

**Mizoram Board  
Class IX Science  
Sample Paper 2 – Solution**

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1. (iii) Methylene blue is used to stain animal cells.
2. (iv) Adipose tissue has large fat deposition in them, which provide energy when needed.
3. (iii) Ctenophores or comb jellies are the common names for animals of the Phylum Ctenophora.
4. (ii) Rabies is a viral disease. Anthrax and syphilis are bacterial diseases, while cancer is a non-infectious disease. It may occur due to genetic abnormalities, environment factor or lifestyle.
5. (ii) Transpiration increases the water content in air due to which temperature decreases and rain fall occurs.
6. (i) Each shell can accommodate maximum of  $2n^2$  electrons. K shell with value of  $n=1$  can have maximum of  $2 \times (1)^2 = 2$  electrons.
7. (iv) Carbon is the most reactive because it has incomplete octet while others have completely filled outermost shells.
8. (i) In water, the ratio of the mass of hydrogen to the mass of oxygen is 1: 8. So, 9 grams of water gives 1 gram of hydrogen and 8 grams of oxygen.
9. (iii) Physical change involves change in size, volume, state but not mass.
10. (i) Carbon disulphide should be kept away from flame since it is highly inflammable.
11. (i) Speed describes how fast an object is moving, whereas, velocity describes how fast an object is moving in a particular direction.
12. (iii) Action and reaction being equal and opposite and acting simultaneously for same duration, have equal and opposite impulses. They produce equal and opposite changes of momentum in the pair of bodies involved. It keeps the total momentum of the two body system constant.
13. (iv) The solid should be heavier than water and insoluble in it

- 14.** (iii) The kinetic energy becomes zero. According to the law of conservation of energy the kinetic energy is converted into potential energy. Potential energy is maximum at this height.
- 15.** In the case of uniform velocity, the speed or direction of a moving object is not changed and thus there is no acceleration. Therefore, in the case of uniform velocity the acceleration will be zero.
- 16.** The fan has a tendency to continue its circular motion even after it is switched off due to the inertia of motion. Thus, the fan continues to move for some time even after switching it off.
- 17.** The cochlea is a coiled tube, which has an oval window only one-sixteenth the area of the eardrum to receive vibrations and contains the actual organ of hearing.
- 18.** The subatomic particles of an atom present inside the nucleus are proton and neutron.
- 19.** Law of conservation of mass does not hold good when the compound is obtained by using different isotopes of the combining elements and when the compounds are non stoichiometric.
- 20.** Rain water harvesting and watershed management are the initiatives taken to increase the availability of water for agricultural purposes.
- 21.** When placed in water, dry apricots swell up due to endosmosis. On being transferred to sugar solution, they shrink due to exosmosis.
- 22.** The tissue present in the hard covering of seeds is sclerenchyma tissue. Lignin is the chemical which is responsible for making the tissue hard.
- 23.** Prior to sowing of the crop seeds, some plants like sun hemp or guar are grown and then mulched by ploughing them into the soil. This is called green manure.  
Green manure helps in enriching the soil with nitrogen and phosphorous.

**Or**

In poultry farming, domestic fowls are raised to produce eggs and meat. The fowls are given animal feeds in the form of roughage which is rich in fibre. Thus, by feeding the poultry fibre-rich diet, they provide highly nutritious food in the form of eggs and meat.

- 24.** Nematocysts are organelles that have stinging cells. They are present in Cnidarians. Nematocyst paralyses the preys by injecting poison and helps Cnidarians to catch their prey.
- 25.** A rubber band is considered a solid because it changes shape under the action of force and when the force is removed, it regains its original shape.
- 26.** Tea is a liquid substance so; its particles are not very closely and tightly packed. When we add sugar to it, the sugar particles occupy the spaces between the tea particles and hence the volume of tea does not increase.
- 27.** Body with mass  $2m$  will have a greater kinetic energy, because it has greater height and mass, and hence greater potential energy. This potential energy is converted to kinetic energy as the mass falls down. Hence, mass  $2m$  has greater kinetic energy.
- 28.** The extension of thread decreases because of buoyancy. Buoyancy acts in upward direction opposite to gravitational pull that causes loss in weight. Hence, the extension decreases.
- 29.** Velocity of sound in a given medium mainly depends on two properties—elasticity and density of the medium. These two quantities are always constant for a given medium. Thus, the velocity of sound for a given medium is always constant.
- 30.**  
(a) Ribosome  
(b) Leucoplast  
(c) Nucleolus
- 31.**  
(a) Arthropoda: Jointed legs or appendages  
(b) Annelida: Metamerically segmented body  
(c) Porifera: Body perforated with numerous pores

**Or**

Differences between amphibians and reptiles:

<b>Amphibians</b>	<b>Reptiles</b>
1. Skin is glandular, smooth and moist	1. Skin is non-glandular, dry and keratinised
2. Three-chambered heart	2. Incompletely four-chambered heart
3. Fertilisation is external	3. Fertilisation is internal
4. Examples: Frog, toad	4. Examples: Snake, lizard

**32.**

- (a) Whales and fish are aquatic animals and belong to Phylum Chordata. However, they both differ in several basic characters.
- (b) Whales are warm-blooded, while fish are cold-blooded animals.
- (c) Whales respire through the lungs, while fish breathe through gills.
- (d) Whales possess mammary glands which are absent in fish.
- (e) Whales have a four-chambered heart, while fish have a two-chambered heart.
- (f) Therefore, although whales and fish resemble each other and can swim in water, whales cannot be grouped with fish.
- (g) Whales belong to Class Mammalia, while fish are included in Class Pisces.

