over the coloring as the counter-stain.

or

Explain your observation in the following with reason involved in the process.

- (a) Salt is applied to raw mango pieces.
 (b) Dried raisins are kept in water for a few hours.

Ans :

- (a) Mango pieces will shrink due to exosmosis in which more water molecules will exit the cell.
 (b) Raisins will swell up because the medium surrounding them has a higher concentration of water than the cell. Raisins gain water due to osmosis (endosmosis).

18. (a) What should be the mass of a man if he has to do 2500 joules of work in climbing a tree 5 m tall? ($g = 10 \text{ m/s}^2$)
 (b) List two conditions which need to be satisfied for the work to be done on an object.
 (c) If energy of universe is constant, why are we facing energy crisis? [3]

Ans :

- (a) Given,

$$W = 2500 = 5 \text{ m}$$

$$g = 10 \text{ m/s}^2$$

$$m = ?$$

We know, $W = mgh$

$$m = \frac{W}{gh}$$

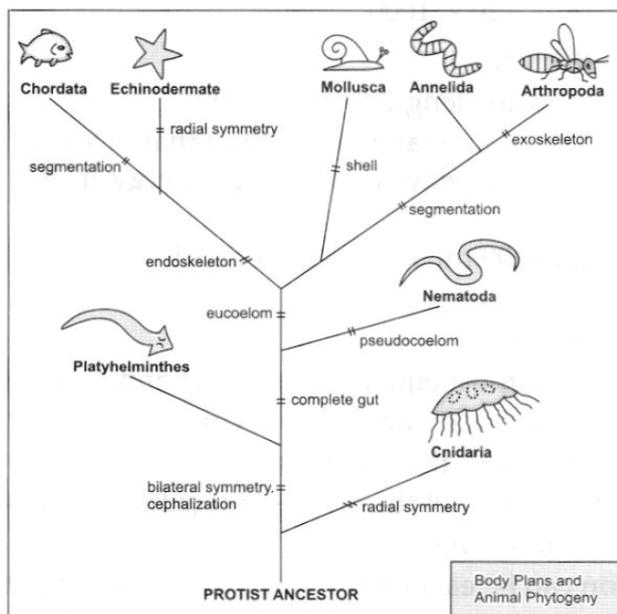
$$m = \frac{2500}{10 \times 5}$$

$$= 50 \text{ kg}$$

- (b) (i) There should be a displacement in the object.
 (ii) A force should act on the object.
 (c) We are facing energy crisis because we are converting the energy available in the form of fuels into non-usable forms. Since we cannot make use of that energy, we are facing energy crisis. The fossil fuels are heading towards exhaustion and cannot be replenished back.

19. Draw a phylogenetic tree to show the natural relationship among various animal phyla. [3]

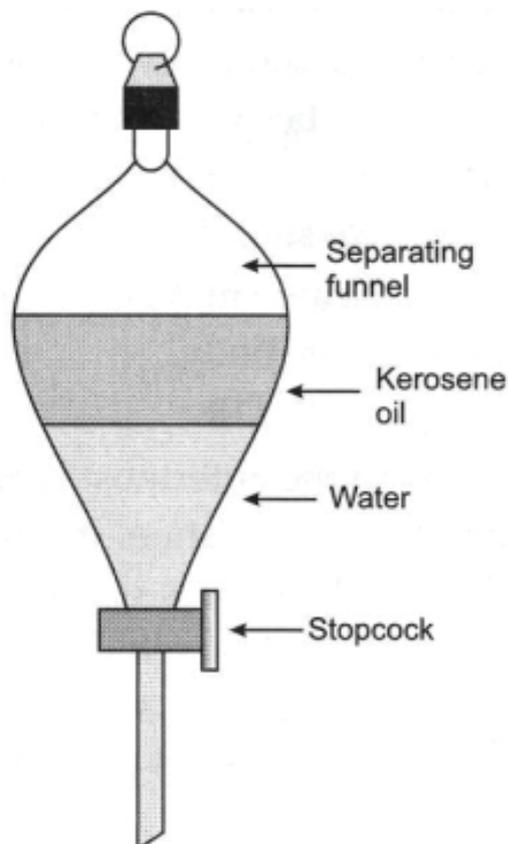
Ans :



