

CLASS IX (2019-20)
SCIENCE (CODE 086)
SAMPLE PAPER-10

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. The phenomenon by which protoplast of a cell shrinks from the wall is [1]
- (a) Osmosis (b) Plasmolysis
(c) Diffusion (d) Glycolysis

Ans : (b) Plasmolysis

2. What could be the diameters of the molecules of matter? [1]
- (a) 10^{-7} m (b) 10^{-11} m
(c) 10^{-9} m (d) 10^{-15} m

Ans : (c) 10^{-9} m

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) :** Turtles lay eggs outside the water.
Reason (R) : Turtles are amphibians. [1]
- Ans :** (c) A is true but R is false.

4. **Assertion (A) :** Plasma membrane is a selectively permeable membrane. [1]
Reason (R) : Plasma membrane allows entry and exit of substance from cell through the process of diffusion.
Ans : (c) A is true but R is false.

5. Diamond is lustrous because : [1]
- (a) It is colourless.
(b) It is hard.
(c) It is pure.
(d) Its refractive index is high.
- Ans :** (d) Its refractive index is high.

6. The tissue present in the lining of kidney tubules and ducts of salivary glands is : [1]
- (a) Squamous epithelium tissue
(b) Glandular epithelium tissue
(c) Cuboidal epithelium tissue
(d) Columar epithelium tissue

Ans : (c) Cuboidal epithelium tissue.**or**

- Parenchyma is a type of : [1]
- (a) Complex tissue (b) Organ
(c) Simple tissue (d) Organelle

Ans : (c) Simple tissue

7. Plasmodium is an example of [1]
- (a) Virus (b) Bacteria
(c) Protozoa (d) Worm

Ans : (b) Bacteria

8. If proton (P^+) number of an element change : [1]
- (a) It becomes an isotope.
(b) It becomes another element.
(c) It will sublime immediately.
(d) It will be an electrolyte.

Ans : (b) It becomes another element.**or**

The atomic number of sodium is 11 and its mass number is 23. It has :

- (a) 11 neutrons and 12 protons
(b) 12 protons and 11 electrons
(c) 11 electrons and 12 neutrons
(d) 12 electrons and 11 neutrons

Ans : (c) 11 electrons and 12 neutrons

9. Which irrigation system is more useful in the areas where canal flow is insufficient or irregular? [1]
- (a) Canal system (b) Tanks
(c) Wells (d) River lift system

Ans : (d) River lift system

10. The earth attracts the moon with a gravitational force of 1020 N. The moon attracts the earth with a gravitational force of [1]
 (a) Less than 10^{20} N (b) 10^{20} N
 (c) Greater than 10^{20} N (d) 10^{-20} N

Ans : (b) 10^{20} N

or

The gravitational force causes

- (a) Tides (b) Motion of moon
 (c) Revolution of earth (d) Both (a) and (b)

Ans : (d) Both (a) and (b)

11. What is the role of “International Code of Binomial Nomenclature”? [1]

Ans :

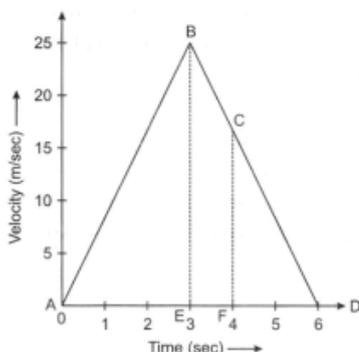
It sets the rules and guidelines for the binomial nomenclature.

12. Calculate the mass of one atom of oxygen. [1]

Ans :

Mass of one oxygen atom = $2 \times 8 = 16$ amu
 Because the atomic mass of oxygen = 16 amu

13. Answer the question numbers 13.1–13.4 on the basis of your understanding of the following paragraph and the related studied concepts. Study the given velocity-time graph and calculate the following :



Mohan bought a new car and wanted to test it on highways. He thought he will find out the acceleration of his car at different velocities in the first 6 seconds. He called his friend Shyam and told him to sit alongside him and note down the different speeds. Shyam prepared the following (graph 1) graph. Mohan’s son, who studied in 9th class wanted to do an experiment with the car. He had recently learned a peculiar thing about circular motion and coerced his father to take the car to a circular track and drive at constant speed.



