CLASS IX (2019-20)
SCIENCE (CODE 086)
SAMPLE PAPER-1

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

DIRECTION : For question numbers 1 and 2, 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 assertion.
(b) Both A and R are true but R is not the correct explanation of the assertion.
(c) A is true but R is false.
(d) Both A and R are false.

1. **Assertion (A) :** The particles of a solution are smaller than 1 nm (10^{-9} metre) in diameter [1]
Reason (R) : Solution can scatter a beam of light passing through it

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

2. **Assertion (A) :** In solids, molecules are tightly packed. [1]
Reason (R) : Force of attraction between molecules in solids is very weak.

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

3. Which soil is derived from basaltic rock ? [1]
(a) Red soil (b) Black soil
(c) Laterite soil (d) Both A and C

Ans : (b) Black soil.

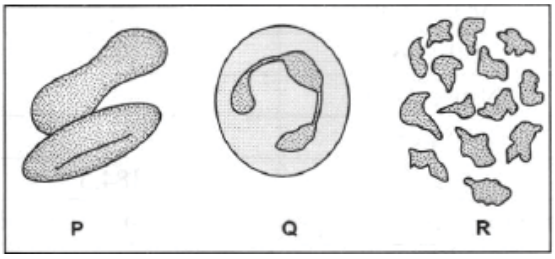
4. A ball is rolling down a slope at a steady speed. Which of the following statements is correct ? [1]
(a) Frictional force is greater than the forward force.
(b) There is an unbalanced force downwards.
(c) There are no forces acting on the ball.
(d) The forces acting on the ball are balanced.

Ans : (d) The forces acting on the ball are balanced.

5. What does the area of a velocity—time graph give ?[1]
(a) Distance (b) Acceleration
(c) Displacement (d) None of these

Ans : (c) Displacement

6. Which of the following is/are true about P, Q and R ?



(a) P-transports food, Q-develops immunity, R-clots blood.
(b) P-transports carbon dioxide, Q-produces antibodies, R-clots blood.
(c) P-transports bacteria, Q-eats foreign material, R-clots blood.
(d) P-transports oxygen, Q-kills bacteria, R-clots blood.

Ans : (d) P-transports oxygen, Q-kills bacteria, R-clots blood.

7. The electrons present in the outermost shell are called
(a) Valency electrons (b) Octet electrons
(c) Duplet electrons (d) Valence electrons

Ans : (d) Valence electrons

or

The nucleons are
(a) Protons and electrons
(b) Neutrons and electrons
(c) Protons and neutrons
(d) None of these

Ans : (c) Protons and neutrons

8. What is the alternate name for Apis cerana indica ?
(a) Indian bee (b) Indian buffalo
(c) Indian cow (d) None of these

Ans : (a) Indian bee

9. Which of the following is true for two bodies separated by some distance ? [1]

(a) When the distance between them is halved, gravitational force becomes 4 times.

(b) When one of the mass becomes halved, gravitational force becomes halved.

(c) When the distance between them is increased four times, gravitational force becomes 1/16 times.

(d) All of the above.

Ans : (d) All of the above.

or

First man who came up with idea of gravity was

(a) Henry Briggs (b) Isaac Newton

(c) John Napier (d) Jobst Burgi

Ans : (b) Isaac Newton

10. Name the disease that affects our lungs. [1]

(a) AIDS (b) Rabies

(c) Polio (d) Tuberculosis

Ans : (d) Tuberculosis

or

Penicillin is capable of one of the following. Which one ?

(a) Interfere in the biological pathway of bacteria.

(b) An antibiotic that can kill bacteria.

(c) Both A and B

(d) None of these

Ans : (c) Both A and B

11. Define one watt of power. [1]

Ans :

Power is the rate of doing work or the rate of utilising energy. The power of an agent may vary with time.
Power, P = W/T
The SI unit of power is Watt. 1 watt is the power of an agent, which does work at the rate of 1 joule per second.

12. 1 carat of diamond is equal to ..... [1]

Ans : 200 milligram

13. Questions 13.1-13.4 are based on the Table A and Table B. Study these tables related to boiling points of different substances and humidity and answer the following questions.

