7. The temperature of the sun is measured with [Pb. PMT 1998; CPMT 1998; Pb. PET 1997, 2001]
(a) Platinum thermometer
(b) Gas thermometer
(c) Pyrometer
(d) Vapour pressure thermometer

8. Absolute temperature can be calculated by [AFMC 1994]
(a) Mean square velocity (b) Motion of the molecule
(c) Both (a) and (b) (d) None of the above

9. Thermoelectric thermometer is based on [CPMT 1993, 95; AFMC 1998]
(a) Photoelectric effect (b) Seeback effect
(c) Compton effect (d) Joule effect

10. Maximum density of H_2O is at the temperature [CPMT 1996; Pb. PMT 1996]
(a) $32°F$ (b) $39.2°F$
(c) $42°F$ (d) $4°F$

11. The study of physical phenomenon at low temperatures (below liquid nitrogen temperature) is called [CPMT 1992]
(a) Refrigeration (b) Radiation
(c) Cryogenics (d) Pyrometry

12. 'Stem Correction' in platinum resistance thermometers are eliminated by the use of [AIIMS 1998]
(a) Cells (b) Electrodes
(c) Compensating leads (d) None of the above

13. The absolute zero is the temperature at which [AIIMS 1998]
(a) Water freezes
(b) All substances exist in solid state
(c) Molecular motion ceases
(d) None of the above

14. Absolute scale of temperature is reproduced in the laboratory by making use of a [SCRA 1998]
(a) Radiation pyrometer
(b) Platinum resistance thermometer
(c) Constant volume helium gas thermometer
(d) Constant pressure ideal gas thermometer

15. Absolute zero ($0\ K$) is that temperature at which [AFMC 1993]
(a) Matter ceases to exist
(b) Ice melts and water freezes
(c) Volume and pressure of a gas becomes zero
(d) None of these

16. On which of the following scales of temperature, the temperature is never negative [EAMCET 1997]
(a) Celsius (b) Fahrenheit
(c) Reaumur (d) Kelvin

17. The temperature on Celsius scale is $25°C$. What is the corresponding temperature on the Fahrenheit scale [AFMC 2001]
(a) $40°F$ (b) $77°F$
(c) $50°F$ (d) $45°F$

18. One quality of a thermometer is that its heat capacity should be small. If P is a mercury thermometer, Q is a resistance thermometer and R thermocouple type then [CPMT 1997]
(a) P is best, R worst (b) R is best, P worst
(c) R is best, Q worst (d) P is best, Q worst

19. Two thermometers are used to record the temperature of a room. If the bulb of one is wrapped in wet hanky [AFMC 1997]
(a) The temperature recorded by both will be same
(b) The temperature recorded by wet-bulb thermometer will be greater than that recorded by the other
(c) The temperature recorded by dry-bulb thermometer will be greater than that recorded by the other
(d) None of the above

20. The temperature of a body on Kelvin scale is found to be $x\ K$. When it is measured by Fahrenheit thermometer, it is found to be $x°F$, then the value of x is [UPSEAT 2000; Pb. CET 2004]
(a) 40 (b) 313
(c) 574.25 (d) 301.25

21. A centigrade and a Fahrenheit thermometer are dipped in boiling water. The water temperature is lowered until the Fahrenheit thermometer registers 140°. What is the fall in temperature as registered by the Centigrade thermometer [CBSE PMT 1992; AIIMS 1998]
(a) 30° (b) 40°

(c) 60° (d) 80°

22. At what temperature the centigrade (Celsius) and Fahrenheit, readings are the same

[RPMT 1997, 99, 2003; BHU 1997; MNR 1992; DPMT 1998; CPMT 1995; UPSEAT 1999; KCET 2000]

(a) – 40° (b) + 40°

(c) 36.6° (d) – 37°

23. Standardisation of thermometers is obtained with

[CPMT 1996]

(a) Jolly's thermometer

(b) Platinum resistance thermometer

(c) Thermocouple thermometer

(d) Gas thermometer

24. The gas thermometers are more sensitive than liquid thermometers because

[CPMT 1993]

(a) Gases expand more than liquids

(b) Gases are easily obtained

(c) Gases are much lighter

(d) Gases do not easily change their states

25. Mercury thermometers can be used to measure temperatures upto

[CBSE PMT 1992, 96; BHU 1998; UPSEAT 1998]

(a) 100°C (b) 212°C

(c) 360°C (d) 500°C

26. A constant volume gas thermometer shows pressure reading of 50cm and 90cm of mercury at 0°C and 100°C respectively. When the pressure reading is 60 cm of mercury, the temperature is

[MNR 1991; UPSEAT 2000; Pb. CET 2004]

(a) 25°C (b) 40°C

(c) 15°C (d) 12.5°C

27. Mercury boils at 367°C. However, mercury thermometers are made such that they can measure temperature up to 500°C. This is done by **[CPMT 2004]**

(a) Maintaining vacuum above mercury column in the stem of the thermometer

(b) Filling nitrogen gas at high pressure above the mercury column

(c) Filling nitrogen gas at low pressure above the mercury level

(d) Filling oxygen gas at high pressure above the mercury column

28. A device used to measure very high temperature is

[KCET 1998]

(a) Pyrometer (b) Thermometer

(c) Bolometer (d) Calorimeter

29. The absolute zero temperature in Fahrenheit scale is

[DCE 1996]

(a) – 273°F (b) – 32°F

(c) – 460°F (d) – 132°F

30. A constant pressure air thermometer gave a reading of 47.5 units of volume when immersed in ice cold water, and 67 units in a boiling liquids. The boiling point of the liquid will be

[AIIMS 1994]

(a) 135°C (b) 125°C

(c) 112°C (d) 100°C

31. If a thermometer reads freezing point of water as 20°C and boiling point as 150°C, how much thermometer read when the actual temperature is 60°C **[AFMC 2004]**

(a) 98°C (b) 110°C

(c) 40°C (d) 60°C

32. If temperature of an object is 140°F, then its temperature in centigrade is

[RPMT 1999]

(a) 105°C (b) 32°C

(c) 140°C (d) 60°C

33. Of the following thermometers, the one which can be used for measuring a rapidly changing temperature is a

[CPMT 1992]

(a) Thermocouple thermometer

(b) Gas thermometer

(c) Maximum resistance thermometer

(d) Vapour pressure thermometer

34. On centigrade scale the temperature of a body increases by 30 degrees. The increase in temperature on Fahrenheit scale is

[UPSEAT 2005]

(a) 50° (b) 40°

(c) 30° (d) 54°

35. The correct value of $0°C$ on Kelvin scale will be **[RPMT 1999]**

(a) 273.15 K (b) 273.00 K

(c) 273.05 K (d) 273.63 K

Thermal Expansion

1. When a copper ball is heated, the largest percentage increase will occur in its **[EAMCET 1992]**

(a) Diameter (b) Area

(c) Volume (d) Density

2. A vertical column 50 cm long at $50°C$ balances another column of same liquid 60 cm long at $100°C$. The coefficient of absolute expansion of the liquid is **[EAMCET 1990]**

(a) $0.005/°C$ (b) $0.0005/°C$

(c) $0.002/°C$ (d) $0.0002/°C$

3. The apparent coefficient of expansion of a liquid when heated in a copper vessel is C and when heated in a silver vessel is S. If A is the linear coefficient of expansion of copper, then the linear coefficient of expansion of silver is **[EAMCET 1991]**

(a) $\frac{C+S-3A}{3}$ (b) $\frac{C+3A-S}{3}$

(c) $\frac{S+3A-C}{3}$ (d) $\frac{C+S+3A}{3}$

4. A uniform metal rod is used as a bar pendulum. If the room temperature rises by $10°C$, and the coefficient of linear expansion of the metal of the rod is 2×10^{-6} per $°C$, the period of the pendulum will have percentage increase of **[NSEP 1992]**

