# CLASS – 8 PHYSICS CHAPTER – 6 HEAT TRANSFER EXERCISE SOLUTIONS

## Test Your Understanding [Page No. 101]

**Question :** Tick the correct option :

**1. When heat is constantly supplied by a burner to boiling water, then the temperature of water during vaporisation**
**Answer : (d)** does not rise at all

**2. The evaporation of water increases under the following conditions**
**Answer : (c)** increase in surface area, rise in temperature

**3. If surface area of liquid is large then evaporation will be**
**Answer : (b)** more

**4. Changing of a liquid into vapours from the surface without heating it is called**
**Answer : (c)** evaporation

**5. Evaporation takes place at**
**Answer : (d)** at all temperatures

## Test Your Understanding [Page No. 105]

**1. The length of an iron rod increases from 10 m to 11 m, when kept over a burner flame. This increase in length is due to**
**Answer : (b)** linear expansion

**2. Gaps are left in railway tracks to compensate thermal expansion during**
**Answer : (c)** hot season

**3. An increase in breadth, length and thickness of a substance is due to**
**Answer : (b)** thermal expansion

**4. An automatic fire alarm is a**
**Answer : (b)** heat detector

**5. Wires on electric poles are given some sag to prevent breaking in**
**Answer : (a)** winter

## EXERCISES

### A. Choose the correct option :

**1. Evaporation takes place from :**
**Answer : (a)** surface of the liquid

**2. Changing of a liquid into vapours at a fixed temperature is called**
**Answer : (b)** boiling

**3. Which of the following is correct in case of thermal expansion?**
**Answer : (b)** A longer rod of a metal expands more than a smaller rod of the same metal

**4. Boiling point of water is**
**Answer : (b)** $100^0$C

**5. Evaporation from surface of any liquid depends on**
**Answer : (d)** all of above

**6. Volume thermal expansion is also termed as :**
**Answer : (d)** cubical thermal expansion

**7. At high temperature, evaporation is**
**Answer : (a)** fast

### B. Fill in the blanks :

**1. Change of state of a liquid into gas at constant temperature is called…….**
**Answer :** boiling

**2. Evaporation is followed by…….effect.**
**Answer :** cooling

**3. Boiling is a…….phenomena.**
**Answer :** bulk

**4. Increase in length of an iron rod on heating is termed as……**
**Answer :** linear expansion

**5. The coefficient of thermal expansion depends on…….of the substance.**
**Answer :** nature

## C. Match the following :

| | |
|---|---|
| 1. Evaporation | a. Bubble formation takes place |
| 2. Heat | b. Surface phenomena |
| 3. Thermal Expansion | c. Evaporation |
| 4. Boiling | d. Change in dimension of space occupied by matter |

Answer : 1 – (b), 2 – (c), 3 – (d), 4 – (a)

## D. Answer the following questions in short.

**1. Name the temperature at which a liquid changes into a gas.**
**Answer :** The temperature at which the liquid starts boiling is called its boiling point.

**2. Name one common substance which can be easily changed from one state to another by heating or cooling.**
**Answer :** Water can be easily changed from one state to another by heating or cooling.

**3. Under what conditions heat can be given to a substance without raising its temperature?**
**Answer :** Heat can be given to a substance without raising its temperature,When a substance is changing its physical state[for e.g., from solid to liquid and liquid to gas ]. The heat energy which has to be supplied to change the state of substance is called its Latent Heat.

**4. Define 'boiling point' of a substance? What is the boiling point of water?**
**Answer :** The temperature at which the liquid starts boiling is called its boiling point.
The boiling point of water is $100^0$C.

**5. Define boiling.**
**Answer :** Rapid vaporization of liquid at a particular temperature.

**6. What do you mean by evaporation?**
**Answer :** A process of turning liquid into its vapours.

**7. What do you mean by term thermal expansion?**
**Answer :** Tendency of matter to change its shape, area, and volume in response to a change in temperature.