- 13.1 Find out the car’s acceleration from A to B. [1]

Ans :

$$a = \frac{\Delta v}{\Delta t} = \frac{25 - 0}{3 - 0} = 8.33 \text{ m/s}^2$$

- 13.2 Find out the car’s acceleration from B to C. [1]

Ans :

$$a = \frac{\Delta v}{\Delta t} = \frac{17.5 - 25}{4 - 3} = \frac{-7.5}{1} = -7.5 \text{ m/s}^2$$

Here, minus sign indicates retardation; velocity is decreasing.

- 13.3 What peculiar thing had Mohan’s son learned about circular motion in his class that he wanted to test in the track? [1]

Ans : In a circular motion, the speed of an object remains same but the velocity is non - uniform. Mohan’s son wanted to understand what this means.

- 13.4 What did Mohan and their son notice when they drove their car in the circular track? [1]

Ans : Mohan and his son felt an outward force away from the center of the track. This is the centrifugal force.

14. Question 14.1 to 14.4 are based on the Table A. Study the table and answer the following question given below :

Table A

S. No.	Processes
1.	Conversion of solid into liquid.
2.	Conversion of liquid into gases.
3.	Conversion of solid into gases.
4.	Conversion of gases into liquid.
5.	Conversion of liquid into solid.

- 14.1 Give the name of the process that is involved in conversion of solid into liquid. [1]

Ans : The conversion of solid into liquid is known as the fusion.

- 14.2 Give the conditions for conversion of gases into liquid. [1]

Ans : Low pressure and high temperature favors the conversion of gases into liquid.

- 14.3 Name the process for conversion of solid into gases. [1]

Ans : The conversion of solid into gases is known as sublimation.

- 14.4 Give the conditions for conversion of liquid into gases. [1]

Ans : High temperature favors the conversion of liquids into gases

SECTION B

15. When will you say a body is in
 (a) Uniform acceleration. [3]
 (b) Non-uniform acceleration.

Ans :

- (a) When an object travels in a straight line and its velocity changes by equal amount in equal intervals of time is said to have uniform acceleration.
- (b) It is also called variable acceleration. When the velocity of an object changes by unequal amounts in equal intervals of time, it is said to have non-uniform acceleration.

16. The element whose atomic number is 10 and the one whose atomic number is 11? [3]

Ans :

Element with atomic number 11 is more reactive than the one with atomic number 10 because electronic configuration of atomic number 11 will be 2, 8, 1. To attain a stable electronic configuration, it will try to lose an electron from its outermost shell. The electronic configuration of the element with atomic number 10 is 2, 8, so it is already stable. Therefore, the atomic number 11 will be more reactive.

17. Name and give the function of each cell of xylem and phloem. Draw a labelled diagram of each tissue. [3]

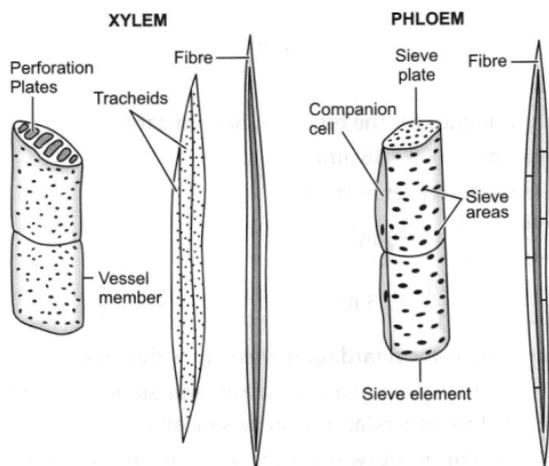
Ans :

Xylem contains four types of cells, such as xylem parenchyma, xylem fibres, tracheids and vessels.

- (a) **Xylem parenchyma :** Store metabolites produced from metabolism of plant. Also help in short distance transport.
- (b) **Xylem fibres :** Provide mechanical support. The walls of xylem fibres are lignified and protoplasm is absent.
- (c) **Xylem tracheids :** Transport of water and mineral salts.
- (d) **Xylem vessels :** Conduction of water and mineral. These cells are dead.

Phloem also contains four types of cells such as phloem parenchyma, phloem fibres, companion cells and sieve tubes.

- (a) **Phloem parenchyma :** Transport of nutrients and storage of organic food.
- (b) **Phloem fibres :** They are non-living component of phloem. They provide mechanical support.
- (c) **Companion cells :** Provide ATP and nutrients to carry out cellular functions.
- (d) **Sieve tubes :** Transport of carbohydrates especially sucrose.