Table A : Boiling points of different substances

Substance	**Boiling point (°C)**
Methanol	64.7
Ethanol	78.4
Nitric Acid	83
Water	100
Iodine	184.3

Table B : Humidity percentage in three situations

	Humidity (%)
Situation A	>75
Situation B	50 – 75
Situation C	<50

13.1 Refer Table B and find out in which situation a bowl of water will evaporate away the fastest and in which situation the slowest. [1]

Ans : Fastest : Situation C

Slowest : Situation A

13.2 A bowl of water and a bowl of ethanol are kept inside a room. Which bowl will get empty first? [1]

Ans : Ethanol.

13.3 "Evaporation is a surface phenomenon." Explain. [1]

Ans : If the surface area increases, then the rate of evaporation will increase.

13.4 Refer Table A and Table B and find in which situation out of the following, the substance will evaporate the fastest. [1]

(a) Methanol in situation C

(b) Iodine in situation A

(c) Nitric acid in situation A

(d) Iodine in situation C

Ans : (a) Methanol in situation C

14. Read the passage and answer the following questions.
Rohan has a brother who is an athlete. One day Rohan had gone to see his brother in a racing competition. The race starts and after sometime, Rohan sees his brother in pain and not able to run properly. He sees that the doctor immediately applies ice on his knees.

14.1 Rohan is confused as to why the doctor is applying ice on his brother's knees. Can you clear his confusion by stating an appropriate reason ? [1]

Ans : These kinds of problems are common in athlete. Most probably Rohan's brother might have suffered from ligament tear. Ligament tear needs immediate treatment and that's the reason the doctor applies ice to control its swelling.

14.2 State one function of a skeletal connective tissue. [1]

Ans : It gives a definite shape to the body.

14.3 What is ligament? [1]

Ans : Ligament is a type of connective tissue. It helps in connecting bones with each other and is highly elastic and strong.

14.4 What values are shown by Rohan ? [1]

Ans : Rohan's behaviour shows that he is inquisitive and has a scientific approach towards a problem.

Section -B

15. A body starts from rest and moves with a uniform acceleration of 2 m/s^2- until it travels a distance of 625 m. Find its velocity. [3]

Ans :

Given,

$$\text{Initial velocity}, u = 0\,\text{m/s}$$
$$\text{Final velocity}, v = ?$$
$$\text{Acceleration} = 2\,\text{m/s}^2$$
$$\text{Distance} = s = 625\,\text{m}$$

By the third equation of motion

$$v^2 - u^2 = 2as$$
$$v^2 - 0 = 2 \times 2 \times 625$$
$$v^2 = 2500$$
$$v = 50\,\text{m/s}$$

Final velocity of the body is 50 m/s.

16. (a) The smell of hot sizzling food reaches you several meters away, but to smell the cold food you have to go close. Why?

(b) After rains, the rain drops dry away easily on a sunny day or on a cloudy day? Give reasons. [3]

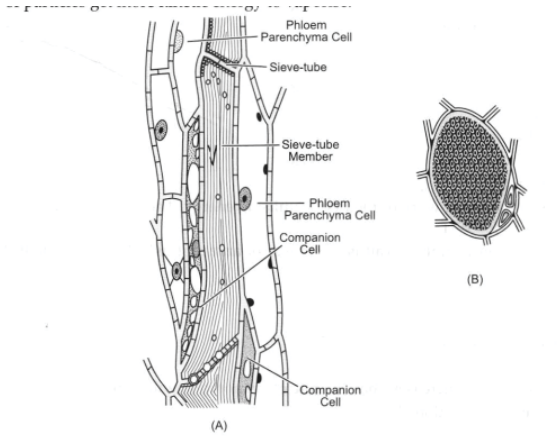
Ans :

(a) Particles of matter are continuously moving. They possess the kinetic energy. As the temperature rises, particles move faster. Thus, particles that carry smell of hot sizzling food move faster than the smell of the cold food. Therefore, the smell of hot sizzling food can reach us several meters away, but to get smell from a cold food you have to go close.

(b) After rains, rain drops will dry easily on a sunny day, as the temperature is higher in sunny day, evaporation increases. On a cloudy day temperature of the surrounding is low due to humidity evaporation decreases. With an increase of temperature, more number of particles get more kinetic energy to vaporise.