(a) -2×10^{-3} (b) -1×10^{-3}

(c) 2×10^{-3} (d) 1×10^{-3}

5. A bar of iron is 10 cm at $20°C$. At $19°C$ it will be (α of iron $= 11 \times 10^{-6}/°C$) **[EAMCET 1997]**

(a) 11×10^{-6} cm longer (b) 11×10^{-6} cm shorter

(c) 11×10^{-5} cm shorter (d) 11×10^{-5} cm longer

6. When a rod is heated but prevented from expanding, the stress developed is independent of **[EAMCET 1997]**

(a) Material of the rod (b) Rise in temperature

(c) Length of rod (d) None of above

7. Expansion during heating **[CBSE PMT 1994]**

(a) Occurs only in solids

(b) Increases the weight of a material

(c) Decreases the density of a material

(d) Occurs at the same rate for all liquids and solids

8. On heating a liquid of coefficient of cubical expansion γ in a container having coefficient of linear expansion $\gamma/3$, the level of liquid in the container will **[EAMCET 1993]**

(a) Rise

(b) Fall

(c) Will remain almost stationary

(d) It is difficult to say

9. A pendulum clock keeps correct time at $0°C$. Its mean coefficient of linear expansions is $\alpha/°C$, then the loss in seconds per day by the clock if the temperature rises by $t°C$ is **[AFMC 1993]**

(a) $\frac{\frac{1}{2}\alpha t \times 864000}{1-\frac{\alpha t}{2}}$ (b) $\frac{1}{2}\alpha t \times 86400$

(c) $\frac{\frac{1}{2}\alpha t \times 86400}{\left(1-\frac{\alpha t}{2}\right)^2}$ (d) $\frac{\frac{1}{2}\alpha t \times 86400}{1+\frac{\alpha t}{2}}$

10. When a bimetallic strip is heated, it **[CBSE PMT 1990]**

(a) Does not bend at all

(b) Gets twisted in the form of an helix

(c) Bend in the form of an arc with the more expandable metal outside

(d) Bends in the form of an arc with the more expandable metal inside

11. A solid ball of metal has a concentric spherical cavity within it. If the ball is heated, the volume of the cavity will

[AFMC 1997; Orissa PMT 2004]

(a) Increase (b) Decrease

(c) Remain unaffected (d) None of these

12. A *litre* of alcohol weighs

[AFMC 1994]

(a) Less in winter than in summer

(b) Less in summer than in winter

(c) Some both in summer and winter

(d) None of the above

13. 5 *litre* of benzene weighs

[MNR 1996]

(a) More in summer than in winter

(b) More in winter than in summer

(c) Equal in winter and summer

(d) None of the above

Water has maximum density at **[Pb. PMT 1997]**

(a) $0°C$ (b) $32°F$

(c) $-4°C$ (d) $4°C$

At some temperature T, a bronze pin is a little large to fit into a hole drilled in a steel block. The change in temperature required for an exact fit is minimum when

[SCRA 1998]

(a) Only the block is heated

(b) Both block and pin are heated together

(c) Both block and pin are cooled together

(d) Only the pin is cooled

If the length of a cylinder on heating increases by 2%, the area of its base will increase by

[CPMT 1993; BHU 1997]

(a) 0.5% (b) 2%

(c) 1% (d) 4%

The volume of a gas at $20°C$ is 100 cm^3 at normal pressure. If it is heated to $100°C$, its volume becomes 125 cm^3 at the same pressure, then volume coefficient of the gas at normal pressure is

[Pb. PET 2002; DPMT 2001]

(a) $0.0015/°C$ (b) $0.0045/°C$

(c) $0.0025/°C$ (d) $0.0033/°C$

The coefficient of superficial expansion of a solid is 2×10^{-5} /°C. It's coefficient of linear expansion is

[KCET 1999]

(a) $4 \times 10^{-5}/°C$ (b) $3 \times 10^{-5}/°C$

(c) $2 \times 10^{-5}/°C$ (d) $1 \times 10^{-5}/°C$

Density of substance at $0°C$ is 10 *gm/cc* and at $100°C$, its density is 9.7 *gm/cc. The coefficient of linear expansion of the substance will be*

[BHU 1996; Pb. PMT 1999; DPMT 1998, 2003]

(a) 102 (b) 10–2

(c) 10–3 (d) 10–4

Coefficient of real expansion of mercury is 0.18 (10–3/°C. If the density of mercury at 0°C is 13.6 gm/cc. its density at 473K is [DPMT 1996]

(a) 13.11 gm/cc (b) 26.22 gm/cc

(c) 52.11 gm/cc (d) None of these

The real coefficient of volume expansion of glycerine is 0.000597 per°C and linear coefficient of expansion of glass is 0.000009 per°C. Then the apparent volume coefficient of expansion of glycerine is [AIIMS 2000]

(a) 0.000558 per°C (b) 0.00057 per°C

(c) 0.00027 per°C (d) 0.00066 per°C

A beaker is completely filled with water at 4°C. It will overflow if [EAMCET 1992; BHU 1994; AFMC 2005]

(a) Heated above 4°C

(b) Cooled below 4°C

(c) Both heated and cooled above and below 4°C respectively

(d) None of the above

The volume of a metal sphere increases by 0.24% when its temperature is raised by 40°C. The coefficient of linear expansion of the metal is ..... °C [Kerala PMT 2005]

(a) 2 (10–5 (b) 6 (10–5

(c) 2.1 (10–5 (d) 1.2 (10–5

Ratio among linear expansion coefficient ((), areal expansion coefficient (() and volume expansion coefficient (() is [RPMT 2000]

(a) 1 : 2 : 3 (b) 3 : 2 : 1

(c) 4 : 3 : 2 (d) None of these

If on heating liquid through 80°C, the mass expelled is (1/100)th of mass still remaining, the coefficient of apparent expansion of liquid is [RPMT 2004]

(a) 1.25 (10–4/°C (b) 12.5 (10–4/°C

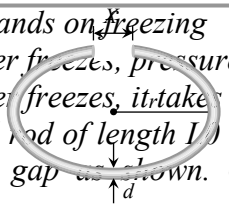
(c) 1.25 (10–5/°C (b) None of these

In cold countries, water pipes sometimes burst, because

(a) Pipe contracts

(b) Water expands on freezing
(c) When water freezes, pressure increases
(d) When water freezes, it takes heat from pipes

A cylindrical metal rod of length L is shaped into a ring with a small gap as shown. On heating the system



(a) x decreases, r and d increase
(b) x and r increase, d decreases
(c) x, r and d all increase
(d) Data insufficient to arrive at a conclusion

The length of a metallic rod is 5m at 0°C and becomes 5.01 m, on heating upto 100°C. The linear expansion of the metal will be [UPSEAT 1999]

(a) 2.33 (10–5 /°C (b) 6.0 (10–5 /°C
(c) 4.0 (10–5 /°C (d) 2.0 (10–5 /°C

A metal rod of silver at 0°C is heated to 100°C. It's length is increased by 0.19 cm. Coefficient of cubical expansion of the silver rod is [UPSEAT 2001]

(a) 5.7 (10–5/°C (b) 0.63 (10–5/°C
(c) 1.9 (10–5/°C (d) 16.1 (10–5/°C

A brass disc fits simply in a hole of a steel plate. The disc from the hole can be loosened if the system [UPSEAT 2001]

(a) First heated then cooled (b) First cooled then heated
(c) Is heated (d) Is cooled

An iron bar of length 10 m is heated from 0°C to 100°C. If the coefficient of linear thermal expansion of iron is 10 (10–6 /°C, the increase in the length of bar is [UPSEAT 2005]

(a) 0.5 cm (b) 1.0 cm
(c) 1.5 cm (d) 2.0 cm

If a cylinder of diameter 1.0 cm at 30°C is to be solid into a hole of diameter 0.9997 cm in a steel plate at the same temperature, then minimum required rise in the temperature of the plate is : (Coefficient of linear expansion of steel □ EMBED Equation.3 □□□) [EAMCET 2001]

(a) 25°C (b) 35°C
(c) 45°C (d) 55°C

Surface of the lake is at 2°C. Find the temperature of the bottom of the lake [Orissa JEE 2002]