18. A car of mass 400 kg travelling at 72 km/h crashes into a truck of mass 4000 kg and travelling at 9 km/h in same direction. The car bounces back at a speed of 18 km/h. Find the speed of the truck after the impact. [3]

Ans :

Given,

$$m_1 = 400 \text{ kg}$$

$$u_1 = 72 \text{ km/h} = 20 \text{ m/s}$$

$$m_2 = 4000 \text{ kg}$$

$$u_2 = 9 \text{ km/h} = 2.5 \text{ m/s}$$

$$v_1 = -18 \text{ km/h} = -5 \text{ m/s}$$

$$v_2 = ?$$

By law of conservation of linear momentum,

$$m_1 u_1 + m_2 u_2 = m_1 v_1 + m_2 v_2$$

$$400 \times 20 + 4000 \times 2.5 = 400 \times (-5) + 4000 \times v_2$$

$$4000 v_2 = 8000 + 10000 + 2000$$

$$v_2 = \frac{20000}{4000}$$

$$v_2 = 5 \text{ m/s} = 18 \text{ km/h}$$

or

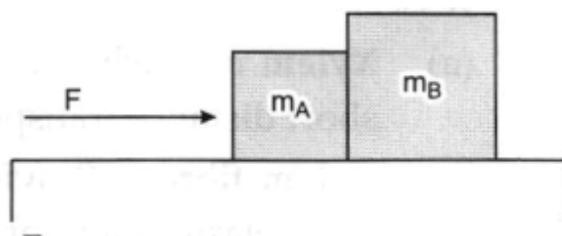
Two blocks A and B of m_A mass and m_B , respectively are kept in contact on a frictionless table. The experimenter pushes the block A from behind so that the blocks accelerate. If the block A exerts a force F on the block B. What is the force exerted by the experimenter on A?

Ans :

Let F_1 be the force with which experimenter pushes the block A. Consider the two masses as a system. Let the net force on the system :

$$F_1 = (m_A + m_B) a$$

$$a = F_1 / (m_A + m_B)$$



Let F_{AB} be the force exerted by the block A on block B = F

$$F_{AB} = F = m_B a$$

$$a = m_B \frac{F_1}{(m_A + m_B)}$$

$$F_1 = F \left(\frac{m_A + m_B}{m_B} \right) = F \left(\frac{m_A}{m_B} + 1 \right)$$

19. (a) What are secretory proteins? Give an example of secretory protein.
 (b) What is membrane biogenesis? How is plasma membrane formed during this process? [3]

Ans :

- (a) Proteins which are synthesized by the cell and then released into outer medium of the cell are

called secretory proteins. Examples of secretory proteins include mucus, digestive enzymes and hormones.

- (b) The process of plasma membrane formation is called membrane biogenesis. Following organelles are involved in this process. The proteins and lipids are first synthesized in rough endoplasmic reticulum and the smooth endoplasmic reticulum, respectively. These are then transported to the Golgi complex for their modification. After modification, these are transported to the cell surface through vesicles which bud off from Golgi complex to fuse with cell membrane and form a part of the membrane.

20. (a) On a hot sunny day, why do people sprinkle water on the roof or open ground?
 (b) Cotton is solid but it floats on water. Why? [3]

Ans :

- (a) The specific heat capacity of water is high. This means that the heat energy required to increase the water temperature by 1°C (degree Celsius) is very high. Thus, on a very hot and sunny day, the sprinkling of water on roofs and gates is helpful in cooling the surface. The heat from the surface of the roofs and gates is used up by the water to heat up and evaporate which in turn cools the surface it was sprinkled on.
- (b) According the laws of physics, the difference if the density of a solid is less than the density of a liquid, the solid will float on the liquid. Cotton is a material that has a porous structure, and the pores trap air inside themselves. As a result, the overall density of cotton is less than water, that is why it floats on water.

or

Explain giving examples the various factors on which rate of evaporation depends.

Ans :

- (a) It depends on the temperature of the surroundings.
- (b) It depends on atmospheric pressure.
- (c) It depends on specific heat of the liquid.
- (d) It depends on the surface area of the liquid.

21. State universal law of gravitation? [3]

Ans :

Universal law of gravitation states :

- (a) Every object in the universe attracts every other object with a force which is directly proportional to the product of their masses.
- (b) Every object in the universe attracts every other object with a force which is inversely proportional to the square of the distance between their centers. The direction of the force is along the line joining the center's of two objects.

Derivation universal law of gravition :

Suppose there are two objects, A and B with masses, m_1 and m_2 , respectively and 'r' is the distance between them.