17. Draw a neat diagram of the section of the tissue that is responsible for the translocation of food from the leaves to the different parts of the plant. [3]

Ans :



(a) Sieve tubes along with companion cells and phloem parachyma cells in longitudinal section.

(b) The face view of sieve plate showing sieve pores represented by black area.

18. (a) Why does a passenger jumping out of a rapidly moving bus fall forward with his face downwards?

(b) Why is it difficult for a fireman to hose, which ejects large amount of water at a high velocity? [3]

Ans :

(a) A man getting down on road from a running bus falls forward with a his face downward because due to inertia of motion upper part of body continues to be in motion in forward direction while feet come to rest as soon as they touch the road.

(b) **Newton's third law of motion :** Every action has an equal and opposite reaction. When the fireman holds the hose, it has an opposite reaction according to the third law of motion. This backward and an equal reaction on the fireman makes him unstable and finds it difficult to hold the hose. Thus, due to the opposite reaction of the water with high velocity a fireman finds it difficult to hold the hose.

or

Which of the following has more inertia:

(a) A rubber or a stone of the same size?

(b) A bicycle or a train?

(c) A five-rupee coin or a one-rupee coin?

Ans :

Inertia is the measure of the mass of the body. The greater is the mass of the body, the greater is the inertia and vice-versa.

(a) Mass of a stone is more than the mass of a rubber ball for the same size. Hence, inertia of the stone is greater than that of a rubber ball.

(b) Mass of a train is more than that the mass of a bicycle. Hence, inertia of the train is greater than that of the bicycle.

(c) Mass of a five rupee coin is more than that of a one rupee coin. Hence, inertia of the five rupee coin is greater than that of the one rupee coin.

19. Name three basic scientific approaches for increasing the yield of a crop. [3]

Ans :

Three basic scientific approaches for increasing the yield of a crop are :

(a) **Crop production management :** It includes proper irrigation and nutrient management. It can be done by adding manure and fertilizers. Nutrient management can also be done by crop rotation, inter—cropping and mixed—cropping.

(b) **Crop protection management :** Plants need protection from weeds, insects, pests and pathogens. It can be done through mechanical methods, biological methods, chemical methods or cultural methods.

(c) **Crop variety management :** Crop variety can be improved by hybridisation or by transgenic measures. It can be done by obtaining desired plant characteristics.

20. What are the properties of a periodic table? [3]

Ans :

Atomic radius increases down a group because as we

move along a group the atomic number increases and the number of shells also increases and the distance of the nucleus from the outer most electron increases as it gets far away from the nucleus. Atomic radius decreases along a period because as we move from left to right along a period, the atomic number of an atom increases, and the positive charge nucleus and electrons are added to the same orbit and higher nuclear charge will increase the force of attraction of the electrons.

or

Define ionization energy and electron affinity.

Ans :

Ionization energy of an element is the amount of energy that must be supplied to one mole of the element in the gaseous state to obtain one mole of cations in the gaseous state. Electron affinity of an atom or molecule is defined as the amount of energy released or spent when an electron is added to a neutral atom or molecule in the gaseous state to form a negative ion.

21. (a) The mass of the body on earth is 60kg, what is its weight on the earth and on moon ? [3]

(b) How is the weight of an object related to its mass ?

Ans :

(a) Mass = 60 kg acceleration in earth $= 10\,m/s^2$ so, weight of the object in earth $= 60 \times 10 =$ 600N weight of the object in moon $= \left(\frac{1}{6}\right) \times 600$ $= 100\,N$

(b) Mass defines amount of particles or matter present in an object. The mass remains constant at all the places. Weight defines force of gravity acting on the object. The weight changes from one to another place. The object's weight is calculated by product of the object's mass and acceleration due to gravity at that place. The mass's unit is fundamental unit which is kilogram whereas weight is a derived unit which is Newton.

22. What is classification? What is the need for classification? What is the basis of classification ? [3]

Ans :

Classification is the process of grouping similar things into groups or categories on the basis of similarities and differences.

Need for classification : It is very difficult to study large number of organisms individually. So, organisms that have similar characteristics are grouped together and then studied easily.

Basis for classification : Cell structure, mode and source of the nutrition and body organisation.

or

Describe the general characteristics of gymnosperms.