(a) 2°C (b) 3°C
(c) 4°C (d) 1°C

Two rods, one of aluminum and the other made of steel, having initial length □ EMBED Equation.3 □□□ and □ EMBED Equation.3 □□□ are connected together to form a single rod of length □ EMBED Equation.3 □□□. The coefficients of linear expansion for aluminum and steel are □ EMBED Equation.3 □□□ and □ EMBED Equation.3 □□□ respectively. If the length of each rod increases by the same amount when their temperature are raised by □ EMBED Equation.3 □□□, then find the ratio □ EMBED Equation.3 □□□ [IIT-JEE (Screening) 2003]

(a) □ EMBED Equation.3 □□□ (b) □ EMBED Equation.3 □□□
(c) □ EMBED Equation.3 □□□ (d) □ EMBED Equation.3 □□□

Calorimetry

When vapour condenses into liquid [CPMT 1990]

(a) It absorbs heat (b) It liberates heat
(c) Its temperature increases (d) Its temperature decreases

At NTP water boils at 100°C. Deep down the mine, water will boil at a temperature [CPMT 1996]

(a) 100°C (b) > 100°C
(c) < 100°C (d) Will not boil at all

If specific heat of a substance is infinite, it means [AIIMS 1997]

(a) Heat is given out
(b) Heat is taken in
(c) No change in temperature takes place whether heat is taken in or given out
(d) All of the above

A gas in an airtight container is heated from 25°C to 90°C. The density of the gas will [BCECE 1997]

(a) Increase slightly (b) Increase considerably
(c) Remain the same (d) Decrease slightly

A quantity of heat required to change the unit mass of a solid substance, from solid state to liquid state, while the temperature remains constant, is known as [AIIMS 1998]

(a) Latent heat (b) Sublimation
(c) Hoar frost (d) Latent heat of

fusion

The latent heat of vaporization of a substance is always [SCRA 1998]

(a) Greater than its latent heat of fusion

(b) Greater than its latent heat of sublimation

(c) Equal to its latent heat of sublimation

(d) Less than its latent heat of fusion

The factor not needed to calculate heat lost or gained when there is no change of state is [AFMC 1997; BHU 1997]

(a) Weight (b) Specific heat

(c) Relative density (d) Temperature change

540 g of ice at 0°C is mixed with 540 g of water at 80°C. The final temperature of the mixture is[AFMC 1994]

(a) 0°C (b) 40°C

(c) 80°C (d) Less than 0°C

Water is used to cool radiators of engines, because [AFMC 2001]

(a) Of its lower density (b) It is easily available

(c) It is cheap (d) It has high specific heat

How much heat energy is gained when 5 kg of water at 20°C is brought to its boiling point (Specific heat of water = 4.2 kJ kg–1c–1)[BHU 2001]

(a) 1680 kJ (b) 1700 kJ

(c) 1720 kJ (d) 1740 kJ

Melting point of ice [CBSE PMT 1993]

(a) Increases with increasing pressure

(b) Decreases with increasing pressure

(c) Is independent of pressure

(d) Is proportional to pressure

Heat required to convert one gram of ice at 0°C into steam at 100°C is (given Lsteam = 536 cal/gm)[Pb. PMT 1990]

(a) 100 calorie (b) 0.01 kilocalorie

(c) 716 calorie (d) 1 kilocalorie

80 gm of water at 30°C are poured on a large block of ice at 0°C. The mass of ice that melts is [CBSE PMT 1989]

(a) 30 gm (b) 80 gm

(c) 1600 gm (d) 150 gm

The saturation vapour pressure of water at 100°C is [EAMCET 1997]

(a) 739 mm of mercury (b) 750 mm of mercury

(c) 760 mm of mercury (d) 712 mm of mercury

Two spheres made of same substance have diameters in the ratio 1 : 2. Their thermal capacities are in the ratio of [JIPMER 1999]

(a) 1 : 2 (b) 1 : 8

(c) 1 : 4 (d) 2 : 1

Work done in converting one gram of ice at –10°C into steam at 100°C is [MP PET/PMT 1988; EAMCET (Med.) 1995; MP PMT 2003]

(a) 3045 J (b) 6056 J

(c) 721 J (d) 616 J

If mass energy equivalence is taken into account, when water is cooled to form ice, the mass of water should [AIEEE 2002]

(a) Increase (b) Remain unchanged

(c) Decrease (d) First increase then decrease

Compared to a burn due to water at 100°C, a burn due to steam at 100°C is [KCET 1999; UPSEAT 1999]

(a) More dangerous (b) Less dangerous

(c) Equally dangerous (d) None of these

50 gm of copper is heated to increase its temperature by 10°C. If the same quantity of heat is given to 10 gm of water, the rise in its temperature is (Specific heat of copper = 420 Joule-kg–1 °C–1) [EAMCET (Med.) 2000]

(a) 5°C (b) 6°C

(c) 7°C (d) 8°C

Two liquids A and B are at 32°C and 24°C. When mixed in equal masses the temperature of the mixture is found to be 28°C. Their specific heats are in the ratio of [DPMT 1996]

(a) 3 : 2 (b) 2 : 3

(c) 1 : 1 (d) 4 : 3

A beaker contains 200 gm of water. The heat capacity of the beaker is equal to that of 20 gm of water. The initial temperature of water in the beaker is 20°C. If 440 gm of hot water at 92°C is poured in it, the final temperature (neglecting radiation loss) will be nearest to [NSEP 1994]

(a) 58°C (b) 68°C

(c) 73°C (d) 78°C

Amount of heat required to raise the temperature of a body through 1K is called its

[KCET 1996; MH CET 2001; AIEEE 2002]

(a) Water equivalent (b) Thermal capacity

(c) Entropy (d) Specific heat

A metallic ball and highly stretched spring are made of the same material and have the same mass. They are heated so that they melt, the latent heat required

[AIIMS 2002]

(a) Are the same for both

(b) Is greater for the ball

(c) Is greater for the spring

(d) For the two may or may not be the same depending upon the metal

A liquid of mass m and specific heat c is heated to a temperature 2T. Another liquid of mass m/2 and specific heat 2c is heated to a temperature T. If these two liquids are mixed, the resulting temperature of the mixture is

[EAMCET 1992]

(a) (2/3)T (b) (8/5)T

(c) (3/5)T (d) (3/2)T

Calorie is defined as the amount of heat required to raise temperature of 1g of water by 1°C and it is defined under which of the following conditions

[IIT-JEE (Screening) 2005]

(a) From 14.5°C to 15.5°C at 760 mm of Hg

(b) From 98.5°C to 99.5°C at 760 mm of Hg

(c) From 13.5°C to 14.5°C at 76 mm of Hg

(d) From 3.5°C to 4.5°C at 76 mm of Hg

100 gm of ice at 0°C is mixed with 100 g of water at 100°C. What will be the final temperature of the mixture

[SCRA 1996; AMU 1999]

(a) 10°C (b) 20°C

(c) 30°C (d) 40°C

At atmospheric pressure, the water boils at 100°C. If pressure is reduced, it will boil at

[MP PMT 1984]

(a) Higher temperature (b) Lower temperature

(c) At the same temperature (d) At critical temperature

A closed bottle containing water at 30°C is carried to the moon in a space-ship. If it is placed on the surface of the moon, what will happen to the water as soon as the lid is opened [RPMT 2002]

(a) Water will boil

(b) Water will freeze

(c) Nothing will happen on it

(d) It will decompose into □ EMBED Equation.3 □□□ and □ EMBED Equation.3 □□□

The thermal capacity of 40 gm of aluminium (specific heat = 0.2 cal/gm/°C) is

[CBSE PMT 1990]

(a) 40 cal/°C (b) 160 cal/°C

(c) 200 cal/°C (d) 8 cal/°C

If temperature scale is changed from °C to °F, the numerical value of specific heat will

[CPMT 1984]

(a) Increases (b) Decreased

(c) Remains unchanged (d) None of the above

By exerting a certain amountof pressure on an ice block, you

[JIPMER 1997]

(a) Lower its melting point

(b) Make it melt at 0°C only

(c) Make it melt at a faster rate

(d) Raise its melting point

When we rub our palms they gets heated but to a maximum temperature because

(a) Heat is absorbed by our palm

(b) Heat is lost in the environment

(c) Produced of heat is stopped

(d) None of the above

A bullet moving with a uniform velocity v, stops suddenly after hitting the target and the whole mass melts be m, specific heat S, initial temperature 25°C, melting point 475°C and the latent heat L. Then v is given by