20. (a) Name the principle used to separate kerosene and water. Draw a neat and labelled diagram of the apparatus used in this separation.
 (b) Can physical and chemical changes happen at the same time? Support your answer with illustrative example. [3]

Ans :

(a) Kerosene oil and water differ in their densities; therefore, can be separated by separating funnel.



(b) Yes, both can take place simultaneously breaking of chocolate in mouth is physical change. Its digestion is a chemical change.

or

(a) Why did Rutherford select a gold foil in his alpha scattering experiments?
 (b) Mention any two drawbacks of Rutherford's model.

Ans :

(a) Rutherford used gold for his scattering experiment because gold is the most malleable metal and he wanted the thinnest layer as possible. The gold sheet used was around 1000 atoms thick. Therefore, Rutherford selected a gold foil in his alpha scattering experiment.

(b) **Drawbacks of Rutherford's model of atom :** Rutherford proposed that electrons revolve at a high speed in circular orbits around the positively charged nucleus. When a charged particle i.e., electron revolves around positively charge nucleus, it needs to be accelerated so as to keep it moving in circular orbits. However, according to electromagnetic theory, whenever a charged particle such as an electron is accelerated around another charged centre (nucleus) which are under force of attraction, there will be continuous radiation of energy. This loss of energy would slow down the speed of the electron. This would reduce the radius of the electron orbit. Eventually, the electron would fall into the nucleus. The result would be that the atom would collapse. But this does not happen. Thus, Rutherford's atom could not explain the stability of the atom. Failure of Rutherford's model i.e., reduction of radius of orbit is shown below. Rutherford proposed that electrons revolve around the nucleus in the fixed orbits. However, he did not specify the orbits and the number of electrons in each orbit.

21. (a) Describe an activity to demonstrate balanced forces.
 (b) Why is it advised to wear a seat belt in a moving car? [3]

Ans :

(a) Consider some children pushing a heavy box on a rough surface with some force.
 (i) The box does not move due to the friction between the surface and the box, which balances the applied force.
 (ii) The applied force is still increased but the friction again balances with the applied force.
 (iii) When the box is pushed with still a greater force, the applied force becomes greater than the frictional force. The force acting on box is unbalanced and the box moves.
 (b) It is advice to wear a seat belt while driving or while sitting in a moving car because as car is in motion so due to inertia our body is also in motion and if car stops then due to inertia of motion of body our body pushed forward and the person become injured. So to prevent injuries it is advice to wear a seat belt.

22. Given below are the names of some connective tissues. Mention the composition and function of each of them: Blood, cartilage and bone. [3]

Ans :

Blood : It is a fluid (liquid) connectivity tissue. In this tissue, the cells move in a fluid matrix or medium called blood plasma. The blood plasma contains cells called blood corpuscles which include red blood corpuscles (RBCs), white blood corpuscles (WBCs) and platelets. RBCs and WBCs are living while plasma and platelets are non-living components.

Cartilage : The cartilage is a specialised connective tissue which is compact and less vascular. It provides support and flexibility to the body parts and also smoothens bone surfaces at joints. Cartilage has widely spaced cells and is present in the nose, ear and larynx.

Bone : Bone is very strong and non-flexible tissue embedded in a hard matrix made up of both organic matter (protein) and inorganic matter (calcium and phosphorous compounds). It provides shape and skeletal support to the body.

or

- (a) Write a note on the protective tissue in plant.
- (b) What is differentiation plant tissue?

