# PHYSICS

# BOOKS - DISHA PHYSICS (HINGLISH)

# THERMAL EXPANSION AND CALORIMETRY

Physics

**1.** A galss flask is filled up to a mark with 50 cc of mercury at $18^{\circ} C$. If the flask and contents are heated to $38^{\circ}C$, how mech mercury will be above the mark ($\alpha$ for glass is $9 \times 10^{-6} / ^{\circ}C$ and coeffiecient of real expansion of mercury is $180 \times 10^{-6} / ^{\circ}C$)?

A. 0.85c c`

B. $0.46cc$

C. $0.153cc$

D. $0.05cc$

**Answer:**

Watch Video Solution

**2.** The coefficient of apparent expansion of mercury in a glass vessel is $153 \times 10^{-6} / ^{\circ} C$ and in a steel vessel is $114 \times 10^{-6} / ^{\circ} C$. If $\alpha$ for steel is $12 \times 10^{-6} / ^{\circ} C$, then that of glass is

A. $9 \times 10^{-6} / ^{\circ} C$

B. $6 \times 10^{-6} / ^{\circ} C$

C. $36 \times 10^{-6} / ^{\circ} C$

D. $27 \times 10^{-6} / ^{\circ} ) C$

**Answer:**

Watch Video Solution

**3.** An iron tyre is to be fitted onto a wooden wheel 1.0 m in diameter. The diameter of the tyre is 6 mm smaller than that of wheel the tyre should be heated so that its temperature increases by a minimum of (coefficient of volume expansion of iron is $3.6 \times 10^{-5} / {}^{\circ} C$)

A. $167^{\circ} C$

B. $334^\circ C$

C. $500^\circ C$

D. $1000^\circ C$

**Answer:**

Watch Video Solution

**4.** A rod of length $20cm$ is made of metal. It expands by $0.075cm$ when its temperature is raised from $0^\circ C$ to $100^\circ C$. Another rod of 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 oher of metal $B$. This rod expandss by $0.060 cm$ for the same change in temperature. The portion made of metal $A$ has the length :

A. $20 cm$

B. $10 cm$

C. $15 cm$

D. $18 cm$

**Answer:**

Watch Video Solution

**5.** A glass flask of volume one litre at $0^\circ C$ is filled, level full of mercury at this temperature. The flask and mercury are now heated to $100^\circ C$. How much mercury will spill out if coefficient of volume expansion of mercury is $1.82 \times 10^{-4} /^\circ C$ and linear expansion of glass is $0.1 \times 10^{-4} /^\circ C$ respectively?

A. $21.2cc$

B. `15.2c c

C. $1.52cc$

D. $2.12cc$

**Answer:**

Watch Video Solution

**6.** The apparent coefficient of expansion of 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, linear expansion coefficient of silver is

A. $\dfrac{C+S-3A}{3}$

B. $\dfrac{C+3A-S}{3}$

C. $\dfrac{S+3A-C}{3}$

D. $\dfrac{S-3A+C}{3}$

**Answer:**

Watch Video Solution

**7.** The apparent coefficient of expansion of 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, linear expansion coefficient of silver is

A. $18.8mm$

B. $9.2mm$

C. $7.4mm$

D. $4.5mm$

**Answer:**

Watch Video Solution

**8.** A piece of metal weighs 46 g in air and 30 g in lipuid of density $1.24 \times 10^3 kgm^{-3}$ kept at $27^0 C$. When the temperature of the liquid is raised to $42^0 C$ the metal piece weights 30.5 g . The density of the liqued at $42^0 C$ is $1.20 \times 10^3 kgm^{-3}$. Calculate the coefficient of linear expandsion of the metal.

A. $3.316 \times 10^{-5} / ^\circ C$

B. $2.316 \times 10^{-5} / ^\circ C$

C. $4.316 \times 10^{-5} / ^\circ C$

D. None of these

**Answer:**

Watch Video Solution

**9.** 2kg of ice at $20^\circ C$ is mixed with 5kg of water at $20^\circ C$ 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 & ice are $1kcal/kg/^\circ C$ and $0.5$

$kcal / kg /^{\circ} C$ while the latent heat of fusion of ice is $80 kcal / kg$

A. $7kg$

B. $6kg$

C. $4kg$

D. $2kg$

**Answer:**

Watch Video Solution

**10.** A lead bullet just melts when stopped by an obstacle. Assuming that 25 per cent of the heat is absorbed by the obstacle, find the velocity of the bullet if its initial temperature is $27^{\circ} C$ . (Melting point of lead $= 327^{\circ} C$, specific heat of lead $= 0.03 cal / g .^{\circ} C$, latent heat of fusion of lead $= 6 cal / g, J = 4.2 J / cal$).

A. $410 m / \sec$

B. $1230 m / \sec$

C. 307.5`m//sce

D. none of the above

**Answer:**

Watch Video Solution

**11.** The temperature of equal masses of three different liquids A,B and C are $12^\circ C, 19^\circ C$ and $28^\circ C$ respectively. The temperature when A and B are mixed is $16^\circ C$ and when B and C are mixed it is $23^\circ C$. What should be the temperature when A and C are mixed?

