

Molecular motion and energy

1. A student claims that the following statements are correct. Do you agree?
 - (a) The total kinetic energy of all the molecules of an object is zero when the temperature of that object is at 0°C . **Incorrect**
 - (b) The temperatures of two objects must be the same if they have the same total kinetic energy. **Incorrect**
2. Two glasses A and B contain 0.2 kg of water at 80°C and 0.5 kg of water at 20°C respectively.
 - (a) In which glass are there more water molecules? **B**
 - (b) In which glass of water do the molecules have a higher average speed due to random motion? **A**
 - (c) In which glass do the water molecules have a higher average kinetic energy due to random motion? **B**
3. State whether the following statements are correct or not.
 - (a) A hot object must have more internal energy than a cold object. **Incorrect**
 - (b) The internal energy of a cup of water is the same as that of a cup of milk, if they have the same mass and temperature. **Incorrect**
 - (c) The molecules in hot water move faster on average than those in cold water. **Correct**
 - (d) The average kinetic energy of molecules in 1000 mL of cola is higher than that in 350 mL of cola, if they are both at room temperature. **Incorrect**

Processes of heat transfer

1. [Conduction] State whether the following statements are correct or not.
 - (a) Conduction only takes place between two bodies. **Incorrect**
 - (b) The ability to conduct heat is different for different materials. **Correct**
 - (c) Heat cannot be transferred in air through conduction. **Incorrect**
 - (d) All electrons in a good conductor are tightly bound to atoms. **Incorrect**
 - (e) Insulators can stop conduction of heat between two bodies. **Incorrect**
2. [Conduction] An experiment is carried out to compare the abilities of copper and glass to conduct heat. A pin is fixed at the end of each rod with a little wax. The two rods shown (figure omitted here) have the same length and cross-sectional area.

- (a) State, in terms of motion of particles, the difference(s) between conduction of heat in the copper rod and the glass rod.
- (b) A student claims that the pins drop earlier if the rods are thinner. Do you agree? Briefly explain your answer. **Incorrect**
3. [Convection] State whether the following statements are correct or not.
- (a) When air is heated, it rises because it becomes less dense. **Correct**
- (b) A convection current is the movement of a fluid from one region to another. **Correct**
- (c) A sea breeze is formed when warm air flows from the land to the sea to take the place of the risen cool air there. **Incorrect**
4. [Radiation] Heat is transferred from the Sun to the Moon by **C**
- A. conduction
- B. convection
- C. radiation
5. [Radiation] Marathon runners are wrapped in shiny blankets after the race. Which of the following is the best explanation? **C**
- A. Shiny surfaces prevent evaporation from occurring.
- B. The shiny blankets are good conductors of heat.
- C. The shiny blankets are poor emitters of radiation which help reduce the heat loss from the runners.