**33.** There are colloidal particles of mist in the forest. When light passes through the canopy of the forest, these colloidal particles are scattered and we observe the Tyndall effect. Smoke and milk also show the Tyndall effect

**34.** 1 mole of Ca = 40 g

$$\begin{aligned}\text{No. of atoms of calcium} &= \text{no. of moles} \times 6.022 \times 10^{23} \\ &= (\text{Given Mass/Molar Mass}) \times 6.022 \times 10^{23} \\ &= (125/40) \times 6.022 \times 10^{23} \\ &= 1.88 \times 10^{24} \text{ atoms}\end{aligned}$$

$$\begin{aligned}\text{No. of atoms of iron} &= (\text{Given Mass/Molar Mass}) \times 6.022 \times 10^{23} \\ &= (130/56) \times 6.022 \times 10^{23} \\ &= 1.39 \times 10^{24} \text{ atoms}\end{aligned}$$

Calcium has more number of atoms.

$$\begin{aligned}\text{Difference in number of atoms} &= 1.88 \times 10^{24} - 1.39 \times 10^{24} \\ &= 10^{24} (1.88 - 1.39) \\ &= 0.49 \times 10^{24} \\ &= 4.9 \times 10^{23} \text{ atoms}\end{aligned}$$

**Or**

Mass of sodium carbonate + mass of ethanoic acid = mass of sodium ethanoate + mass of water + mass of carbon dioxide

$$\begin{aligned}5.6 \text{ g} + 7.0 \text{ g} &= x + 2.8 + 0.7 \text{ g} \\ x &= 12.6 - 3.5 = 9.1 \text{ g}\end{aligned}$$

**35.**

- (i) Net force  $F = F_2 - F_1 = 30 - 20 = 10 \text{ N}$
- (ii) Net force acts along the direction of  $F_2$ .
- (iii) Acceleration  $F = ma$

$$\rightarrow a = \frac{10}{10} = 1 \text{ ms}^{-2}$$

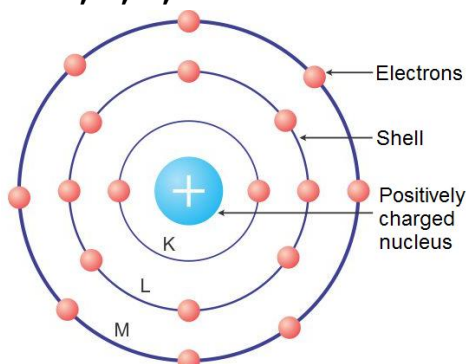
36.

- (i) The boat floats lower in water, that is, it sinks a little more in water.
- (ii) Weight of water displaced by the submerged part of the boat increases.
- (iii) Because of the greater weight of water displaced the buoyant force acting on the boat increases. This greater buoyant force enables the extra weight of the man in the boat.

37.

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

- Niels Bohr proposed that the 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.



**Niels Bohr's Atomic Model**

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

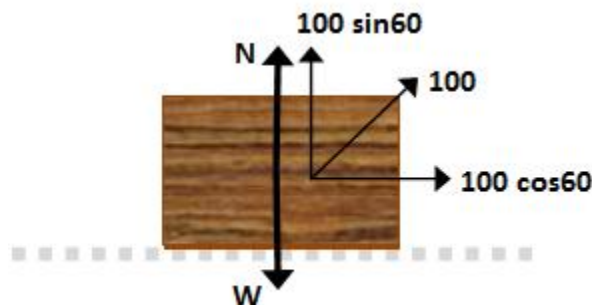
(b) Failures of Thomson's atomic model

- Although Thomson's atomic model explained why an atom is electrically neutral, it could not explain the distribution of electrons in the atom.

- If we accept that electrons are embedded in the positive charge, then the opposite electric charges should cancel each other out and the charged sphere would become chargeless.
- Thomson's model could not explain why different elements have different chemical properties.

**38.**

(i) Given that a force of 50 N is applied on a box of weight W.



Force applied to the box at an angle of 60 is a vector quantity which has two components—horizontal and vertical.

Because the force causes a displacement in the horizontal direction, its horizontal component is to be considered.

We know that  $W = F \cos\theta \times s$

$$\therefore W = 50 \cos 60^\circ \times 6$$

$$\therefore W = 50 \times 0.5 \times 6$$

$$W = 150 \text{ J}$$

(ii) Yes. The two spheres will start rolling in the direction in which the train was moving. Due to the application of the brakes, the train comes to rest, but due to inertia, the spheres try to remain in motion; so, they begin to roll. Because the masses of the spheres are not the same, the inertial forces are also not the same on both. Thus, the spheres will move with different speeds.

**39.**

(a)

(i) Liver

(ii) Antibiotics block the chemical pathways of bacteria such as synthesis of cell wall and proteins, thereby killing the bacteria.

(iii) No, antibiotics will not help in curing Kiran's disease because hepatitis is a viral disease, while antibiotics are effective against bacteria.

(b) There are several limitations confronted while treating an infectious disease.

(i) When a person gets a disease, the body functions get disturbed and may never recover completely.

(ii) Treatment of a disease takes time.

- (iii) A person suffering from an infectious disease can serve as a medium for further spread of infections to other people.

Therefore, prevention of a disease is more desirable than its treatment.