**8. Why do liquids and gases not expand superficially?**
**Answer :** Liquids and gases show only cubical expansion, but no linear and superficial expansion because they do not have a definite shape.
Different gases have the same rate of expansion for the same rise in temperature, as compared to solids and liquids which show different rates of expansion for the same rise in temperature.

**9. How does the water kept in an earthen pot (matka) become cold during summer?**
**Answer :** An earthen pot or a matka is porous in nature. Water placed in earthen pots is evaporated from minuscule pores it has as it is made of mud particles. This evaporation of water produces a cooling effect.
Hence, water stored in earthen pots tends to become cooler in summer.

**10. How does perspiration or sweating help keep our body cool on a hot day?**
**Answer :** Sweat helps cool you down by releasing moisture onto your skin. But that's not all that's going on. On a hot day, your sweat evaporates from your skin taking a little bit of your body heat with it. So your sweat won't evaporate very much because the humid air can't hold very many more water molecules.

**11. Name the type of thermal expansion that occurs in solids, liquids and gases.**
**Answer : Linear expansion :** An increase in length of a solid on heating.
**Superficial expansion :** An increase in area of a solid on heating.
**Cubical expansion :** An increase in volume of a gas, liquid or solid on heating.

**12. Name the factors that decide the linear expansion.**
**Answer : Linear expansion depends on the following factors :**

**(i)** Temperature
**(ii)** Original length of the solid
**(iii)** Nature of the material

## E. Answer the following questions in detail.

**1. (a)** What is evaporation? State the various factors which affect evaporation.
**(b)** Why does evaporation cool a liquid?
**Answer : (a) Evaporation :** The process of a liquid changing into vapour (or gas) at any temperature below its boiling point is called evaporation.
**The evaporation of a liquid depends mainly on the following factors :**
**(i)** Temperature
**(ii)** Surface area
**(iii)** Humidity
**(iv)** Wind speed
**(b)** The cooling caused by evaporation is based on the fact that when a liquid evaporates, it draws (or takes) the latent heat of vaporisation from 'anything' which it touches. By losing heat, this 'anything' gets cooled.

**2. Why does temperature remains constant when water boils?**
**Answer :** When boiling occurs, the more energetic molecules change to a gas, spread out, and form bubbles. These rise to the surface and enter the atmosphere. In addition, gas molecules leaving the liquid remove thermal energy from the liquid. Therefore the temperature of the liquid remains constant during boiling.

**3. A sample of water is boiled and its boiling point is 102$^0$C. Does this sample is pure? Give reasons in support of your answer.**
**Answer :** The boiling point of pure water is 100$^0$C. Soluble impurities increase the boiling point of a liquid. As the sample of water boils at 102$^0$C, hence it is not pure. Impurities does not affect the freezing point, hence the given sample of water will freeze at 0$^0$C.

**4. Give a brief about the three ways of thermal expansion in solids.**
**Answer :** It is a well-known phenomenon now that substances expand on heating and contract on cooling. If you heat a body, it alters its dimensions. Depending on the shape of the body.
The expansion can occur in length in which case it is called **Linear Expansion.**
If we take a square tile and heat it, the expansion will be on two fronts, length and breadth, here it is called **Area Expansion.**
If we take a cube and heat it, all its sides expand and now the body experiences an increase in the overall volume due to this and it is called **Volume Expansion.**

**5. List any five daily life examples where you can experience thermal expansion.**
**Answer : (i)** The iron rims are fitted around wooden wheels by the process of expansion on heating **(followed by contraction on cooling).**
**(ii)** The Railway engineers always leave a small gap between two rails to compensate for the expansion of the rails during the hot day time and contraction during cold nights.
**(iii)** Rollers supports are commonly located at one end of long bridges. This allows the beidge structure to expand and contract with temperature changes.
**(iv)** There are several joint gaps on the concrete road which allow easy movement of concrete due to thermal expansion and moisture.
**(v)** An automatic fire alarm is a heat detector that responds to the heat from a fire by setting off an alarm.