Ans :

- (a) The protective tissue is present in the outermost layer of the plant such as roots, stem and leaves. Protective tissue prevents desiccation, mechanical injury and infection in plants. They form a protective barrier which does not allow the entry of the pathogen into the plant. Cork cells are highly thick and secrete a chemical called suberin that protects the inner tissue of the plant. The epidermis is the outer layer of the plant which secretes a waxy chemical, which is water resistant and prevents loss of water also protect them from infection and injury.
- (b) Differentiation in plants refers to the processes by which distinct cell types arise from precursor cells and become different from each other. Plant tissue systems fall into one of two general types: meristematic tissue and permanent (or non-meristematic) tissue.

23. State the universal law of gravitation. Derive its expression. [3]

Ans :

The force of gravitation between two objects in the universe is directly proportional to product of their masses and inversely proportional to square of distance between their centres. For objects of masses m_1 and m_2 separated by a distance r ,

$$F \propto m_1 m_2$$

$$F \propto \frac{1}{r^2}$$

or

$$F \propto \frac{m_1 m_2}{r^2}$$

When we add a constant G,

$$F = G \frac{m_1 m_2}{r^2}$$

Where, $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2 =$ gravitational constant.

24. What are the desirable characters of bee varieties suitable for honey production? [3]

Ans :

The desirable characters of bee varieties suitable for honey production are:

- (a) High honey collection capacity.
- (b) They must sting comparatively less.
- (c) They should stay in the given beehives for a longer period and breed properly.

SECTION - C

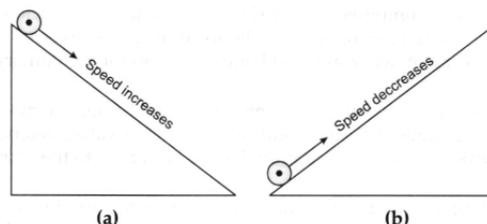
25. Describe Galileo's experiment to demonstrate motion of objects on an inclined plane. [5]

Ans :

Galileo deduced that objects move with constant speed when no force acts on them by observing the motion of objects on inclined planes. Galileo studied the motion of marbles on an inclined plane in his first experiment.

- (a) He observed that when a marble rolls down an inclined plane, its velocity increases.
- (b) Here the marbles falls under the unbalanced force of gravity.
- (c) The velocity of the marbles decreases when it rolls up the inclined plane (against the force of gravity).

From the observations, Galileo argued that the velocity of a marble rolling on flat horizontal surface should remain constant.



Motion of a marble (a) down the inclined plane and (b) up the inclined plane.

or

Explain the following briefly:

- (a) A greater force is required to impart greater velocity to an object.
- (b) An applied unbalanced force causes a change in momentum.
- (c) A cricket ball causes much severe injury than a tennis ball on hitting a spectator.

Ans :

- (a) In order to change the velocity of the object you have to apply force. Because according to Newton first law of motion acceleration is directly proportional to the force and in order to change the acceleration you have to change the force. So, that's mean you are changing the velocity too in order to create the acceleration as we know that the acceleration is produced by the change of velocity. This is why changing force mean changing the velocity too, greater the force greater will be the velocity.
- (b) When two or more forces which are unequal in magnitude are acting in the opposite direction

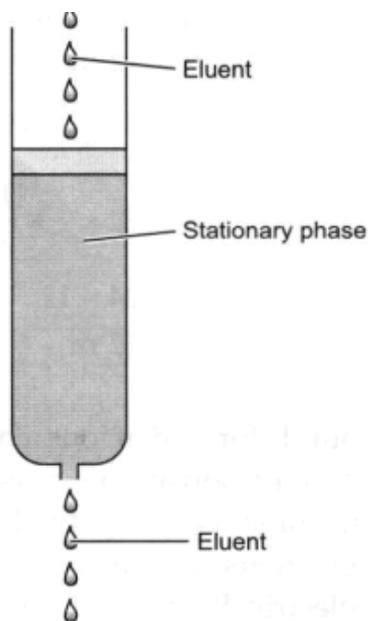
of an object, which causes change in the state of motion are called as unbalanced forces. Unbalanced forces causes acceleration. If unbalanced forces are acting on an object, then the velocity of an object increases and hence its momentum also. Because momentum is defined as product of mass and velocity.

