

QB365 Question Bank Software Study Materials

Heat Important 2,3 & 5 Marks Questions With Answers (Book Back and Creative)

9th Standard

Science

Total Marks : 75

2 Marks

10 x 2 = 20

- 1) What is the heat in joules required to raise the temperature of 25 grams of water from 0°C to 100°C? What is the heat in Calories?
(Specific heat of water = 4.18 J/g°C)

Answer : Mass of water = 25 grams

$$\Delta T = (100^{\circ}\text{C} - 0^{\circ}\text{C}) = 100^{\circ}\text{C}$$

$$C = 4.18 \text{ J/g}^{\circ}\text{C}$$

$$\text{Heat energy required } Q = M \times C \times \Delta T$$

$$= 25 \times 4.18 \times 100^{\circ}\text{C}$$

$$= 10450 \text{ j}$$

- 2) How much heat energy is required to change 2 kg of ice at 0°C into water at 20°C? (Specific latent heat of fusion of water = 3,34,000J/kg, Specific heat capacity of water = 4200JKg⁻¹K⁻¹).

Answer : Mass (m) = 2 kg

$$\text{Specific heat capacity (c)} = 4200 \text{ Jkg}^{-1} \text{ K}^{-1}$$

$$\text{Temperature variation } (\Delta t) = 20^{\circ}\text{C} - 0^{\circ}\text{C} = 20^{\circ}\text{C}$$

$$\text{Specific latent heat (L)} = 3,34,000 \text{ J/kg}$$

$$\text{Heat energy required} = mc\Delta t + ml$$

$$= (2 \times 4200 \times 20) + (2 \times 3,34,000)$$

$$= 168000 + 668000$$

$$= 836000 \text{ J}$$

- 3) Heat gained by a body depends upon which factors?

Answer : 1. Mass of the body

2. Change in temperature of the body

3. Nature of the material of the body.

- 4) What do you mean by thermal equilibrium?

Answer : When two bodies at different temperatures are kept in contact with each other, then heat energy flows from the hot body to the colder one.

It means that the hot body will lose heat and the cold body will gain heat till they reach a common temperature. This state is called thermal equilibrium.

- 5) Define one calorie.

Answer : The amount of heat energy required to raise the temperature of 1 g water by 1°C is called one calorie.

- 6) What is the relation between calorie and Joule?

$$\text{Answer : } 1 \text{ Calorie} = 4.186 \text{ J}$$

$$= 4.2 \text{ J}$$

- 7) Name a device that prevents loss of energy (or gain) by conduction, convection and radiation.

Answer : Thermos flask.

- 8) Which factor determines the direction of flow of heat from one body to another?

Answer : Temperature.

Who introduced the term latent heat?

9) WHO INTRODUCED THE TERM LATENT HEAT?
Answer : Joseph Black in 1750.

10) What is the minimum possible temperature? Is there also a maximum possible temperature?

Answer : The minimum possible temperature is 0K. There is no limit to maximum temperature.

3 Marks

10 x 3 = 30

11) Define conduction.

Answer : The process of transfer of heat in solids from a region of higher temperature to a region of lower temperature without the actual movement of molecules is called conduction.

12) Ice is kept in a double-walled container. Why?

Answer : To avoid the loss of heat due to conduction, convection and radiation, ice is kept in a double walled container.

13) How does the water kept in an earthen pot remain cool?

Answer : The earthen pot is made up of soil. Soil is the bad conductor of heat. So the pot has minute pores. The least amount of water is leaked through the pores. It prevents heat from entering into the pot, so the water remains cool.

14) Differentiate convection and radiation

Answer :

| S.No | Convection | Radiation |
|------|--|--|
| 1. | It needs particles for transfer of heat | It does not need particles for transfer of heat. |
| 2. | It lacks in electromagnetic waves | Heat flows from one place to another by means of electromagnetic waves |
| 3. | It flows from higher temperature to lower temperature. | It occurs in a vacuum. |

15) Why do people prefer wearing white clothes during summer?

Answer : White coloured clothes are good reflectors of heat. They keep us cool during summer. So people prefer wearing white clothes during summer.

16) What is specific heat capacity?

Answer : Specific heat capacity of a substance is defined as the amount of heat required to raise the temperature of 1 kg of the substance by 1°C.

17) Define thermal capacity.

Answer : Heat capacity or thermal capacity is defined as the amount of heat energy required to raise the temperature of a body by 1°C.

18) Define specific latent heat capacity

Answer : Latent heat is the amount of heat energy absorbed or released by a substance during a change in its physical state without any change in its temperature.

19) What is the amount of heat required to raise the temperature of 5 kg of iron from 30°C to 130°C? Specific heat capacity of iron = 483 Jkg⁻¹C⁻¹.