Ans :

Characteristics of gymnosperms :

(a) The stem is erect, aerial and branched or unbranched.

(b) The leaves are usually dimorphic, i.e., presence of two types of leaves on a plant.

(c) These are naked seeded plants, i.e., their ovules are not enclosed in their ovaries.

(d) The microsporophyll (male reproductive organ) and megasporophyll (female reproductive organ) are compactly arranged around the central axis forming male cone and female cone respectively.

23. (a) What amount of energy in kWh is consumed in 10 h by a machine of power 500 W? [3]

(b) An archer stretches the string of his bow to shoot an arrow. Name :

(i) The type of energy he uses in the process.

(ii) The type of energy into which it is converted.

(iii) The energy transformation taking place when the arrow is shot.

(c) If a body is thrown vertically upward, its velocity goes on decreasing. What happens to its kinetic energy when it stops at the top and its velocity becomes zero ?

Ans :

(a) Energy consumed = Power × Time = 500 W × 10 h = 5000 Wh = 5kWh

(b) (i) Potential energy stored in string of the bow.

(ii) Kinetic energy of the arrow.

(iii) Potential energy of the stretched string into kinetic energy of the arrow.

(c) The whole of its kinetic energy gets converted into potential energy, mgh, where m is the mass of body and h is the height.

24. What are the main functional regions of a cell? Explain with the help of diagram. [3]

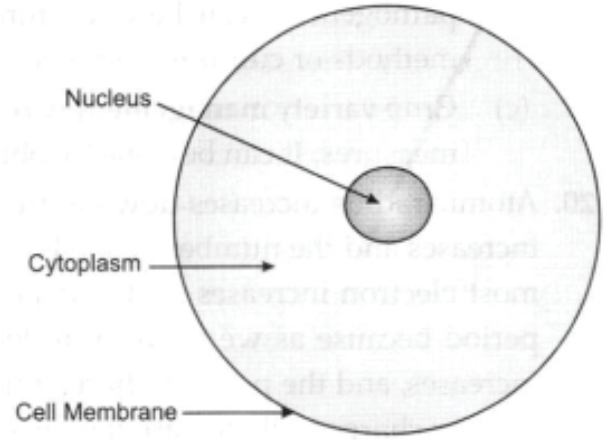
Ans :

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 Nucleus 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 Cell Membrane all vital activities of a cell. It also contains the genetic material.



Section -C

25. (a) How can ultrasound be used to detect the defects in a metal block ? [5]
(b) What is reverberation and what is done to reduce it ?

Ans :

(a) Ultrasound are those waves which have frequency greater than 20 kHz. Now, metal blocks are subjected to ultrasound at one end and at the other end, detectors are placed. If the metal block does not contain any defect then ultrasound travels through the block and is detected by the detectors at the other end If the metal block has any defect then from that region ultrasounds are not detected and gets reflected back indicating the presence of defect in the block.
(b) The repeated reflection of sound that results in the persistence of sound is called as reverberation. We can reduce reverberation by:
(i) Covering roofs and walls of auditorium with sound absorbing materials.
(ii) Seat material is also selected on the basis of its sound absorbing property.

or

Sound requires a medium to travel. Justify experimentally.

Ans :

Sound requires a medium to travel and it can be proven by the following experiment.
(a) Take a bell jar and suspend an electric bell in it.
(b) The bell jar is connected to a vacuum pump. Till the air is in the bell jar, the sound of the electric bell is louder.
(c) Now with the help of vacuum pump, suck out the air from the jar gradually.
(d) As the air is getting pumped out, the sound of the bell gets fainter and fainter.
(e) When the bell jar is completely vacuumed, no sound can be heard.
(f) This shows that the air is required for the propagation of sound.

26. Describe an activity that rate of intermixing depends upon the forces of attraction between the particles.[5]

Ans :

Activity : To prove that the mixing speed depends on the attraction force between particles.
Procedure :
(a) Take two water-filled beakers.
(b) Place a drop of ink on the first beaker's sides.
(c) In the second beaker, place a drop of honey in the same manner.
(d) Leave them and record the observation without disturbance.