[NCERT 1972]

(a) □ EMBED Equation.3 □□□

(b) □ EMBED Equation.3 □□□

(c) □ EMBED Equation.3 □□□

(d) □ EMBED Equation.3 □□□

A water fall is 84 metres high. If half of the potential energy of the falling water gets converted to heat, the rise in temperature of water will be

[JIPMER 2002]

(a) 0.098°C (b) 0.98°C

(c) 9.8°C (d) 0.0098°C

A body of mass 5 kg falls from a height of 30 metre. If its all mechanical energy is changed into heat, then heat produced will be [CPMT 1975]

(a) 350 cal (b) 150 cal

(c) 60 cal (d) 6 cal

In supplying 400 calories of heat to a system, the work done will be [MP PMT 1989]

(a) 400 joules (b) 1672 joules

(c) 1672 watts (d) 1672 ergs

0.93 watt-hour of energy is supplied to a block of ice

weighing 10 gm. It is found that
[NCERT 1973; DPMT 1999]
(a) Half of the block melts
(b) The entire block melts and the water attains a temperature of 4°C
(c) The entire block just melts
(d) The block remains unchanged

The weight of a person is 60 kg. If he gets 105 calories heat through food and the efficiency of his body is 28%, then upto how much height he can climb (approximately)
[AFMC 1997]
(a) 100 m (b) 200 m
(c) 400 m (d) 1000 m

The temperature of Bhakhra dam water at the ground level with respect to the temperature at high level should be
(a) Greater (b) Less
(c) Equal (d) 0°C

The height of a waterfall is 84 metre. Assuming that the entire kinetic energy of falling water is converted into heat, the rise in temperature of the water will be
□ EMBED Equation.3 □□□ [MP PET 1994]
(a) 0.196°C (b) 1.960°C
(c) 0.96°C (d) 0.0196°C

Hailstone at 0°C falls from a height of 1 km on an insulating surface converting whole of its kinetic energy into heat. What part of it will melt □ EMBED Equation.3 □□□ [MP PMT 1994]
(a) □ EMBED Equation.3 □□□ (b) □ EMBED Equation.3 □□□
(c) □ EMBED Equation.3 □□□ (d) All of it will melt

The SI unit of mechanical equivalent of heat is
[MP PMT/PET 1998]
(a) Joule (Calorie (b) Joule/Calorie
(c) Calorie (Erg (d) Erg/Calorie

Of two masses of 5 kg each falling from height of 10 m, by which 2kg water is stirred. The rise in temperature of water will be [RPET 1997]
(a) 2.6°C (b) 1.2°C
(c) 0.32°C (d) 0.12°C

A lead ball moving with a velocity V strikes a wall and stops. If 50% of its energy is converted into heat, then what will be the increase in temperature (Specific heat of lead is S)
[RPMT 1996]
(a) □ EMBED Equation.3 □□□ (b) □ EMBED Equation.3 □□□
(c) □ EMBED Equation.3 □□□ (d) □ EMBED Equation.3 □□□

The mechanical equivalent of heat J is[MP PET 2000]
(a) A constant (b) A physical quantity
(c) A conversion factor (d) None of the above

Water falls from a height of 210m. Assuming whole of energy due to fall is converted into heat the rise in temperature of water would be (J = 4.3 Joule/cal)
[Pb. PMT 2002]
(a) 42°C (b) 49°C
(c) 0.49°C (d) 4.9°C

A block of mass 100 gm slides on a rough horizontal surface. If the speed of the block decreases from 10 m/s to 5 m/s, the thermal energy developed in the process is
[UPSEAT 2002]
(a) 3.75 J (b) 37.5 J
(c) 0.375 J (d) 0.75 J

4200 J of work is required for
[MP PMT 1986]
(a) Increasing the temperature of 10 gm of water through 10°C
(b) Increasing the temperature of 100 gm of water through 10°C
(c) Increasing the temperature of 1 kg of water through 10°C
(d) Increasing the temperature of 10 kg of water through 10°C

At 100°C, the substance that causes the most severe burn, is
[KCET 1999; UPSEAT 1999]
(a) Oil (b) Steam
(c) Water (d) Hot air

In a water-fall the water falls from a height of 100 m. If the entire K.E. of water is converted into heat, the rise in temperature of water will be
[MP PMT 2001]
(a) 0.23°C (b) 0.46°C
(c) 2.3°C (d) 0.023°C

A lead bullet of 10 g travelling at 300 m/s strikes against a block of wood and comes to rest. Assuming 50% of heat is absorbed by the bullet, the increase in its temperature is
(Specific heat of lead = 150J/kg, K) [EAMCET 2001]
(a) 100°C (b) 125°C
(c) 150°C (d) 200°C

The temperature at which the vapour pressure of a

liquid becomes equals to the external (atmospheric) pressure is its
[Kerala (Engg.) 2001]
(a) Melting point (b) Sublimation point
(c) Critical temperature (d) Boiling point
When the pressure on water is increased the boiling temperature of water as compared to 100°C will be [RPET 1999]
(a) Lower
(b) The same
(c) Higher
(d) On the critical temperature
Calorimeters are made of which of the following [AFMC 2000]
(a) Glass (b) Metal
(c) Wood (d) Either (a) or (c)
Triple point of water is [CPMT 2002]
(a) 273.16°F (b) 273.16 K
(c) 273.16°C (d) 273.16 R
A liquid boils when its vapour pressure equals [MP PET 2002]
(a) The atmospheric pressure
(b) Pressure of 76.0 cm column of mercury
(c) The critical pressure
(d) The dew point of the surroundings
The amount of work, which can be obtained by supplying 200 cal of heat, is [Pb. PET 2001, 03; BHU 2004]
(a) 840 dyne (b) 840 W
(c) 840 erg (d) 840 J
How many grams of a liquid of specific heat 0.2 at a temperature 40°C must be mixed with 100 gm of a liquid of specific heat of 0.5 at a temperature 20°C, so that the final temperature of the mixture becomes 32°C [Pb. PET 1999]
(a) 175 gm (b) 300 g
(c) 295 gm (d) 375 g
1 g of a steam at 100°C melt how much ice at 0°C? (Latent heat of ice = 80 cal/gm and latent heat of steam = 540 cal/gm) [Pb. PET 2000]
(a) 1 gm (b) 2 gm
(c) 4 gm (d) 8 gm
5 g of ice at 0°C is dropped in a beaker containing 20 g of water at 40°C. The final temperature will be [Pb. PET 2003]
(a) 32°C (b) 16°C
(c) 8°C (d) 24°C
One kilogram of ice at 0°C is mixed with one kilogram of water at 80°C. The final temperature of the mixture is
(Take : specific heat of water□ EMBED Equation.3 □□□, latent heat of ice □ EMBED Equation.3 □□□ [KCET 2002]
(a) 40°C (b) 60°C
(c) 0°C (d) 50°C
During constant temperature, we feel colder on a day when the relative humidity will be [Pb. PMT 1996]
(a) 25% (b) 12.5%
(c) 50% (d) 75%
Which of the following is the unit of specific heat [MH CET 2004]
(a) □ EMBED Equation.3 □□□ (b) □ EMBED Equation.3 □□□
(c) □ EMBED Equation.3 □□□ (d) □ EMBED Equation.3 □□□
50 gm of ice at 0°C is mixed with 50 gm of water at 80°C, final temperature of mixture will be [DCE 2002]
(a) 0°C (b) 40°C
(c) 40°C (d) 4°C
The freezing point of the liquid decreases when pressure is increased, if the liquid [DCE 1995]
(a) Expands while freezing
(b) Contracts while freezing
(c) Does not change in volume while freezing
(d) None of these
The relative humidity on a day, when partial pressure of water vapour is □ EMBED Equation.3 □□□ at 12°C is (take vapour pressure of water at this temperature as □ EMBED Equation.3 □□□) [AIIMS 1998]
(a) 70% (b) 40%
(c) 75% (d) 25%
A hammer of mass 1kg having speed of 50 m/s, hit a iron nail of mass 200 gm. If specific heat of iron is 0.105 cal/gm°C and half the energy is converted into heat, the raise in temperature of nail is [RPMT 1995]
(a) 7.1°C (b) 9.2°C
(c) 10.5°C (d) 12.1°C
Latent heat of 1gm of steam is 536 cal/gm, then its value in joule/kg is [RPMT 1999]
(a) □ EMBED Equation.3 □□□ (b) □ EMBED Equation.3 □□□
(c) 2.25 (d) None
Which of the following has maximum specific heat

