CBSE
Class IX Science
Term 2
Sample Paper – 6 Solution

SECTION A

1. The pressure applied on an object depends upon the following two factors:
- Force applied
- Area over which the force is applied

2. The law of constant proportion states that, "In a chemical substance, elements are always present in a definite proportion by mass".

3. Urea and proteins contain both oxygen and nitrogen.

4.
(a) Kinetic Energy and Potential Energy
(b) Potential Energy
(c) Kinetic Energy
(d) Kinetic Energy

5.
The number of atoms present in one molecule of an element is called its atomicity. For example,

Name	Formula of molecule	Atomicity	
Helium	He	1	Monoatomic
Hydrogen	H_2	2	Diatomic
Ozone	O_3	3	Triatomic
Phosphorous	P_4	4	Tetra-atomic
Sulphur	S_8	8	Poly-atomic

6.

(a)

i. Hydra possesses tentacles around the mouth.

ii. Possess body cavity called coelenterons.

(b)

i. Echinodermata

ii. Aves

7.

(a) Water vapour is formed due to:

i. Heating of water bodies.

ii. The activities of living organisms.

(b) It makes the soil porous so that air and water can penetrate deep into the soil and become available to the roots of the plants.

8.

(a) We know that, $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$

The time taken for the echo to travel from the source of sound to the reflecting surface $= \frac{6}{2} = 3$ s

Distance of the reflecting surface from the source = Speed of sound × time

$= 342 \times 3 = 1026$ m

Thus, the reflecting surface is at a distance of 1026 m from the source.

(b) Following are the two applications of SONAR:

- To locate submarines under water.
- To find the depth of the sea bed.

9.

(a) The two conditions for echoes to be heard are:

i. The time interval between the original sound and the reflected sound should be of at least 0.1 s.

ii. Minimum distance of the obstacle from the source of sound must be 17.2 m (20°C).

(b) While flying, bats emit high frequency ultrasonic waves. These signals (echoes) are received by them after reflection from the prey. The bats then judge the distance of the insect by the time taken by the echo to be heard. Thus, bats are able to catch their prey.

10.

(a) Given that,

Mass of the body = 2 kg,

Time 't' = 2 s,

Initial velocity, u = 20 m/s, g = - 10 m/s^2

The height covered by the body in 2 s can be calculated using the formula,

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

$$= 20 \times 2 + \frac{1}{2} \times (-10) \times (2)^2$$

$$= 20 \text{ m}$$

(b)

i. In an electrical heater, electrical energy is transformed into heat energy.

ii. In a microphone, sound energy is transformed into electrical energy.

11.

(a) Average power is defined as the ratio of total work done by an agent to the total time.

(b) Given that,

Mass of water lifted, 'm' = 100 kg

Height, 'h' = 19 m

Time 't' = 25 s

The power of the pump can be calculated using the formula,

$$P = \frac{\text{Work}}{\text{Time}} = \frac{mgh}{t}$$

$$= \frac{100 \times 10 \times 19}{25} = 760 \text{ watts}$$

Thus, the power of the pump is 760 watts.

12. Consider a sound wave propagating through a medium with velocity 'v', such that its wavelenght is λ and its time period is 'T'.

The frequency 'ν' of the sound wave is the reciprocal of its time period, that is

$$\nu = \frac{1}{T} \quad \text{----------(Eqn 1)}$$

The speed of the wave is the distance covered by the wave in one time period. So, the wave velocity can be written as:

$$v = \frac{\text{Distance covered}}{\text{Time taken to cover the distance}}$$

$$v = \frac{\text{Wavelength}}{\text{Time period}} = \frac{\lambda}{T}$$

$\therefore v = \nu\lambda$ (From eqn. 1)

Hence, Wave velocity = Frequency × Wavelength

13. The postulates of Dalton's Atomic Theory:

- All matter is made up of very tiny particles called atoms.
- Atoms are indivisible particles, which can neither be created nor destroyed in a chemical reaction.
- Atoms of a given element are identical in mass and chemical properties.
- Atoms of different elements have different masses and chemical properties.
- Atoms combine in the ratio of small whole numbers to form compounds.
- The relative numbers and kinds of atoms are constant in a given compound.

14.

(a) **Significance of symbol of an element**

Symbol of an element signifies:

- Name of the element
- One atom of the element

For example,

The symbol N stands for,

- Element Nitrogen.
- One atom of Nitrogen element.

(b) Avogadro's number is the actual number of molecules in one gram molecule of any substance. Its value is 6.022×10^{23} particles.

(c)

Symbols/Formula	X	Y
Valency	3+	2-
Formula	X_2Y_3	

The chemical formula of the compound formed between X and Y is given by X_2Y_3.

15.

(a) Echidna and platypus lay eggs but are warm blooded and feed their young ones with milk.

(b) In spite of the four chambered heart, crocodile is a cold blooded animal and so, it is considered as a reptile.

(c) Birds have pneumatic bones which makes their body light for flight.

