NCERT QUESTIONS WITH SOLUTIONS

1. The primary difference between solids and liquids is that the constituent particles are:

(i) closely packed in solids, while they are stationary in liquids.

(ii) far apart in solids and have fixed position in liquids.

(iii) always moving in solids and have fixed position in liquids.

(iv) closely packed in solids and move past each other in liquids.

Sol. (iv) closely packed in solids and move past each other in liquids.

In **solids**, the particles are tightly packed with very little interparticle space and strong forces of attraction. They cannot move freely but only **vibrate about fixed positions**, which is why solids have a definite shape and volume.

In **liquids**, the particles are also close together but the forces of attraction are weaker compared to solids. Thus, the particles can **slide and move past each other**, allowing liquids to flow, have a definite volume but no definite shape.

2. Which of the following statements are true? Correct the false statements.

(i) Melting ice into water is an example of the transformation of a solid into a liquid.

(ii) Melting process involves a decrease in interparticle attractions during the transformation.

(iii) Solids have a fixed shape and a fixed volume.

(iv) The interparticle interactions in solids are very strong, and the interparticle spaces are very small.

(v) When we heat camphor in one corner of a room, the fragrance reaches all corners of the room.

(vi) On heating, we are adding energy to the camphor, and the energy is released as a smell.

Sol. **(i) True** → Ice (solid) changes to water (liquid) on melting, so this is a solid-to-liquid transformation.

(ii) True → During melting, particles gain energy and their intermolecular attractions weaken, allowing them to move more freely.

(iii) True → Solids have a fixed shape and fixed volume due to tightly packed particles.

(iv) True → Solids have very strong interparticle forces and very little interparticle space, which makes them rigid.

(v) True → Camphor undergoes sublimation (solid → gas), and the vapour particles diffuse rapidly through air, spreading the fragrance to all parts of the room.

(vi) False → On heating camphor, energy is supplied to overcome intermolecular forces and convert it into vapour. The vapour diffuses and carries the smell. The smell is **not released energy**, but the result of gaseous camphor particles spreading in the air.

3. Choose the correct answer with justification. If we could remove all the constituent particles from a chair, what would happen?

(i) Nothing will change.

(ii) The chair will weigh less due to lost particles.

(iii) Nothing of the chair will remain.

Sol. (iii) Nothing of the chair will remain.

Matter is made up of **constituent particles** (atoms and molecules).

- A chair exists only because these particles are present, closely packed, and arranged in a definite structure.
- If **all particles are removed**, there would be no matter left — hence, the chair would completely disappear.
- Option (i) is wrong because without particles, there can be no structure.
- Option (ii) is wrong because it's not about losing *some* particles (which would reduce weight), but about losing **all** particles, which means the chair ceases to exist.

4. Why do gases mix easily, while solids do not?

Sol. **In gases**, particles are separated by **large interparticle spaces** and have very **weak forces of attraction**. They move randomly and at high speeds, so when two gases come together, their particles intermingle quickly — this is called **diffusion** whereas i**n solids**, particles are **closely packed** and held by **strong forces of attraction**.

They can only vibrate about fixed positions and cannot move freely.

Hence, solids cannot diffuse into one another under ordinary conditions.

5. When spilled on the table, milk in a glass tumbler flows and spreads out, but the glass tumbler stays in the same shape. Justify this statement.

Sol. **In milk (liquid),** particles are **close together** but not fixed in position.

They can **slide past each other**, which allows milk to flow and take the shape of any container or surface it is on.

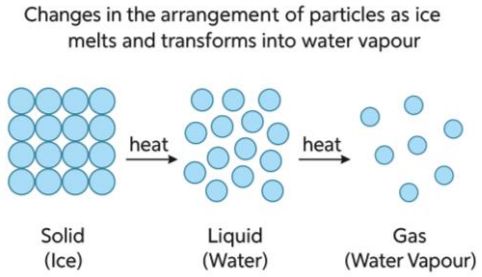
That is why milk spreads out on the table when spilled whereas in **glass tumbler (solid),** particles are **tightly packed** with **very strong forces of attraction**.

The particles can only vibrate about fixed positions and cannot move freely.

This gives the tumbler a **definite shape and definite volume**, so it does not change shape like the milk.

6. Represent diagrammatically the changes in the arrangement of particles as ice melts and transforms into water vapour.

Sol.



Ice (solid) → closely packed, fixed positions.

Water (liquid) → still close but able to move/slide past one another.

Water vapour (gas) → very far apart, moving freely in all directions.

In **ice**, strong interparticle forces keep the molecules tightly packed in an orderly pattern.

On **melting**, heat energy weakens these forces, so molecules become mobile while remaining close → **liquid state**.

On further **heating to vapour**, particles gain enough energy to overcome intermolecular forces, move far apart, and spread randomly in all directions → **gaseous state**.

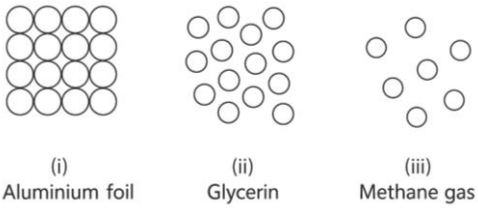
7. Draw a picture representing particles present in the following:

(i) Aluminium foil

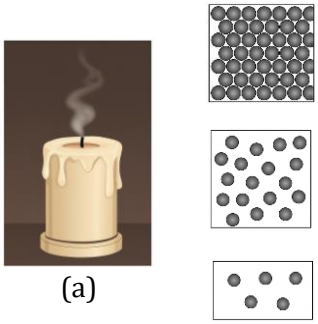
(ii) Glycerin

(iii) Methane gas

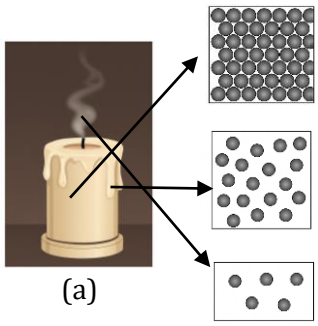
Sol.



8. Figure 'a' shows the image of a candle that was just extinguished after burning for some time. Identify the different states of wax in the figure and match them with figure 'b' showing the arrangement of particles.



Sol.



- **Solid wax** on the candle → matches
- **Molten wax (liquid)** dripping on the sides → matches **closely packed but mobile particles)**.
- **Wax vapour/smoke (gas)** rising after extinguishing → matches **widely spaced particles)**.

In **solid wax**, particles are tightly packed with strong forces of attraction, giving the candle its definite shape.

On burning, part of the wax **melts** to form a liquid; here, the particles are still close but can slide past one another, so molten wax drips down.

When the candle is extinguished, some wax **vaporizes**, and the gaseous wax particles spread far apart and move randomly in air, seen as smoke.

9. Why does the water in the ocean taste salty, even though the salt is not visible? Explain.

Sol. Ocean water tastes salty because it contains a large amount of dissolved salts, mainly sodium chloride these salts are not visible because the **salt dissolves completely** in water and breaks down into invisible particles.

That is why we cannot see the salt, but we can taste its salty flavour.

10. Grains of rice and rice flour take the shape of the container when placed in different jars. Are they solids or liquids? Explain.

Sol. They are **solids**, not liquids.

Rice grains and rice flour are made of solid particles with fixed shape and volume.

They only appear to take the container's shape because particles move and settle freely.

Liquids, however, truly lack fixed shape and flow as a continuous fluid.