- (c) A cricket ball has more mass than the tennis ball, so the momentum possessed by the Cricket ball will be more than tennis ball. As the momentum is more, change in momentum will be also more, so when the cricket ball hits the spectator, the final momentum becomes zero and hence the impact force of the cricket ball is more on hitting a spectator than tennis ball.

26. What is chromatography? State its principle with the help of a diagram. [5]

Ans :

“Chromatography is an analytical technique wherein a sample mixture under test is separated into different components.” This is both a qualitative and quantitative method. The sample gets separated under the influence of a mobile phase (moving phase) over a stationary phase. These separated components are later identified and also quantified. Chromatography is based on the principle of separation of compounds into different bands (color graphs) and the identification of those bands. The preferential separation is done due to differential affinities of compounds towards stationary and mobile phase. After separation of the compounds, they are identified by suitable detection methods.



- 27. (a) In what way smooth muscles are different from striated muscles with respect to the number of nuclei?
- (b) Water hyacinth floats on water surface. Explain.
- (c) Why is epidermis present as a thick waxy coating of cutin in desert plants? [5]

Ans :

- (a) Striated muscle is composed of muscle fibers, made up of thick and thin filaments, but smooth muscle has interconnected cells to form

layers. Skeletal muscle is involved in voluntary movement, whereas smooth muscle serves for involuntary movement inside the body.

- (b) Water hyacinth floats on surface of water because the parenchyma tissue present in water hyacinth has specialised tissue modification which is called aerenchyma. This tissue has large air cavities due to which it provides the buoyancy to the plant and helps to float in the water.
- (c) The main adaptation of desert plants is to minimise the water loss. Hence, layer of cutin is present on epidermis, which is a thick waxy coating. This waxy coating helps in minimising water loss by transpiration.

or

What are simple permanent tissues of plants? Explain in detail (also give differences in them).

Ans :

	Character-istic	Paren-chyma	Collen-chyma	Scleren-chyma
1.	Type of cells	Living cell isodia-metric shape.	Living cells with thick comers	Dead cells, long and narrow
2.	Cell wall	Thin walls.	Thickened at comers	Thick due to deposition of pectin.
3.	Cytoplas-mic content	Distinct nucleus with large central vacuole.	Distinct unclous and dense cytoplasm.	No nucleus and no cytoplasm.
4.	Function	Stores food and forms pack ing tissue.	Gives mechanical support and carry out photosyn-thesis.	Provides strength to the plants.
5.	Location	In all soft parts, i.e., stems, roots, lea ves , flowers and fruits.	Present below the epidermis in stems and leaves.	Present in xylem and phloem , shells of nuts, in hard seeds and pulp of pear.

28. The brakes applied to a car produce an acceleration of 6m/s. in opposite direction to the motion. If the car takes 2 second to stop after the application of break, calculate the distance its travel during this time? [5]

Ans :

Given, Acceleration, $a = -6 \text{ m/s}^2$

Time = $2s$

Final velocity $v = 0 \text{ m/s}$

Let initial velocity be u

Let distance be s ,

we have, $v = u + at$

So, $0 = u + (-6) \times 2$

So, $u = 12 \text{ m/s}$

Now,

$$s = ut + \frac{1}{2}at^2$$

$$s = 12 \times 2 + \frac{1}{2}(-6)2^2$$

$$s = 24 - 12$$

$$s = 12 \text{ m}$$

Thus, distance travelled is 12 m

29. (a) What are ionic and molecular compounds? Give examples.
 (b) Calculate the number of moles of magnesium present ribbon weighing 14 g. Molar atomic mass of magnesium is 24 gmol^{-1} . [5]

Ans :

(a) Ionic compounds are compounds formed of ions, charged particles that form when an atom (or group of atoms, in the case of polyatomic ions) gains or loses electrons. A cation is a positively charged ion. An anion is a negatively charged ion. Covalent or molecular compounds develop when elements share electrons in a covalent bond to create molecules. Molecular compounds are electrically neutral. Ionic compounds are (normally) produced when a metal reacts with a non metal (or a polyatomic ion). Covalent compounds are formed when two non metals react with each other.