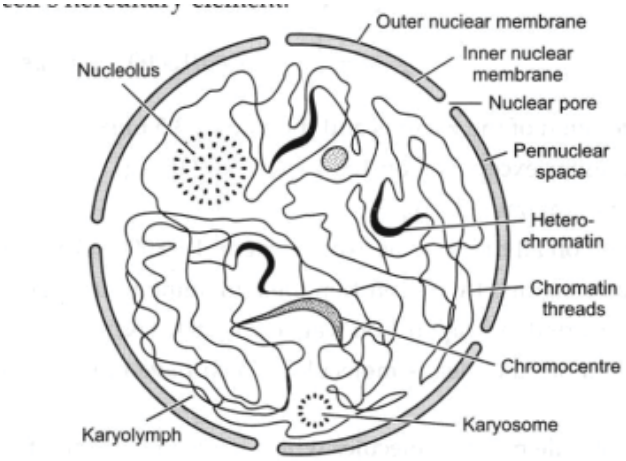
We are going to observe that the attraction forces between the ink particles are weak, sothey are quickly distributed evenly in water. on the other hand, the attraction forces between the honey particles are powerful and therefore they move slowly. As a consequence, it takes longer time for the honey particles to enter the water spaces

Conclusion : Particles of matter are moving continuously, but the intermixing rate depends on the attraction forces between them.

27. Explain in detail what do you know about the structure of nucleus. [5]

Ans :

The nucleolus fabricates subunits of ribosomal from proteins and RNA, which is also perceived as RNA. It then transfers the subunits out to the bottom of the cell where they merge into intact ribosomes. Ribosomes produce proteins hence; the nucleolus performs an important function in producing proteins in the cell. The principal function of the cell nucleus is to regulate gene appearance and reconcile the reproduction of DNA throughout the cell cycle. The nucleus is an organelle observed in eukaryotic cells. The internal part of the nuclear membrane comprises the majority of the cell's hereditary element.



Ultrastructure of Nucleus

or

What are lysosomes and centrosomes? Write their function.

Ans :

Lysosomes : Lysosomes are the main digestive compartment of the cell. As such, they contain a variety of enzymes capable of degrading different types of biological material including nucleic acids, lipids and proteins among others.
Function : The manner in which lysosomes function highly depends on the way the enzymes affect other materials outside and inside the cell. There are a number of processes through which lysosomes digest material.
Centrosomes : Centrosomes are organelles which serve as the main microtubule organising centers for animal cells. Centrosomes are made up from arrangement of two barrel shaped clusters of microtubules called "centrioles," and a complex of proteins that help additional microtubules to form. These proteins allow the centrosomes to start and stop the formation of microtubule proteins. This allows them to control the formation of mitotic spindle fibers and other structures that play important roles in cellular development.

Function : Centrosomes are sometimes referred to as the "MTOC," or "microtubule organising center" of the cell. They serve to direct the movements of microtubules and other cytoskeletal structures and proteins, ultimately allowing large changes to the shapes of animal cell membranes.

28. An 8000 kg engine pulls a train of 5 wagons, each of 2000 kg along with a horizontal track. If the engine exerts a force of 40000 N and the track offers a friction force of 5000 N, then calculate : [5]

(a) The net accelerating force
(b) The acceleration of the train
(c) The force of wagon 1 on wagon 2.

Ans :

(a) Force exerted by the engine, $F = 40000$ N.
Frictional force offered by the track, $F_f = 5000$N
Net accelerating force, $F_a = F - F_f = 4000 - 5000 = 3500$ N.
Hence, the net accelerating force is 35000 N.

(b) Acceleration of the train = a.
The engine exerts a force of 40000 N on all the five wagons.
Net accelerating force on the wagons. $F_a = 35000$ N
Mass of the wagons,

m = mass of a wagon x number of wagons

Mass of a wagon = 2000 kg

Number of wagons = 5

Therefore, $m = 2000 \times 5 = 10000$ kg

Total mass, $M = m = 10000$ kg

From Newton's second law of motion:

$$F_a = Ma$$
$$a = \frac{F_a}{M}$$
$$= 35000/10000$$
$$= 3.5\,\text{ms}^{-2}$$

Hence, the acceleration of the wagons and the train is $3.5\,\text{m/s}^2$.