Answer : Mass of iron m = 5 kg

Initial temperature t₁ = 30°C

Final temperature t₂ = 130°C

Rise in temperature $\Delta t_2 = (t_2 - t_1) = 130 - 30 = 100^\circ\text{C}$

Specific heat capacity of iron c = 483 Jkg⁻¹C⁻¹

$Q = m \times c \times \Delta t$

= 5 x 483 x 100

= **2,41,500 J**

- 20) What will be the final temperature if 1,68,000 J of heat is absorbed by 2 kg of water at 30°C?

Answer : Heat absorbed $Q = 1,68,000 \text{ J}$

$m = 2\text{kg}$

Initial temperature $t_1 = 30^\circ\text{C}$

Let final temperature $t_2 = x^\circ\text{C}$

Rise in temperature $\Delta t = (t_2 - t_1)$

$= (x - 30)^\circ\text{C}$

Specific heat capacity of water $C = 4200 \text{ J kg}^{-1}\text{C}^{-1}$

We know that $Q = m \times c \times \Delta t$

$1,68,000 = 2 \times 4200 \times (x - 30)$

$$x - 30 = \frac{1,68,000}{2 \times 4200}$$

$$x - 30 = 20$$

$$x = 30 + 20$$

$$= 50^\circ\text{C}$$

So, the final temperature of water = 50°C

5 Marks

5 x 5 = 25

- 21) Explain convection in daily life.

Answer : Hot air balloons:

Air molecules at the bottom of the balloon get heated by a heat source and rise. As the warm air rises, cold air is pushed downward and it is also heated. When the hot air is trapped inside the balloon, it rises.

Breezes:

During day time, the air in contact with the land becomes hot and rises. Now the cool air over the surface of the sea replaces it. It is called sea breeze. During night time, air above the sea is warmer. As the warmer air over the surface of the sea rises, cooler air above the land moves towards the sea. It is called land breeze.

Winds:

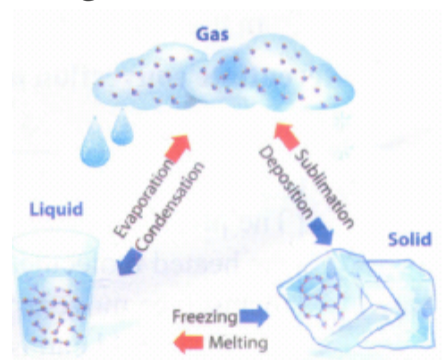
Air flows from area of high pressure to area of low pressure. The warm air molecules over hot surface rise and create low pressure. So, cooler air with high pressure flows towards low pressure area. This causes wind flow.

Chimneys:

Tall chimneys are kept in kitchen and industrial furnaces. As the hot gases and smoke are lighter, they rise up in the atmosphere.

- 22) What are the changes of state in water? Explain.

Answer : The process of changing of a substance from one physical state to another at a definite temperature is defined as change of state.



For example, water molecules are in liquid state at normal temperature. When water is heated to 100°C, it becomes steam which is a gaseous state of matter. On reducing the temperature of the steam it becomes water again. If we reduce the temperature further to 0°C, it becomes ice which is a solid state of water. Ice on heating, becomes water again. Thus, water changes its state when there is a change in temperature. There are different such processes in the change of state in matter. The figure shows various processes of change state.

- 23) How can you experimentally prove that water is a bad conductor of heat? How is it possible to heat water easily while cooking.

Answer : Water has the highest specific heat capacity. So water absorbs a large amount of heat for unit rise in temperature. Thus water is used as a coolant in car radiators and factories to keep engine and other machinery parts cool. So water is a bad conductor of heat. Specific heat capacity of water is 4200J/kg°C. So it is easy to raise the temperature. So it is possible to heat water easily while cooking.

- 24) Compare heat capacity and specific heat capacity.

Answer :

| S.No | Specific heat capacity | Heat capacity |
|------|---|---|
| 1. | It is the heat required to raise the temperature of 1g of a substance through 1 ⁰ C. | It is the heat required to raise the temperature of a given mass of substance through 1 ⁰ C. |
| 2. | It does not depend on the mass of the body | It depends on the mass of the body |
| 3. | Its unit is Jkg ⁻¹⁰ C ⁻¹ | Its unit is J ⁰ C ⁻¹ |

25) How conduction is used in daily life?

Answer : Conduction in daily life:

(i) Metals are good conductors of heat. So, aluminum is used for making utensils to cook food quickly.

(ii) Mercury is used in thermometers because it is a good conductor of heat.

(iii) We wear woolen clothes in winter to keep ourselves warm. Air, which is a bad conductor, does not allow our body heat to escape.