[RPMT 1999]

(a) Water (b) Alcohol

(c) Glycerine (d) Oil

50 gm ice at 0°C in insulator vessel, 50g water of 100°C is mixed in it, then final temperature of the mixture is (neglect the heat loss)

[RPMT 2001]

(a) 10°C (b) □ EMBED Equation.3 □□□

(c) 20°C (d) Above 20°C

A stationary object at 4°C and weighing 3.5 kg falls from a height of 2000 m on a snow mountain at 0°C. If the temperature of the object just before hitting the snow is 0°C and the object comes to rest immediately □ EMBED Equation.3 □□□ and (latent heat of ice□ EMBED Equation.3 □□□), then the object will melt [BHU 2001]

(a) 2 kg of ice (b) 200 gm of ice

(c) 20 gm ice (d) 2 gm of ice

300 gm of water at 25°C is added to 100 gm of ice at 0°C. The final temperature of the mixture is [MP PET 2004]

(a) □ EMBED Equation.3 □□□ (b) □ EMBED Equation.3 □□□

(c) – 5°C (d) 0°C

Calculate the amount of heat (in calories) required to convert 5 gm of ice at 0°C to steam at 100°C [DPMT 2005]

(a) 3100 (b) 3200

(c) 3600 (d) 4200

2gm of steam condenses when passed through 40gm of water initially at 25°C. The condensation of steam raises the temperature of water to 54.3°C. What is the latent heat of steam [J & K CET 2005]

(a) 540 cal/g (b) 536 cal/g

(c) 270 cal/g (d) 480 cal/g

10 gm of ice at 0°C is mixed with 100 gm of water at 50°C. What is the resultant temperature of mixture [AFMC 2005]

(a) 31.2°C (b) 32.8°C

(c) 36.7°C (d) 38.2°C

Three liquids with masses □ EMBED Equation.3 □□□ are thoroughly mixed. If their specific heats are □ EMBED Equation.3 □□□ and their temperatures □ EMBED Equation.3 □□□ respectively, then the temperature of the mixture is

(a) □ EMBED Equation.3 □□□

(b) □ EMBED Equation.3 □□□

(c) □ EMBED Equation.3 □□□

(d) □ EMBED Equation.3 □□□

The point on the pressure-temperature phase diagram where all the phases co-exist is called[MH CET 2005]

(a) Sublimation (b) Fusion point

(c) Triple point (d) Vaporisation point

Boiling water is changing into steam. At this stage the specific heat of water is [UPSEAT 1998]

(a) < 1 (b) (

(c) 1 (d) 0

A vessel contains 110 g of water. The heat capacity of the vessel is equal to 10 g of water. The initial temperature of water in vessel is 10°C. If 220 g of hot water at 70°C is poured in the vessel, the final temperature neglecting radiation loss, will be [UPSEAT 2000]

(a) 70°C (b) 80°C

(c) 60°C (d) 50°C

The thermal capacity of a body is 80 cal, then its water equivalent is [UPSEAT 2001]

(a) 80 cal / gm (b) 8 gm

(c) 80 gm (d) 80 kg

A liquid of mass M and specific heat S is at a temperature 2t. If another liquid of thermal capacity 1.5 times, at a temperature of □ EMBED Equation.3 □□□ is added to it, the resultant temperature will be [EAMCET (Engg.) 1999]

(a) □ EMBED Equation.3 □□□ (b) t

(c) □ EMBED Equation.3 □□□ (d) □ EMBED Equation.3 □□□

Dry ice is [CPMT 2000]

(a) Ice cube (b) Sodium chloride

(c) Liquid nitrogen (d) Solid carbon dioxide

A glass flask is filled up to a mark with 50 cc of mercury at 18ºC. If the flask and contents are heated to 38ºC, how much mercury will be above the mark ? (□ for glass is 9 × 10–6/ºC and coefficient of real expansion of mercury is 180 × 10–6/ºC) [EAMCET 1997]

(a) 0.85 cc (b) 0.46 cc

(c) 0.153 cc (d) 0.05 cc

The coefficient of apparent expansion of mercury in

a glass vessel is 153 × 10–6/ºC and in a steel vessel is 144 × 10–6/ºC. If (for steel is 12 × 10–6/ºC, then that of glass is
[EAMCET 1997]
(a) 9 × 10–6/ºC (b) 6 × 10–6/ºC
(c) 36 × 10–6/ºC (d) 27 × 10–6/ºC
Solids expand on heating because
[CPMT 1990]
(a) Kinetic energy of the atoms increases
(b) Potential energy of the atoms increases
(c) Total energy of the atoms increases
(d) The potential energy curve is asymmetric about the equilibrium distance between neighbouring atoms
An iron tyre is to be fitted on to a wooden wheel 1m in diameter. The diameter of tyre is 6 mm smaller than that of wheel. The tyre should be heated so that its temperature increases by a minimum of (the coefficient of cubical expansion of iron is 3.6 × 10–5/ºC) [CPMT 1989]
(a) 167ºC (b) 334ºC
(c) 500ºC (d) 1000ºC
A glass flask of volume one litre at 0°C is filled, level full of mercury at this temperature. The flask and mercury are now heated to 100°C. How much mercury will spill out, if coefficient of volume expansion of mercury is □EMBED Equation.3□□□ and linear expansion of glass is□EMBED Equation.3□□□ respectively
[MNR 1994]
(a) 21.2 cc (b) 15.2 cc
(c) 1.52 cc (d) 2.12 cc
A steel scale measures the length of a copper wire as □ EMBED Equation.3 □□□ when both are at □ EMBED Equation.3 □□□ (the calibration temperature for scale). What would be the scale read for the length of the wire when both are at □ EMBED Equation.3 □□□? (Given (steel □ EMBED Equation.3 □□□per°C and (copper □ EMBED Equation.3 □□□)
[CPMT 2004]
(a) □ EMBED Equation.3 □□□ (b) □ EMBED Equation.3 □□□
(c) □ EMBED Equation.3 □□□ (d) □ EMBED Equation.3 □□□
A bimetallic strip is formed out of two identical strips, one of copper and other of brass. The coefficients of linear expansion of the two metals are □EMBED Equation.3□□□ and □EMBED Equation.3□□□. On heating, the temperature of the strip goes up by (T and the strip bends to form an arc of radius of curvature R. Then R is
[IIT-JEE (Screening) 1999]
(a) Proportional to (T
(b) Inversely proportional to (T
(c) Proportional to □EMBED Equation.3□□□
(d) Inversely proportional to □EMBED Equation.3□□□
Two metal strips that constitute a thermostat must necessarily differ in their [IIT-JEE 1992]
(a) Mass
(b) Length
(c) Resistivity
(d) Coefficient of linear expansion
A metal ball immersed in alcohol weighs □ EMBED Equation.3 □□□ at 0°C and □ EMBED Equation.3 □□□ at 59°C. The coefficient of cubical expansion of the metal is less than that of alcohol. Assuming that the density of metal is large compared to that of alcohol, it can be shown that
[CPMT 1998]
(a) □ EMBED Equation.3 □□□ (b) □ EMBED Equation.3 □□□
(c) □ EMBED Equation.3 □□□ (d) □ EMBED Equation.3 □□□
The coefficient of volumetric expansion of mercury is 18 × 10–5/ºC. A thermometer bulb has a volume 10–6 m3 and cross section of stem is 0.004 cm2. Assuming that bulb is filled with mercury at 0ºC then the length of the mercury column at 100ºC is [Pb. PMT 1998, DPMT 1997, 2001]
(a) 18.8 mm (b) 9.2 mm
(c) 7.4 cm (d) 4.5 cm
A piece of metal weight 46 gm in air, when it is immersed in the liquid of specific gravity 1.24 at 27ºC it weighs 30 gm. When the temperature of liquid is raised to 42ºC the metal piece weight 30.5 gm, specific gravity of the liquid at 42ºC is 1.20, then the linear expansion of the metal will be
[BHU 1995]
(a) 3.316 × 10–5/ºC (b) 2.316 × 10–5/ºC
(c) 4.316 × 10–5/ºC (d) None of these
It is known that wax contracts on solidification. If molten wax is taken in a large vessel and it is allowed to cool slowly, then
[CBSE PMT 1994]
(a) It will start solidifying from the top

downward

(b) It will start solidifying from the bottom upward

(c) It will start solidifying from the middle, upward and downward at equal rates