According to the first point of Newton's law of gravitation: $F \propto m_1 \times m_2$... (i)

According to second point of Newton's law of gravitation: $F \propto \frac{1}{r^2}$... (ii)

Combining (i) and (ii),

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

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

Where, G = Universal gravitational constat.

22. (a) Explain the basis for grouping organisms into the five kingdoms.
 (b) How would you choose between two characteristics to be used for developing a hierarchy in classification? [3]

Ans :

- (a) Following is the basis for grouping organisms into the five kingdoms :
 - (i) If the organisms are made of prokaryotic or eukaryotic cells.
 - (ii) The organism has a single cell in its body or is a multicellular life form.
 - (iii) The organism prepares its own food or is dependent on other on food.
- (b) We would choose the characteristic related to their structure and function that will help developing a hierarchy from one level to the next level. Like arthropods are organisms with jointed appendages but among arthropods insects and spiders make to separate groups having peculiar characteristics to define them. Hence, we can make the hierarchy in classification by selecting general to specific characteristics.

or

How do annelids animal differ from arthropods?

Ans :

S. No.	Annelids	Arthropods
1.	Body cavity is true columns	Body cavity is haemocoel like in cockroach.
2.	Body is segmented and segments are known as annuli.	Body is segmented into head, mesothorax, and metathorax.
3.	Legs are absent.	Three pairs of legs are present.
4.	Closed circulatory system is present	Open circulatory system is present.

23. Show that when a body is dropped from a certain height, the sum of its kinetic energy at any instant during its fall is constant. [3]

Ans :

The mechanical energy (kinetic energy + potential energy) of a freely falling object remains constant.

It may be shown by calculation as follows :

Suppose a body of mass m falls from point A, which is at height 'h' from the surface of earth.

Initially at point A, kinetic energy is zero and the body has only potential energy.

Total energy of body at point A = Kinetic energy + Potential energy

$$= 0 + mgh = mgh$$

Suppose during fall, the body is at position *b*. The body has fallen at a distance *x* from its initial position. If velocity of body at B is *v*, then from formula

$$v^2 - u^2 = 2as$$

$$v^2 = 0 + 2gx = 2gx$$

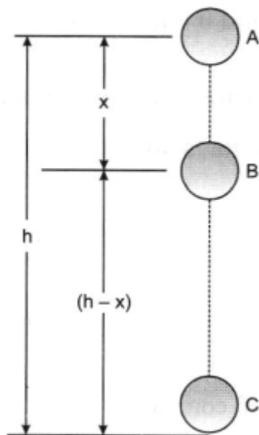
Kinetic energy of body at point

$$B = \frac{1}{2}mv^2$$

$$= \frac{1}{2}m \times 2gx = mgx$$

Potential energy of body at point

$$B = mg(h - x) = mgh$$



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.

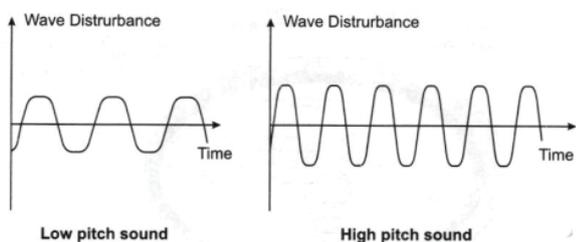
SECTION -C

25. (a) What do you understand by low pitch and high pitch sound? Draw appropriate diagrams to support your answer.

(b) How is ultrasound used for cleaning? [5]

Ans :

- (a) High pitch sounds are those which have a higher frequency that is, in 1 second, they complete a large number of oscillations. Low pitch sounds are those which have lesser frequency i.e., in 1 second, they complete less number of vibrations.



(b) Ultrasound is generally used to clean parts located in hard to reach places. For example, spiral tubes, odd shaped parts, electronic components, etc. Objects to be cleaned are placed in a cleaning solution and ultrasonic waves are sent into the solution. Due to the high frequency, the particles of dust, grease and dirt get detached from the object and drop out. The object thus gets thoroughly cleaned.

26. (a) What temperature in Kelvin scale is equal to 50°C?

(b) Describe an activity to show that rate of evaporation increases with surface area. [5]

Ans :

(a) As we know that, $T_k = 273^\circ + t^\circ C$

Temperature on Kelvin = 273 +

temperature on Celsius

$$T_k = 273 + 50^\circ C$$

$$= 323 K$$

$$50^\circ C = 323 K$$

(b) **Aim :** To prove that rate of evaporation increases with increase in surface area.

Apparatus required : Any liquid (water), Petridish and test tube.