A. 18.2^(@)C`

B. $22^\circ C$

C. $20.2^\circ C$

D. $25.2^\circ C$

**Answer:**

Watch Video Solution

**12.** $50gm$of copper is heated to increase its temperature by $10^{\circ}C$. If the same quantity of heat is given to $10gm$of water, the rise in its temperature is (Specific heat of copper $= 420Jo\underline{e} - kg^{-1} \circ C^{-1}$

A. $5^{\circ}C$

B. $6^{\circ}C$

C. $7^{\circ}C$

D. $8^{\circ}C$

**Answer:**

Watch Video Solution

**13.** A beaker contains 200 g of water. The heat capacity of the beaker is equal to that of 20 g of water. The initial temperature of water in the beaker is $20^\circ C$ .If 440 g of hot water at $92^\circ C$ is poured in it, the final temperature (neglecting radiation loss) will be nearest to

A. $58^\circ C$

B. $68^\circ C$

C. $73^\circ C$

D. $78^{\circ} C$

**Answer:**

Watch Video Solution

**14.** Calorie is defined as the amount of heat required to raise temperature of 1 g of water by $1^{\circ} C$ and it is defined under which of the following conditions?

A. From$14.5^{\circ} \rightarrow 15.5^{\circ} C$ at760 mm of Hg

B. From $98.5^{\circ}$ to $99.5^{\circ} C$ at 760 mm of Hg

C. From $13.5^{\circ} C$ to $14.5^{\circ} C$ at 760 mm of Hg

D. From $3.5^{\circ} C$"to" 4.5^(@` at 760 mm of Hg

**Answer:**

Watch Video Solution

**15.** 5A 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 $25^{\circ} C$, melting point

$475^\circ C$ and the latent heat L. Then v is given by

A. mL=mS(475-25)+(1)/(2) (mv^(2))/(J)`

B. $mS(475-25)+mL=\frac{1}{2}\frac{mv^2}{2J}$

C. $mS(475-25)+mL=\frac{1}{2}\frac{mv^2}{J}$

D. $mS(475-25)+mL=\frac{1}{2}\frac{mv^2}{2J}$

**Answer:**

Watch Video Solution

**16.** A stationary object at $4^{\circ} C$ and weighing $3.5 kg$ falls from a height of $2000 m$ on a snow mountain at $0^{\circ} C$. If the temperature of the object just before hitting the snow is $0^{\circ} C$and the object comes to rest immediately? (g=10m//s^(2)) $\text{and } heatofice$=3.5xx10^(5) joule //sec), then the object will melt

A. $2kg of ice$

B. $200gm of ice$

C. $20gm of ice$

D. $2gm of ice$

**Answer:**

Watch Video Solution

**17.** The density of a substance at $0^{\circ} C$ is $10 g / cc$ and at $100^{\circ} C$, its density is $9.7 g / cc$. The coefficient of linear expansion of the substance is

A. $10^{-2}$

B. $10^{-2}$

C. $10^{-3}$

D. 10^(-4)

**Answer:**

Watch Video Solution

**18.** The real coefficient of volume expansion of glycerine is $0.000597 per ^\circ C$ and linear coefficient of expansion of glass is

$0.000009 par ^\circ C$ . Then the apparent volume coefficient of glycerine is

A. $0.000597 per ^\circ C$

B. 0.000057 ^(@) C`

C. $0.00027 Per ^\circ C$

D. 0.0006 per ^(@)C`

**Answer:**

Watch Video Solution

**19.** A constant volume gas thermometer shows pressure readings of $50 cm$ and $90 cm$ of mercury at $0^{\circ} C$ and $100^{\circ} C$ respectively, The temperature of the bath when pressure reading is $60 cm$ of mercury.

A. $25^{\circ} C$

B. $40^{\circ} C$

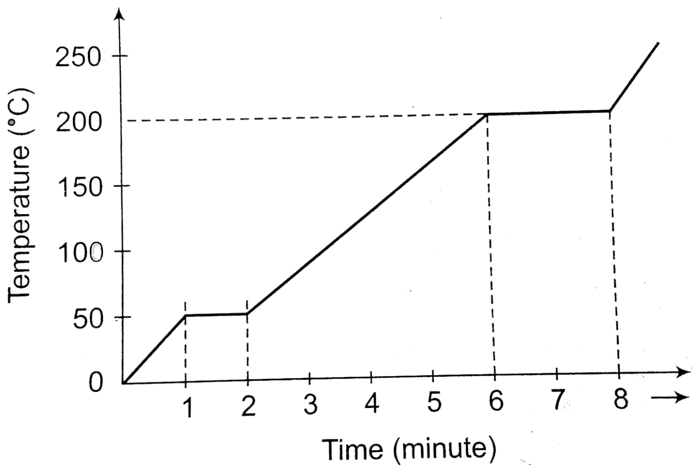
C. $15^{\circ} C$

D. $12.5^{\circ} C$

**Answer:**

Watch Video Solution

20.