(d) The whole mass will solidify simultaneously

A substance of mass m kg requires a power input of P watts to remain in the molten state at its melting point. When the power is turned off, the sample completely solidifies in time t sec. What is the latent heat of fusion of the substance

[IIT JEE 1992]

(a) □ *EMBED Equation.3* □□□ *(b)* □ *EMBED Equation.3* □□□

(c) □ *EMBED Equation.3* □□□ *(d)* □ *EMBED Equation.3* □□□

1. *Steam at 100ºC is passed into 1.1 kg of water contained in a calorimeter of water equivalent 0.02 kg at 15ºC till the temperature of the calorimeter and its contents rises to 80ºC. The mass of the steam condensed in kg is*

[IIT 1995]

(a) 0.130 *(b) 0.065*

(c) 0.260 *(d) 0.135*

2. *2 kg* of ice at – 20°*C* is mixed with 5 *kg* of water at 20°*C* in an insulating vessel having a negligible heat capacity. Calculate the final mass of water remaining in the container. It is given that the specific heats of water and ice are 1 *kcal*/*kg per* °*C* and 0.5 *kcal*/*kg*/°*C* while the latent heat of fusion of ice is 80 *kcal*/*kg* **[IIT-JEE (Screening) 2003]**

(a) 7 *kg* (b) 6 *kg*

(c) 4 *kg* (d) 2 *kg*

3. Water of volume 2 *litre* in a container is heated with a coil of $1\,kW$ at $27°C$. The lid of the container is open and energy dissipates at rate of $160\,J/s$. In how much time temperature will rise from $27°C$ to $77°C$ [Given specific heat of water is $4.2\,kJ/kg$] **[IIT-JEE (Screening) 2004]**

(a) 8 *min* 20 *s* (b) 6 *min* 2 *s*

(c) 7 *min* (d) 14 *min*

4. A lead bullet at 27°*C* just melts when stopped by an obstacle. Assuming that 25% of heat is absorbed by the obstacle, then the velocity of the bullet at the time of striking (M.P. of lead = 327°*C*, specific heat of lead = 0.03 *cal*/*gm*°*C*, latent heat of fusion of lead = 6 *cal*/*gm* and *J* = 4.2 *joule*/*cal*) **[IIT 1981]**

(a) 410 *m*/*sec* (b) 1230 *m*/*sec*

(c) 307.5 *m*/*sec* (d) None of the above

5. If two balls of same metal weighing 5 *gm* and 10 *gm* strike with a target with the same velocity. The heat energy so developed is used for raising their temperature alone, then the temperature will be higher

(a) For bigger ball

(b) For smaller ball

(c) Equal for both the balls

(d) None is correct from the above three

6. The temperature of equal masses of three different liquids *A*, *B* and *C* are 12º*C*, 19º*C* and 28º*C* respectively. The temperature when *A* and *B* are mixed is 16º*C* and when *B* and *C* are mixed is 23º*C*. The temperature when *A* and *C* are mixed is **[Kerala PET 2005]**

(a) 18.2º*C* (b) 22º*C*

(c) 20.2º*C* (d) 25.2º*C*

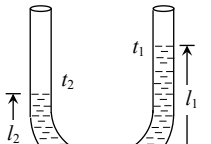
7. In an industrial process 10 *kg* of water per hour is to be heated from 20°*C* to 80°*C*. To do this steam at 150°*C* is passed from a boiler into a copper coil immersed in water. The steam condenses in the coil and is returned to the boiler as water at 90°*C*. how many *kg* of steam is required per hour.

(Specific heat of steam = 1 *calorie* per *gm*°*C*, Latent heat of vaporisation = 540 *cal*/*gm*)

(a) 1 *gm* (b) 1 *kg*

(c) 10 *gm* (d) 10 *kg*

8. In a vertical U-tube containing a liquid, the two arms are maintained at different temperatures



t_1 and t_2. The liquid columns in the two arms have heights l_1 and l_2 respectively. The coefficient of volume expansion of the liquid is equal to

(a) $\frac{l_1 - l_2}{l_2 t_1 - l_1 t_2}$ (b) $\frac{l_1 - l_2}{l_1 t_1 - l_2 t_2}$

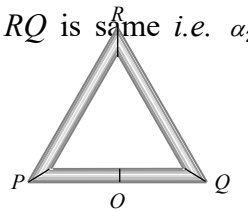
(c) $\frac{l_1 + l_2}{l_2 t_1 + l_1 t_2}$ (d) $\frac{l_1 + l_2}{l_1 t_1 + l_2 t_2}$

9. The coefficient of linear expansion of crystal in one direction is α_1 and that in every direction perpendicular to it is α_2. The coefficient of cubical expansion is

(a) $\alpha_1 + \alpha_2$ (b) $2\alpha_1 + \alpha_2$

(c) $\alpha_1 + 2\alpha_2$ (d) None of these

10. Three rods of equal length l are joined to form an equilateral triangle PQR. O is the mid point of PQ. Distance OR remains same for small change in temperature. Coefficient of linear expansion for PR and RQ is same *i.e.* α_2 but that for PQ is α_1. Then



(a) $\alpha_2 = 3\alpha_1$

(b) $\alpha_2 = 4\alpha_1$

(c) $\alpha_1 = 3\alpha_2$

(d) $\alpha_1 = 4\alpha_2$

11. A one *litre* glass flask contains some mercury. It is found that at different temperatures the volume of air inside the flak remains the same. What is the volume of mercury in this flask if coefficient of linear expansion of glass is $9 \times 10^{-6}/°C$ while of volume expansion of mercury is $1.8 \times 10^{-4}/°C$

(a) 50 *cc* (b) 100 *cc*

(c) 150 *cc* (d) 200 *cc*

12. 10 *gm* of ice at $-20°C$ is dropped into a calorimeter containing 10 *gm* of water at $10°C$; the specific heat of water is twice that of ice. When equilibrium is reached, the calorimeter will contain

(a) 20 *gm* of water

(b) 20 *gm* of ice

(c) 10 *gm* ice and 10 *gm* water

(d) 5 *gm* ice and 15 *gm* water

13. A rod of length 20 *cm* is made of metal. It expands by 0.075*cm* when its temperature is raised from $0°C$ to $100°C$. Another rod of a different metal B having the same length expands by 0.045 *cm* for the same change in temperature. A third rod of the same length is composed of two parts, one of metal A and the other of metal B. This rod expands by 0.060 *cm* for the same change in temperature. The portion made of metal A has the length

[CPMT 1991]

(a) 20 *cm* (b) 10 *cm*

(c) 15 *cm* (d) 18 *cm*

14. Steam is passed into 22 *gm* of water at $20°C$. The mass of water that will be present when the water acquires a temperature of $90°C$ (Latent heat of steam is 540 *cal*/*gm*) is

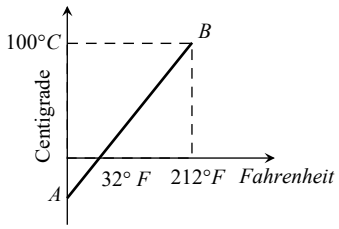
[SCRA 1994]

(a) 24.8 *gm* (b) 24 *gm*

(c) 36.6 *gm* (d) 30 *gm*

Graphical Questions

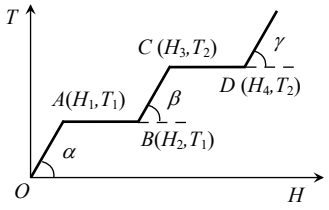
1. The graph AB shown in figure is a plot of temperature of a body in degree celsius and degree Fahrenheit. Then