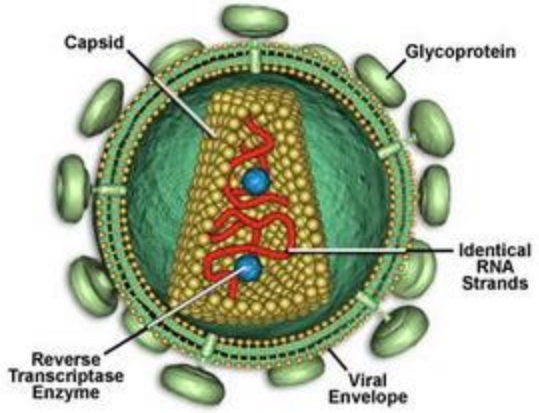
16.

- Lichens grow on the surface of rock and extract minerals from them. This creates small crevices at places where a thin layer of soil builds up.
- Mosses grow over these crevices and deepen them to build up more soil.
- The roots of trees grow into cracks in the rocks and widen to form soil.

17. Malaria is caused due to a protozoan parasite called Plasmodium. When a female Anopheles mosquito bites a healthy person, it goes to his/her blood and the person suffers from malaria. The diseases caused by protozoa are sleeping sickness and amoebic dysentery.

18. A symptom indicates that there is something wrong but it does not indicate what is wrong. For example, headache may be due to examination stress, meningitis, malarial fever or some other reason.
Small pox and tuberculosis spread through direct contact.

19.



Structure of HIV

20.

(a) Work done by a force on an object is equal to the product of the magnitude of force exerted on the object and the distance travelled by the object in the direction of the force.
The S.I. Unit of work is joule (J).

(b)

i. When we twist a wire, there is a change in its shape. This is because work is done against the internal forces of cohesion between the molecules of the wire.
ii. When we press a football between our palms, we change its shape.
iii. When we push a table, work is done against the frictional force between the table (legs) and the ground,
iv. Force is constantly applied in order to hold the bag but, since there is no displacement, no work is done.

21.

(a)

i. Given that,

Mass of the packet, 'm' = 500 g

Volume of the packet, 'V' = 350 cm^3

$$\text{Density of the packet, 'd'} = \frac{\text{Mass}}{\text{Volume}}$$

$$d = \frac{500}{350} = 1.43 \text{ g cm}^{-3}$$

Thus, the density of the sealed packet is 1.43 g cm^3.

Since the density of the packet is greater than the density of water, it will sink in water.

ii. $\text{Mass of the water displaced} = \text{Volume of the water displaced} \times \text{Density of water}$

$= \text{Volume of the sealed packet} \times \text{Density of water}$

$= 350 \times 1 = 350 \text{ g}.$

The mass of the water displaced by the packet is 350 g.

(b)

i. Loudness - The sensation produced in the ear which enables us to distinguish between a loud and a faint sound is called loudness.

Loudness is determined basically by the amplitude of the sound wave.

ii. Pitch - It is that characteristic of sound which helps in differentiating between a shrill and a grave sound.

It depends on the frequency of vibration.

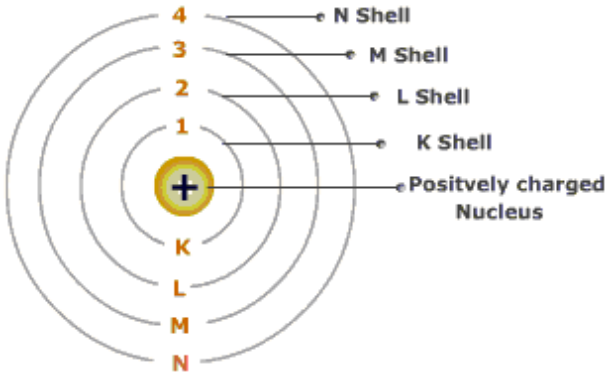
iii. Quality or timbre - The characteristic of a sound which distinguishes it from another of the same pitch and loudness is called quality.

It depends on the shape (wave-form) of the sound wave.

22. Bohr's Model of an Atom

Niels Bohr revised Rutherford's atomic model and put forth the following suggestions:

- Neils Bohr proposed that electrons possess a specific amount of energy which allows them to revolve around the nucleus.
- An atom contains discrete orbits which correspond to specific amount of energy. Hence, these orbits are also known as energy levels.
  The energy levels of an atom are represented as **K, L, M, N,** and so on or the numbers n = **1, 2, 3, 4,** and so on.



Energy levels in an Atom

- The electrons are confined to these energy levels. While revolving in these discrete orbits, electrons do not radiate energy. Hence, these orbits are also known as **'stationary orbits'** or **'stationary shells'**. The smaller the size of the orbit, the smaller is its energy.
- As we move away from the nucleus, the energy of the orbit increases progressively.
- Transfer of an electron from one orbit to another is always accompanied with absorption or emission of energy.
- When an electron jumps from a lower energy level to higher energy level, it **absorbs energy**.
- When an electron returns from a higher energy level to a lower energy level, it **emits energy**.