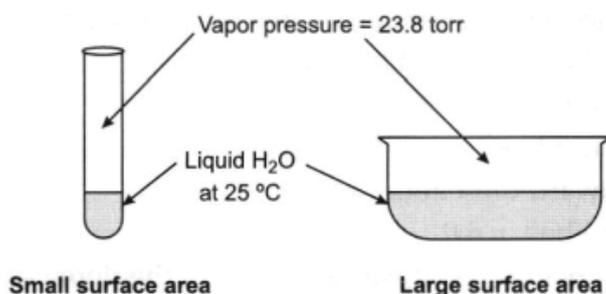
Procedure :

- (i) Take 10ml of water in petridish and test tube and keep them under the fan.
- (ii) Note down the time taken for evaporation in both the cases.

Observation :

- (i) We observe that more amount of water is evaporated in case of petridish. Since evaporation is a surface phenomenon. During evaporation process the particles escape from the surface of liquid.
- (ii) The increase in the surface are provides more scope for particles from the surface. Hence increases rate of evaporation

Conclusion : If surface area increases then rate of evaporation increases.



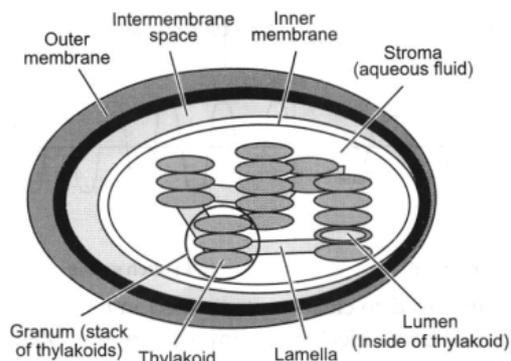
27. (a) Write the name of different plant parts in which chromoplast, chloroplast and leucoplast are present.

(b) Which type of plastids help in photosynthesis? Draw its diagram. [5]

Ans :

- (a) (i) Flower and fruit : Chromoplast
- (ii) Leaves of the plant : Chloroplast
- (iii) Root of the plant : Leucoplast

- (b) The type of plastids which help in photosynthesis is called chloroplasts. The plastid which helps in photosynthesis is called as chloroplasts. It is one of the most known of the plastids found in leaves of plants. Chloroplasts are responsible for the photosynthesis process and they are mainly filled with thylakoids. Thylakoids are the place of photosynthesis. So, we can say that they are the place for the pigments to be stored and synthesized in the plant.

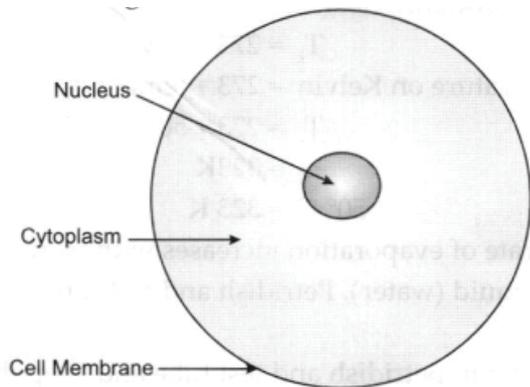


or

What are the main functional regions of a cell? Explain with the help of diagram.

Ans :

There are three main functional regions of a cell, as shown in the diagram.



- (a) **Plasma membrane (PM)** : It is flexible and made up of phospholipid bilayer that consists of proteins and lipids which surrounds the cell and is semipermeable in nature.
- (b) **Cytoplasm** : It is an amorphous and homogeneous colloidal ground substances present between the PM and nucleus.
- (c) **Nucleus** : It is centrally located, spherical prominent organelle surrounded by two unit membranes, which is responsible for controlling all vital activities of a cell. It also contains the genetic material.

28. (a) State the law of conservation of momentum.
 (b) How much momentum will a dumb bell of mass 10 kg transfer to the floor if it falls from a height of 80 cm. Take its downward acceleration to be 10 ms^{-2} . [5]

Ans :

- (a) According to law of conservation of momentum when two or more bodies acts upon each other,

their total momentum remains constant provided no external forces are acting. Momentum can neither be created nor destroyed .

- (b) Mass of the dumb bell, $m = 10 \text{ kg}$ Distance covered by the dumbbell, $s = 80 \text{ cm} = 0.8 \text{ m}$ Acceleration in the downward direction, $a = 10 \text{ m/s}^2$.

Initial velocity of the dumbbell, $u = 0$.