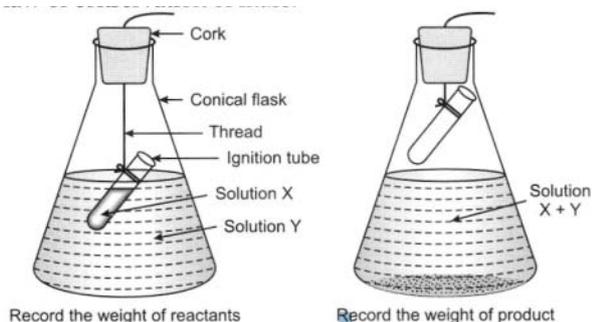
(b) Given, 1 mole of Mg = 24 g
 24 g of Mg = 1 mol
 14 g of Mg = $\frac{1}{24} \times 14 = 0.58 \text{ mol}$.

or

How will you prove experimentally the law of conservation of mass?

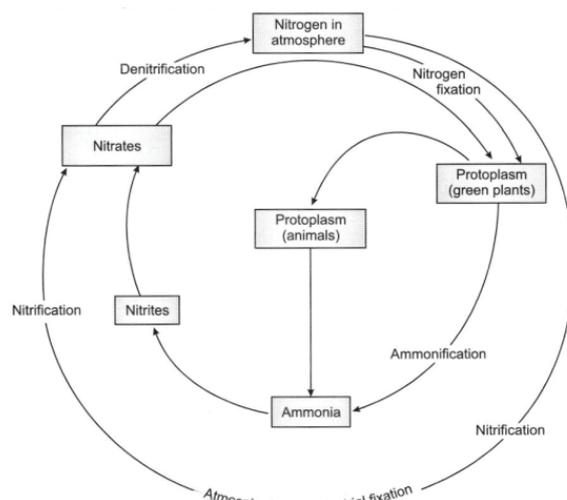
Ans :

- Take copper sulphate solution and dissolve it in water in a conical flask.
- Now take solution of sodium carbonate in the ignition tube and hang it carefully so that the two do not get mixed. Put a cork on the flask.
- Weigh the flask with its contents carefully.
- Now tilt and shake the flask so that the solutions of copper sulphate and sodium carbonate get mixed.
- Weigh again.
- The chemical reaction takes place in flask.
- Put cork on the mouth of the flask so that reactants and products do not spill out of flask.
- The mass of flask and its contents remain the same before as well as after the reaction that proves the law of conservation of mass.



30. Describe the nitrogen cycle with appropriate diagrams. [5]

Ans :



Nitrogen is an essential nutrient for the survival of living beings. It is found in proteins like DNA and RNA. Nitrogen cannot be used directly from the atmosphere and have to be converted into nitrates and nitrites by certain Nitrogen fixing bacteria. These bacteria are found in the root nodules of legumes (plants that give us pulses).

Another method through which the nitrogen in the environment can be converted into nitrates or nitrates is the physical process of lightning. The high pressure and temperature during the lightning creates the nitrogen into oxides of nitrogen. These oxides then dissolve in water bodies, thus forming nitrous and nitric acids.

Once nitrogen is converted into the useful form of nitrates and nitrites, they can be used further. Plants use them to produce amino acids, which are then used to make proteins. Other complex compounds that require nitrogen are also made by the plants through some complex biochemical process. These proteins and complex compounds are subsequently consumed by the animals. Once these plants and animals die and get buried in the soil, bacteria convert these proteins back to nitrates and nitrites. A certain kind of bacteria converts the proteins to elemental nitrogen, thus completing a complete nitrogen cycle.

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