CHAPTER 7

Heat Transfer in Nature

CLASS 7TH

NCERT SOLUTIONS - SCIENCE

P1 P2

1. Choose the correct option in each case.

(i) Your father bought a saucepan made of two materials, A and B, as shown in Fig. 7.14. The A and B have the following properties-

(a) Both A and B are good conductors of heat

(b) Both A and B are poor conductors of heat

(c) A is a good conductor and B is a poor conductor heat

(d) A is a poor conductor and B is a good conductor heat

Fig. 7.14: Saucepan

(ii) Pins are stuck to a metal strip with wax and a burning candle is kept below the rod, as shown in Fig. 7.15. Which of the following will happen?

(a) All the pins will fall almost at the same time

(b) Pins I and II will fall earlier than pins III and IV

(c) Pins I and II will fall later than pins III and IV

(d) Pins II and III will fall almost at the same time

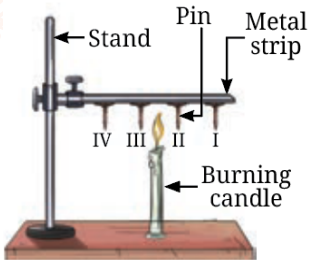


Fig. 7.15: Heat transfer set-up

(iii) A smoke detector is a device that detects smoke and sounds an alarm. Suppose you are fitting a smoke detector in your room. The most suitable place for this device will be:

(a) Near the floor

(b) In the middle of a wall

(c) On the ceiling

(d) Anywhere in the room

ANSWER

(i) Correct option: (c) A is a good conductor and B is a poor conductor of heat.

Reason: Cooking pans are made so the base (A) is metallic - a good conductor so heat reaches food quickly. The handle (B) is made of wood/plastic - a poor conductor so you can hold it safely.

(ii) Correct option: (b) Pins I and II will fall earlier than pins III and IV.

Reason: Heat travels along the metal strip by conduction from the heated end. Wax holding pins closer to the flame melts earlier, so pins nearer the flame fall first.

(iii) Correct option: (c) On the ceiling.

Reason: Smoke is hot gas + particles; hot air rises by convection, so detectors should be on/near the ceiling for earliest detection

2. A shopkeeper serves you cold lassi in a tumbler. By chance, the tumbler had a small leak. You were given another tumbler by the shopkeeper to put the leaky tumbler in it. Will this arrangement help to keep the lassi cold for a longer time? Explain.

ANSWER

Yes - the arrangement helps.

Explanation: When the leaky tumbler is placed inside another tumbler, an air layer (and possibly a small volume of trapped lassi/ liquid) forms between the two tumblers. Air is a poor conductor of heat, so this trapped air reduces heat flow from the outside warm air into the lassi. Thus the lassi stays cold longer than it would in a single exposed tumbler.

3. State with reason(s) whether the following statements are True [T] or False [F].

(i) Heat transfer takes place in solids through convection. [ ]

False.

Reason: In solids heat transfer occurs mainly by conduction (particles vibrate and pass energy to neighbours); convection requires particle movement and happens in fluids (liquids/gases).

(ii) Heat transfer through convection takes place by the actual movement of particles. [ ]

True.

Reason: In convection, warmer fluid rises and cooler fluid sinks, so bulk motion of particles carries heat.

(iii) Areas with clay materials allow more seepage of water than those with sandy materials. [ ]

False.

Reason: Clay particles are very fine and pore spaces are small, so seepage (infiltration) is slower than in sandy soils which have larger pores.

(iv) The movement of cooler air from land to sea is called land breeze. [ ]

True.

Reason: At night land cools faster than sea; cooler air from land flows to sea - called land breeze.

4. Some ice cubes placed in a dish melt into water after sometime. Where do the ice cubes get heat for this transformation?

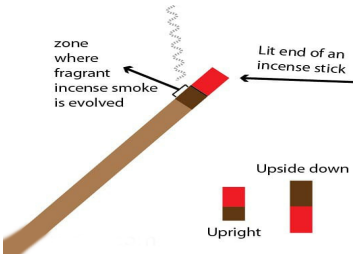
ANSWER

The ice cubes absorb heat from their surroundings - air, the dish, the table - which are at higher temperature. Heat flows from warmer surroundings to the ice by conduction and radiation, causing the ice to melt.

5. A burning incense stick is fixed, pointing downwards. In which direction would the smoke from the incense stick move?

ANSWER

The smoke will move upwards. Smoke consists of hot gases and fine particles. These are warmer (less dense) than surrounding air, so they rise by convection.



6. Two test tubes with water are heated by a candle flame as shown in Fig. 7.16. Which thermometers (Fig. 7.16a or Fig. 7.16b) will record a higher temperature? Explain.

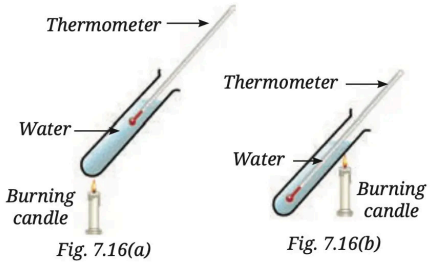


Fig. 7.16: Two thermometers dipped in two test tubes

ANSWER

- The thermometer in Fig. 7.16(b) will record a higher temperature.

Explanation:

- In Fig. 7.16(a), the candle flame heats water from the top. Hot water remains at the top and does not circulate down because water is a poor conductor of heat. Therefore, the thermometer shows only a slight rise in temperature.
- In Fig. 7.16(b), the flame heats water from the bottom. Hot water rises up and cold water moves down, setting up convection currents. This distributes heat throughout the water, so the thermometer records a much higher temperature.

Conclusion: Heating water from below (as in Fig. 7.16b) is more effective due to convection, so the thermometer in (b) shows a higher temperature.

7. Why are hollow bricks used to construct the outer walls of houses in hot regions?

ANSWER

Hollow bricks contain air gaps inside them. Air is a poor conductor of heat, so these bricks do not allow outside heat to pass easily into the house. Thus, hollow bricks help in keeping the interiors of houses cool in hot regions.

8. Explain how large water bodies prevent extreme temperature in areas around them.

ANSWER

- Water heats up and cools down more slowly than land.
- During the day, water bodies absorb heat and keep the surroundings cooler.
- At night, they release the stored heat slowly and keep the surroundings warmer.
- This moderating effect of water prevents extreme temperature changes in coastal areas.

9. Explain how water seeps through the surface of the Earth and gets stored as groundwater.

ANSWER

- When it rains, water seeps into the soil through cracks, pores, and spaces between soil particles.
- This process is called infiltration.
- The infiltrated water moves downward and gets collected in the empty spaces between rocks and soil layers.
- This collected water is called groundwater, which can be drawn through wells, tube wells, and handpumps.

10. The water cycle helps in the redistribution and replenishment of water on the Earth. Justify.

ANSWER:

- The water cycle involves processes like evaporation, condensation, and precipitation.
- Water from oceans, rivers, lakes, and plants evaporates, forms clouds, and falls back as rain or snow.
- This cycle redistributes water from one place to another and ensures that water is continuously renewed and replenished.
- Without the water cycle, freshwater sources on land would dry up.