Final velocity of the dumbbell (when it was about to hit the floor) = v

According to the third equation of motion :

$$v^2 = u^2 + 2as$$

$$v^2 = 0 + 2 \times 10 \times 0.8$$

$$v = 4 \text{ m/s}$$

Hence the momentum with which the dumbbell hits the floor is

$$= mv = 10 \times 4 = 40 \text{ kgms}^{-1}$$

or

- (a) Why is it advised to tie a rope on the luggage while you travel by the bus?
- (b) Why does an athlete take a longer jump if he comes running from a distance than when he jumps suddenly from the take-off line?
- (c) A motorcar of mass 1200 kg is moving along a straight line with a uniform velocity of 90 km/h. Its velocity is slowed down to 18 km/h in 4 s by an unbalanced external force. Calculate the acceleration and change in momentum. Also calculate the magnitude of the force required.

Ans :

- (a) This is because when the driver applies the brake suddenly, the luggage on the rooftop experiences inertia and may fall off the roof. So, it's advisable to tie the luggage with a rope.
- (b) An athlete runs before jumping to gain momentum. Because it helps in jumping higher and longer because of inertia of motion gained due to the motion. When the athletes jump they already have a forward motion that would be greater than that of a jump made from standing in one spot.

- (c) Mass of the motor, $m = 1200 \text{ kg}$
 Initial velocity of the motor car,
 $u = 90 \text{ km/h} = 25 \text{ m/s}$
 Final velocity of the motor car,
 $v = 18 \text{ km/h} = 5 \text{ m/s}$
 Time $t = 4 \text{ s}$
 According to first equation of motion
 $v = u + at$
 $5 = 25 + a(4)$
 $a = -5 \text{ m/s}^2$

Negative sign indicates that it's a retarding motion, i.e., velocity is decreasing.

$$\text{Change in momentum} = mv - mu = m(v - u)$$

$$1200(5 - 25) = -2400 \text{ kgms}^{-1}$$

$$\text{Force} = \text{Mass} \times \text{Acceleration}$$

$$= 1200 \times (-5)$$

$$= -6000 \text{ N}$$

$$\text{Acceleration of the motor} = 5 \text{ ms}^{-2}$$

Change in momentum of the motor car

$$= -24000 \text{ kgms}^{-1}$$

Hence, the force required to decrease the velocity is 6000 N.

(Negative sign indicates retardation, decrease in momentum and retarding force)

29. How will you separate a mixture containing kerosene and petrol (difference in their boiling points is more than 25°C), which are miscible with each other? [5]

Ans :

A technique known as simple distillation can be used to separate the mixture of miscible liquids, where the difference in boiling point is more than 25°C , for example; kerosene and petrol. The whole concept is established on the volatility property of substances. The following are the various steps in the process of simple distillation:

- In a distillation flask, take the mixture.
- Treat the mixture with heat while a thermometer is affix.
- We observe evaporation of petrol as it has a low boiling point.
- As the vapours advance towards the condenser, a dip in the temperature causes condensation of the vapours into liquid which can be accumulated in a flask.
- We notice that kerosene tends to remain in the flask in a liquid state due to comparatively higher boiling point.
- Consequently, the liquids are separated.

or

To make a saturated solution, 30 g of sodium chloride is dissolved in 100 g of water at 293 K. Find its concentration at this temperature.

Ans :

Given, Mass of solute (NaCl) = 30 g

Mass of solvent (H_2O) = 100 g

So, Mass of solution (NaCl + H_2O) = 130 g

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

$$\text{Concentration} = \frac{30}{130} \times 100 = 23.07\%$$

Hence, the concentration of the solution is 23.07%

30. What are the limitations in the approach of treating the infectious diseases? Also mention the principles of prevention. [5]

Ans :

There are three limitations in the treatment approach of an infectious disease :

- If someone has a disease, their body functions are damaged and may never recover completely.
- A treatment will take time, which means that someone suffering from a disease is likely to be bedridden for some time even if he is given proper treatment.
- The person suffering from an infectious disease can serve as the source from where the infection may spread to other people.

There are two ways to prevent a disease, one is general and one is specific to each disease :

- The general way of preventing a disease is to prevent our body's exposure to microbes. For example, we can prevent exposure to air borne microbes by providing living conditions that are not overcrowded. We can prevent exposure to water borne microbes by providing safe drinking water.
- The second principle is based on the strength of our immune system to fight the diseases. For a proper functioning immune system, availability of proper and sufficient food for everyone is very important.

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