(c) Mass of all the wagons except wagon 1 is $4 \times 2000 = 8000$ kg.
Acceleration of the wagons $= 3.5\,\text{ms}^{-2}$.
Thus, force exerted on all the wagons except wagon 1= $8000 \times 3.5 = 28000$ N Therefore, the force exerted by wagon 1 on the remaining four wagons is 28000 N.
Hence, the force exerted by wagon 1 on wagon 2 is 28000 N.

29. (a) Explain with examples. [5]
(i) Mono atomic molecules
(ii) Diatomic molecules
(iii) Triatomic molecules
(iv) Polyatomic molecules

(b) What is formula unit of mass? How is it different from molecular mass ?

Ans :

(a) (i) Monoatomic molecule means molecules which have only 1 atom, for example; Na, K etc.
(ii) Diatomic molecule means molecules which have only 2 atom, for example; H_2, N.
(iii) The molecule formed by three atoms is called triatomic molecule, for example; CO_2 and H_2O.
(iv) Those molecule which are formed by more than three atoms is called polyatomic molecule, for example; S_8, H_2SO_4.

(b) The formula unit mass in chemistry is the empirical formula of any ionic or covalent network solid compound used as an independent entity for stoichiometry calculations. It is the lowest whole number ratio of ions represented in an ionic compound.
The key difference between molecular mass and formula mass is that the formula mass of a molecule of a compound is the sum of atomic weights of the atoms in its empirical formula while molar mass is the mass of 1 gram mole of substance.

or

Which has more number of atoms, 100 grams of sodium or 100 grams of iron (given, atomic mass of Na = 23 u, Fe = 56 u) ?

Ans :

In order to solve this problem, we should convert 100 grams of sodium into moles of sodium, and also 100 grams of iron into moles of iron. The element having more moles will have more atoms. Since the atomic mass of sodium is 23 u, the molar mass of sodium will be 23 g / mol. Similarly, since the atomic mass of iron is 56 u, the molar mass of iron will be 56 g / mol. We will now
calculate the moles of sodium atoms (Na) and iron atoms (Fe) one by one.

(a) $$\text{Mass of sodium} = \frac{\text{Mass of sodium}}{\text{Molar mass of sodium}}$$
$$= \frac{100}{23}$$
$$= 4.34$$

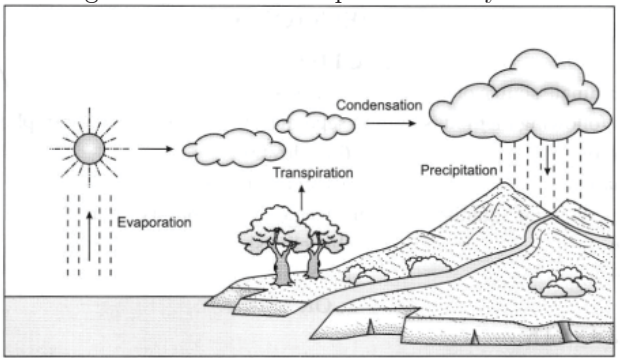
(b) $$\text{Moles of iron} = \frac{\text{Mass of iron}}{\text{Molar mass of iron}}$$
$$= 100/56$$
$$= 1.78$$

We find that 100 grams of sodium contain 4.34 moles of atom whereas 100 grams of iron contain 1.78 moles of atoms. Since 100 grams of sodium has more moles, it contains more atoms than 100 grams of iron

30. Describe the water cycle with the help of a diagram. [5]

Ans :

The stages involved in a complete water cycle are :



Stage I : Evaporation and Transpiration: The sunlight heats up the water bodies and leads to the evaporation of water. Water bodies might include rivers, lakes, oceans, swamps, etc. Plants and trees also lose water to the atmosphere through transpiration. All this vapour goes up with the rising air currents towards the sky.

Stage II : Condensation : As the vapours rise high, the cooler temperatures make them cool down and turn back into liquid condensation. Wind and air currents move the moisture around, leading to the formation of clouds.

Stage III : Precipitation : Wind movements cause the clouds particles to collide. As they become water laden, they develop into rain bearing clouds and fall back onto the earth's surface by the process known as precipitation. This may occur in the form of rain, hail, snow or sleet depending upon the temperature conditions.

Stage IV : Runoff and Infiltration : The precipitation either runs off into oceans, rivers and ground surface or is absorbed into the soil (infiltration).