(a) Slope of line AB is 9/5 (b)Slope of line AB is 5/9

(c) Slope of line AB is 1/9 (d)Slope of line AB is 3/9

2. The graph shows the variation of temperature (T) of one *kilogram* of a material with the heat (H) supplied to it. At O, the substance is in the solid state. From the graph, we can conclude that



(a) T_2 is the melting point of the solid

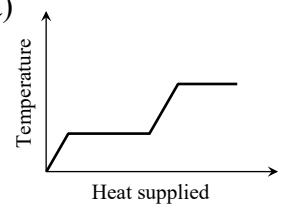
(b) BC represents the change of state from solid to liquid

(c) $(H_2 - H_1)$ represents the latent heat of fusion of the substance

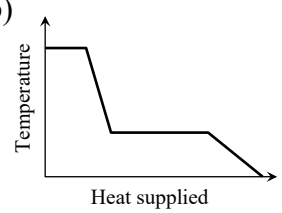
(d) $(H_3 - H_1)$ represents the latent heat of vaporization of the liquid

3. A block of ice at $-10°C$ is slowly heated and converted to steam at $100°C$. Which of the following curves represents the phenomenon qualitatively **[IIT-JEE (Screening) 2000]**

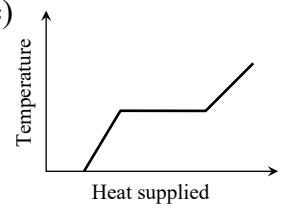
(a)



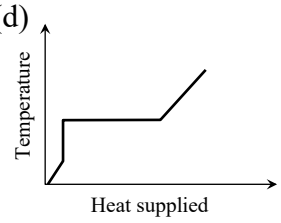
(b)



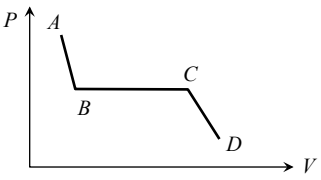
(c)



(d)



4. The portion AB of the indicator diagram representing the state of matter denotes



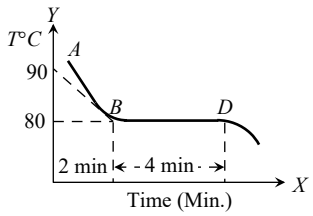
(a) The liquid state of matter

(b) Gaseous state of matter

(c) Change from liquid to gaseous state

(d) Change from gaseous state to liquid state

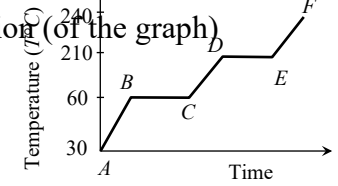
5. The figure given below shows the cooling curve of pure wax material after heating. It cools from A to B and solidifies along BD. If L and C are respective values of latent heat and the specific heat of the liquid wax, the ratio L/C is



(a) 40 (b) 80

(c) 100 (d) 20

6. A solid substance is at $30°C$. To this substance heat energy is supplied at a constant rate. Then temperature versus time graph is as shown in the figure. The substance is in liquid state for the portion (of the graph) **[RPET 1990, 94]**

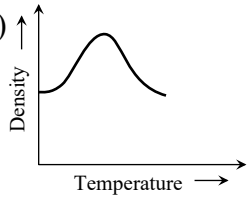


(a) BC (b) CD

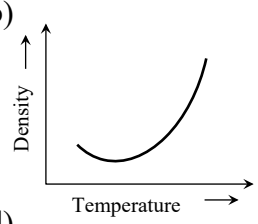
(c) ED (d) EF

7. The variation of density of water with temperature is represented by the

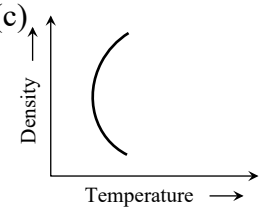
(a)



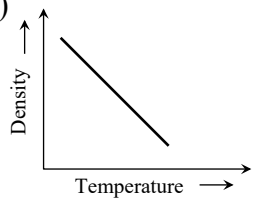
(b)



(c)



(d)



8. If a graph is plotted taking the temperature in Fahrenheit along *Y*-axis and the corresponding temperature in Celsius along the *X*-axis, it will be a straight line **[AIIMS 1997]**

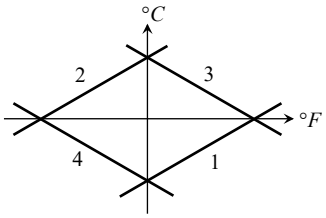
(a) Having a +*ve* intercept on *Y*-axis

(b) Having a +*ve* intercept on *X*-axis

(c) Passing through the origin

(d) Having *a* – *ve* intercepts on both the axis

9. Which of the curves in figure represents the relation between Celsius and Fahrenheit temperatures



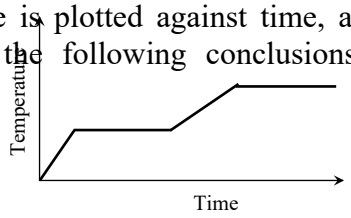
(a) 1

(b) 2

(c) 3

(d) 4

10. Heat is supplied to a certain homogenous sample of matter, at a uniform rate. Its temperature is plotted against time, as shown. Which of the following conclusions can be drawn



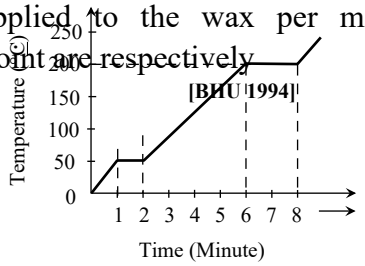
(a) Its specific heat capacity is greater in the solid state than in the liquid state

(b) Its specific heat capacity is greater in the liquid state than in the solid state

(c) Its latent heat of vaporization is greater than its latent heat of fusion

(d) Its latent heat of vaporization is smaller than its latent of fusion

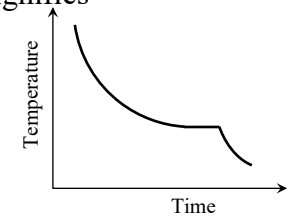
11. A student takes 50*gm* wax (specific heat = 0.6 *kcal*/*kg*°*C*) and heats it till it boils. The graph between temperature and time is as follows. Heat supplied to the wax per minute and boiling point are respectively **[BHU 1994]**



(a) 500 *cal*, 50°*C* (b) 1000 *cal*, 100°*C*

(c) 1500 *cal*, 200°*C* (d) 200°*C*

12. The graph signifies **[JIPMER 1999]**



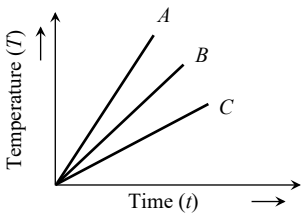
(a) Adiabatic expansion of a gas

(b) Isothermal expansion of a gas

(c) Change of state from liquid to solid

(d) Cooling of a heated solid

13. Which of the substances *A*, *B* or *C* has the highest specific heat ? The temperature *vs* time graph is shown



(a) *A* (b) *B*

(c) *C* (d) All have equal specific heat

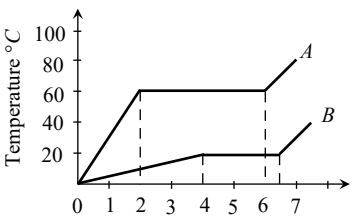
14. Two substances *A* and *B* of equal mass *m* are heated at uniform rate of 6 *cal* s^{-1} under similar conditions. A graph between temperature and time is shown in figure. Ratio of heat absorbed H_A / H_B by them for complete fusion is

(a) $\frac{9}{4}$

(b) $\frac{4}{9}$

(c) $\frac{8}{5}$

(d) $\frac{5}{8}$



A R Assertion & Reason

For AIIMS Aspirants

Read the assertion and reason carefully to mark the correct option out of the options given below :

(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(c) If assertion is true but reason is false.
(d) If the assertion and reason both are false.
(e) If assertion is false but reason is true.