Distribution of Electrons in Orbits

- The distribution of electrons in different orbits of an atom was suggested by Bohr and Bury.
- According to Bohr's model, electrons occupy certain stable orbits or shells. Each shell has definite energy.
- These orbits or shells are represented by the letters K, L, M, N or the numbers 1, 2, 3, 4.
- The maximum number of electrons present in the shell is given by the formula **$(2n^2)$**, where n is the orbit number or the shell number.
- First orbit or K shell will be = $2 \times 1^2 = 2$, Second orbit or L shell will be = $2 \times 2^2 = 8$, Third orbit or M shell will be = $2 \times 3^2 = 18$, Fourth orbit or N shell will be = $2 \times 4^2 = 32$ and so on.

Shell designation	Shell number (n)	Formula $2n^2$	Maximum number of electrons in each shell
K-shell	1	$2 \times (1)^2$	2
L-shell	2	$2 \times (2)^2$	8
M-shell	3	$2 \times (3)^2$	18
N-shell	4	$2 \times (4)^2$	32

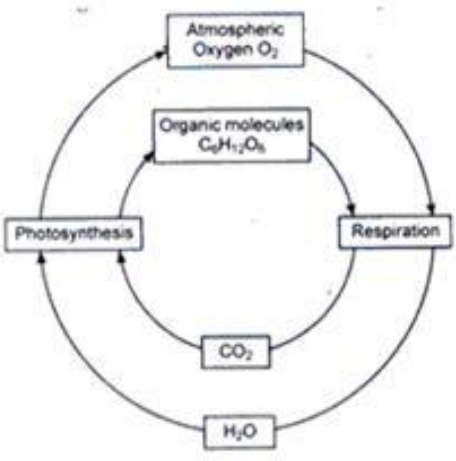
- The maximum number of electrons which can be accommodated in the outermost orbit is 8.
- The orbits or shells are filled in a step-wise manner.
- Electrons are not accommodated in a given shell unless the inner shells are filled.

Octet rule

It states that 'The maximum number of electrons which the outermost shell of an electrically neutral and chemically stable atom can have is 8".
Exception: If the atom has only one shell, it can hold only 2 electrons. For example, Hydrogen and Helium can have only 2 electrons (**Duplet**).

23.

(a) Oxygen-cycle: Oxygen from the atmosphere is used up in combustion, respiration and in the formation of oxides of nitrogen. It is returned to the atmosphere through photosynthesis.



(b) Chlorofluorocarbons used as solvents, refrigerants, propellants and blowing agents for plastic foams are stable and persist in the atmosphere for years. These enter the upper layers of the atmosphere where UV radiation causes CFCs to dissociate the ozone into oxygen.

24.

(a)

i. There are three layers of cells from which differentiated tissues can be made. This allows outside and inside body lining as well as some organs to be made. There is thus some degree of tissue formation.

ii. Coelom is a true internal body cavity in which well developed organs can be accommodated.

(b)

i. Biodiversity: It means the diversity of life forms in a particular region.

ii. Species: A species includes all organisms which are similar and can interbreed with each other.

iii. Lichens: The symbiotic association between fungal species and blue-green algae leads to life forms called lichens.

SECTION B

25. (b)

F_T is less than F_S; because salty water has high density than tap water.

26. (b)

Since the least count of the measuring cylinder is 2 mL, the reading should be a multiple of 2.

27. (d)

For longitudinal vibrations, compressions and rarefactions are produced. For transverse vibrations, crests and troughs are produced.

28. (d)

Dicot plants have a woody stem and their leaves have reticulate venation.

29. (a)

Agaricus has gills.

30. (b)

$$P = \frac{F}{A} = \frac{mg}{A}$$

$$P_{max} = \frac{mg}{A_{min}} = \frac{2\times10\times100\times100}{2\times5} = 20000$$

$$P_{min} = \frac{mg}{A_{max}} = \frac{2\times10\times100\times100}{5\times25} = 1600$$

31. (d)

Sound travels slowest in solids, faster in liquids and fastest in solids.

32. (d)

The overflow can must always be filled up to its spout before using it to measure the volume displaced by the immersed fluid.

33. (d)

The balancing of chemical equation is based upon the law of conservation of mass.
According to this law, mass can neither be created nor destroyed in a chemical reaction.
Total mass of the reactant is equal to the total mass of the product.

34. (a)

A is Funaria, which is a moss; Bryophyta. It has leafy, erect structure which lacks real roots, stems and leaves and has no flowers.
B is a Fern, where the plant body is made up of root, stem and leaves.

35. 6.4 g of $MgCO_3$ on heating gave 2.88 g MgO and 3.52 g CO_2.
Mass of the reactant ($MgCO_3$) = 6.4 g
Mass of the products (MgO + CO_2) = (2.88 + 3.52) g = 6.4 g
Since mass of reactant is equal to the mass of the products, these results are in agreement with the law of conservation of mass.

36.

(a) Meghaphone works on the principle of multiple reflections of sound.
(b) Arshi got disturbed due to noise pollution.
(c) Megaphones should not be used in residential areas in order to avoid noise pollution.