A student takes 50 g wax (specific heat $= 0.6 kcal/kg^{\circ}C$) 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.

A. $500 cal, 50^\circ C$

B. $1000 cal, 100^\circ C$

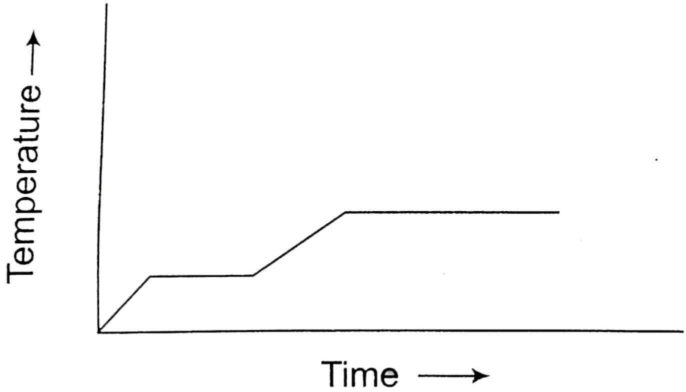
C. $1500 cal, 200^\circ C$

D.

**Answer:**

Watch Video Solution

21.




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

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

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

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

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

A. 1, 2 and 3 are correct

B. 1 and 2 are correct

C. and 4 are correct

D. 1 and 3 are correct

**Answer:**

Watch Video Solution

22. A bimetallic strip is formed out of two identical strips one of copper and the other of brass. The co-efficients of linear expansion of the two metals are $\alpha_C$ and $\alpha_B$. On heating, the the strip bends to form an are of radius of curvature $R$. Then $R$ is

A. 1, 2 and 3 are correc

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

**Answer:**

Watch Video Solution

**23.** When a bimetallic strip is heated, it

A. does not bend at all

B. gets twisted in the form of an helix

C. bends in the form of an arc with the more expandable metal inside.

D. Bend in the form of an arc with the more expandable metal outside

**Answer:**

Watch Video Solution

**24.** In a thermally insulated tube of cross sectional area $4cm^2$ a liquid of thermal expansion coefficeint $10^3 K^{-1}$ is flowing. Its velocity at the entrance is $0.1 m/s$. At the middle of the tube a heater of a power of 10 kW is heating the liquid. The specific heat capacity of the liquid is 1.5 kJ/(kg,K), and its density is $1500 kg/m^3$ at the entrance.

Q. The rise in temperature of the liquid as it pass through the tube is

A. $\frac{1000}{9}.^{\circ}C$

B. $\frac{1}{9}.^{\circ}C$

C. $\frac{500}{9}.^{\circ}C$

D. none

**Answer:**

Watch Video Solution

**25.** In a thermally insulated tube of cross sectional area $4cm^2$ a liquid of thermal expansion coefficeint $10^3 K^{-1}$ is flowing. Its velocity at the entrance is $0.1m/s$. At the middle of the tube a heater of a power of 10 kW is heating the liquid. The specific heat capacity of the liquid is 1.5 kJ/(kg,K), and its density is $1500kg/m^3$ at the entrance.

Q. What is the density of liquid at the exit?

A. $1450kg/m^3$

B. $1400kg/m^3$

C. $1350kg/m^3$

D. none of these

**Answer:**

Watch Video Solution

**26.** In a thermally insulated tube of cross sectional area $4cm^2$ a liquid of thermal expansion coefficeint $10^3 K^{-1}$ is flowing. Its velocity at the entrance is $0.1m/s$. At the middle of the tube a heater of a power of 10 kW is heating the liquid. The specific heat capacity of the liquid is 1.5 kJ/(kg,K), and its density is $1500kg/m^3$ at the entrance.

Q. How much bigger is the volume rate of flow at the end of the tube than at the entrance in cubic meters?

A. $9 \times 10^{-5}$

B. $\frac{1}{3} \times 10^{-5}$

C. $\frac{4}{9} \times 10^{-5}$

D. none

**Answer:**

Watch Video Solution

**27.** Statement-1: Fahrenheit is the smallest unit measuring temperature

Statement-2: Fahrenheit was the first temperature scale used for measuring temperature

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for

Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is false, statement-2 is true.

D. Statement-1 is true, statement-2 is false.

**Answer:**

Watch Video Solution

**28.** Statement-1: A brass disc is just fitted in a hole in a steel plate. The system mst be cooled to loosen the disc from the hole

Statement-2: The coefficient of linear expansion for brass is greater than the coefficient of linear expansion for steel.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is false, statement-2 is true.

D. Statement-1 is true, statement-2 is false.

**Answer:**

Watch Video Solution

**29.** Statement-1: Latent heat of fusion of ice is $336000 Jkg^{-1}$

Statement-2: Latent heat refers to change of state without any change in temperature.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement-1 is false, statement-2 is true.

D. Statement-1 is true, statement-2 is false.

**Answer:**

Watch Video Solution