**6. What is heat? List the effects of heat?**
**Answer : Heat :** The form of energy which gives the sensation of hotness of any object.
**Effects of Heat :**
**(i)** Raises the **temperature**.
**(ii)** Increases **volume**.
**(iii)** Changes state.
**(iv)** Brings about chemical action.
**(v)** Changes physical properties.

## Picture-Based Questions

**Water is kept in four vessel P, Q, R and S. in which vessel the rate of evaporation is highest? Explain.**

**Answer :** In vessel R, because flow of air over it is fast, as compared to other vessels.

## Application-Based Questions

**1. Why are we able to sip hot tea or milk faster from a saucer rather than from a cup?**
**Answer :** A liquid has a larger surface area in a saucer than in a cup. Larger is the surface area more is the evaporation. Thus evaporation is faster in a saucer causing more cooling than in a cup. For this reason, we are able to sip hot tea or milk faster from a saucer than a cup.

**2. Why does all the water of the earth not get evaporated during hot summer days?**
**Answer :** Earth is a very huge planet which revolves around Sun due to which we get seasons. So, when One hemisphere of earth is having summer, the other hemisphere will have winter. Hence due above stated reasons,all the water of the earth does not get evaporated during hot summer .

**3. A metallic spherical ball has a cavity inside. What will happen to the diameter of the ball if the ball is heated?**
**Answer :** The metal ball can be considered to be made up of several layers of thinner ones. On heating each of these layers will increase in radius. As the inner most layer also increases its radius, the volume inside it i.e. the volume of the hollow portion will also increase.

## WORKSHEET [Page No, 111]

**A. Give one word for the following statements:**
**1. The phenomena of change of state of liquid into its vapour at any temperature below its boiling point**
**Answer :** Evaporation

**2. Liquids expands more than**
**Answer :** Solids

**3. Increase in volume of a metal block on heating**
**Answer :** Thermal expansion

**4. Also called hidden heat**
**Answer :** Laten Heat

**5. A surface phenomena**
**Answer :** Evaporation

**6. A bulk phenomena**
**Answer :** Boiling

**7. Temperature at which liquid changes states on heating**
**Answer :** Boiling point

**8. Moisture present in air**
**Answer :** Humidity

**B. Write an activity that demonstrates different liquids expand differently.**
**Answer : AIM :** To study the relative expansion of different types of liquids
**MATERIALS REQUIRED :** Three identical round-bottomed glass flasks with narrow stem, different liquids, such as oil, water and alcohol, a water bath.
**PROCEDURE : (i)** Take three identical round0bottomed glass flasks and fill them with equal volumes of liquids such as water, oil, and alcohol.
**(ii)** Arrange them side by side in a water bath and heat the water.
**(iii)** Observe the level of liquid in each flask carefully.
**OBSERVATIONS :** It can be observed that the amount of expansion is different for different liquids.
**INFERENCE :** The experiment proves that different types of liquids expand by different amounts.

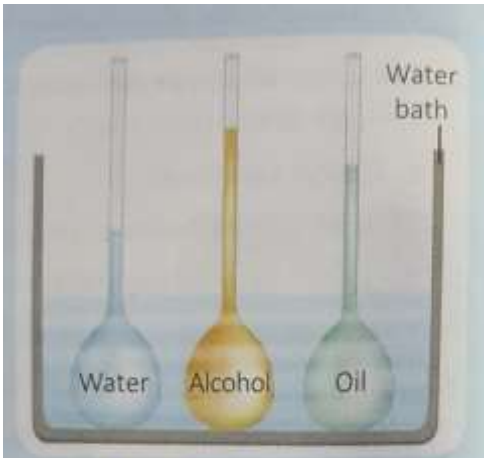


**Fig. 6.13** Thermal expansion in different types of liquids