1. Assertion : The melting point of ice decreases with increase of pressure.
Reason : Ice contracts on melting. **[AIIMS 2004]**

2. Assertion : Fahrenheit is the smallest unit measuring temperature.
Reason : Fahrenheit was the first temperature scale used for measuring temperature.
[AIIMS 1999]

3. Assertion : Melting of solid causes no change in internal energy.
Reason : Latent heat is the heat required to melt a unit mass of solid. **[AIIMS 1998]**

4. Assertion : Specific heat capacity is the cause of formation of land and sea breeze.
Reason : The specific heat of water is more than land.
[AIIMS 1995]

5. Assertion : A brass disc is just fitted in a hole in a steel plate. The system must be cooled to loosen the disc from the hole.
Reason : The coefficient of linear expansion for brass is greater than the coefficient of linear expansion for steel.

6. Assertion : The coefficient of volume expansion has dimension K^{-1}.
Reason : The coefficient of volume expansion is defined as the change in volume per unit volume per unit change in temperature.

7. Assertion : The temperature at which Centigrade and Fahrenheit thermometers read the same is $-40°$.
Reason : There is no relation between Fahrenheit and Centigrade temperature.

8. Assertion : When a solid iron ball is heated, percentage increase is its volume is largest.
Reason : Coefficient of superficial expansion is twice that of linear expansion where as coefficient of volume expansion is three time of linear expansion.

9. Assertion : A beaker is completely filled with water at $4°C$. It will overflow, both when heated or cooled.
Reason : There is expansion of water below and above $4°C$.

10. Assertion : Latent heat of fusion of ice is $336000\ J\ kg^{-1}$.
Reason : Latent heat refers to change of state without any change in temperature

11. Assertion : Two bodies at different temperatures, if brought in thermal contact do not necessary settle to the mean temperature.
Reason : The two bodies may have different thermal capacities.

12. Assertion : Specific heat of a body is always greater than its thermal capacity.
Reason : Thermal capacity is the required for raising temperature of unit mass of the body through unit degree.

13. Assertion : Water kept in an open vessel will quickly evaporate on the surface of the moon.
Reason : The temperature at the surface of

the moon is much higher than boiling point of the water.

14. Assertion : The molecules at $0^{o}C$ ice and $0^{o}C$ water will have same potential energy.

Reason : Potential energy depends only on temperature of the system.

Answers

Thermometry

1	d	2	b	3	a	4	c	5	b
6	d	7	c	8	a	9	b	10	b
11	c	12	c	13	c	14	c	15	c
16	d	17	b	18	c	19	c	20	c
21	c	22	a	23	d	24	a	25	c
26	a	27	b	28	a	29	c	30	c
31	a	32	d	33	a	34	d	35	a

Thermal Expansion

1	c	2	a	3	b	4	d	5	c
6	c	7	c	8	c	9	b	10	c
11	a	12	b	13	b	14	d	15	a
16	d	17	d	18	d	19	d	20	a
21	b	22	c	23	a	24	a	25	a
26	b	27	c	28	d	29	a	30	d
31	b	32	a	33	a	34	c		

Calorimetry

1	b	2	b	3	c	4	c	5	d
6	a	7	c	8	a	9	d	10	a
11	b	12	c	13	a	14	c	15	b
16	a	17	b	18	a	19	a	20	c
21	b	22	b	23	a	24	d	25	a
26	a	27	b	28	a	29	d	30	b
31	a	32	b	33	b	34	a	35	a
36	b	37	c	38	b	39	a	40	a
41	a	42	b	43	d	44	b	45	c
46	c	47	a	48	b	49	b	50	a
51	c	52	d	53	c	54	b	55	b
56	a	57	d	58	d	59	d	60	b
61	c	62	a	63	a	64	a	65	a
66	c	67	a	68	a	69	a	70	a
71	b	72	d	73	c	74	a	75	d
76	b	77	c	78	b	79	d	80	c
81	b	82	d						

Critical Thinking Questions

1	c	2	a	3	d	4	c	5	b
6	a	7	bd	8	d	9	c	10	d
11	b	12	b	13	b	14	a	15	b
16	a	17	a	18	c	19	c	20	b
21	a	22	c	23	d	24	c	25	c
26	b	27	a						

Graphical Questions

1	b	2	c	3	a	4	a	5	d
6	b	7	a	8	a	9	a	10	bc
11	c	12	c	13	c	14	c		

Assertion and Reason

1	a	2	c	3	e	4	a	5	a
6	a	7	c	8	a	9	a	10	b
11	a	12	d	13	a	14	d		

AS Answers and Solutions

Thermometry

1. (d) $T = 273.15 + t^{o}C \Rightarrow 0 = 273.15 + t^{o}C \Rightarrow$ $t = -273.15^{\circ}C$

2. (b) $\frac{C}{5} = \frac{F-32}{9} \Rightarrow \frac{-183}{5} = \frac{F-32}{9} \Rightarrow F = -297^{\circ}F$

3. (a) $\frac{F-32}{9} = \frac{K-273}{5} \Rightarrow \frac{F-32}{9} = \frac{95-273}{5} \Rightarrow$ $F = -288^{\circ}F$

4. (c) Temperature change in Celsius scale = Temperature change in Kelvin scale = 27 K

5. (b) Change in resistance $3.70 - 2.71 = 0.99\,\Omega$ corresponds to interval of temperature $90^{\circ}C$.

So change in resistance $3.26 - 2.71 = 0.55\,\Omega$

Corresponds to change in temperature

$= \frac{90}{0.99} \times 0.55 = 50°C$

6. (d) $-200°C$ to $600°C$ can be measured by platinum resistance thermometer.

7. (c) Pyrometer can measure temperature from $800°C$ to $6000°C$. Hence temperature of sun is measured with pyrometer.

8. (a) $\overline{v^2} \propto T$

9. (b) Thermoelectric thermometer is based on Seeback Effect.

10. (b) Maximum density of water is at $4°C$

Also $\frac{C}{5} = \frac{F-32}{9} \Rightarrow \frac{4}{5} = \frac{F-32}{9} \Rightarrow F = 39.2°F$

11. (c) Production and measurement of temperature close to $0\,K$ is done in cryogenics

12. (c)

13. (c) At absolute zero (*i.e.* $0\,K$) v_{rms} becomes zero.

14. (c)

15. (c) We know that $P = P_0(1+\gamma t)$ and $V = V_0(1+\gamma t)$

and $\gamma = (1/273)/°C$ for $t = -273°C$, we have $P = 0$ and $V = 0$

Hence, at absolute zero, the volume and pressure of the gas become zero.

16. (d) Zero kelvin $= -273°C$ (absolute temperature). As no matter can attain this temperature, hence temperature can never be negative on Kelvin scale.

17. (b) $\frac{C}{5} = \frac{F-32}{9} \Rightarrow \frac{25}{5} = \frac{F-32}{9} \Rightarrow F = 77°F.$

18. (c) Thermoelectric thermometer is used for finding rapidly varying temperature.

19. (c) Due to evaporation cooling is caused which lowers the temperature of bulb wrapped in wet hanky.

20. (c) $\frac{F-32}{9} = \frac{K-273}{5} \Rightarrow \frac{x-32}{9} = \frac{x-273}{5} \Rightarrow$

$x = 574.25$

21. (c) $\frac{C}{5} = \frac{F-32}{9} \Rightarrow \frac{C}{5} = \frac{(140-32)}{9} \Rightarrow C = 60°$

22. (a) $\frac{C}{5} = \frac{F-32}{9} \Rightarrow \frac{t}{5} = \frac{t-32}{9} \Rightarrow t = -40°$

23. (d) Standardisation of thermometers is done with gas thermometer.

24. (a) For gases γ is more.

25. (c) The boiling point of mercury is $400°C$. Therefore, the mercury thermometer can be used to measure the temperature upto $360°C$.

26. (a) $t = \frac{(P_t - P_0)}{(P_{100} - P_0)} \times 100°C = \frac{(60-50)}{(90-50)} \times 100 = 25°C$

27. (b) By filling nitrogen gas at high pressure, the boiling point of mercury is increased which extend the range upto $500°C$.

28. (a) Pyrometer is used to measure very high temperature.

29. (c) $\frac{F-32}{9} = \frac{K-273}{5} \Rightarrow \frac{F-32}{9} = \frac{0-273}{5}$

$\Rightarrow F = -459.4°F \approx -460°F$