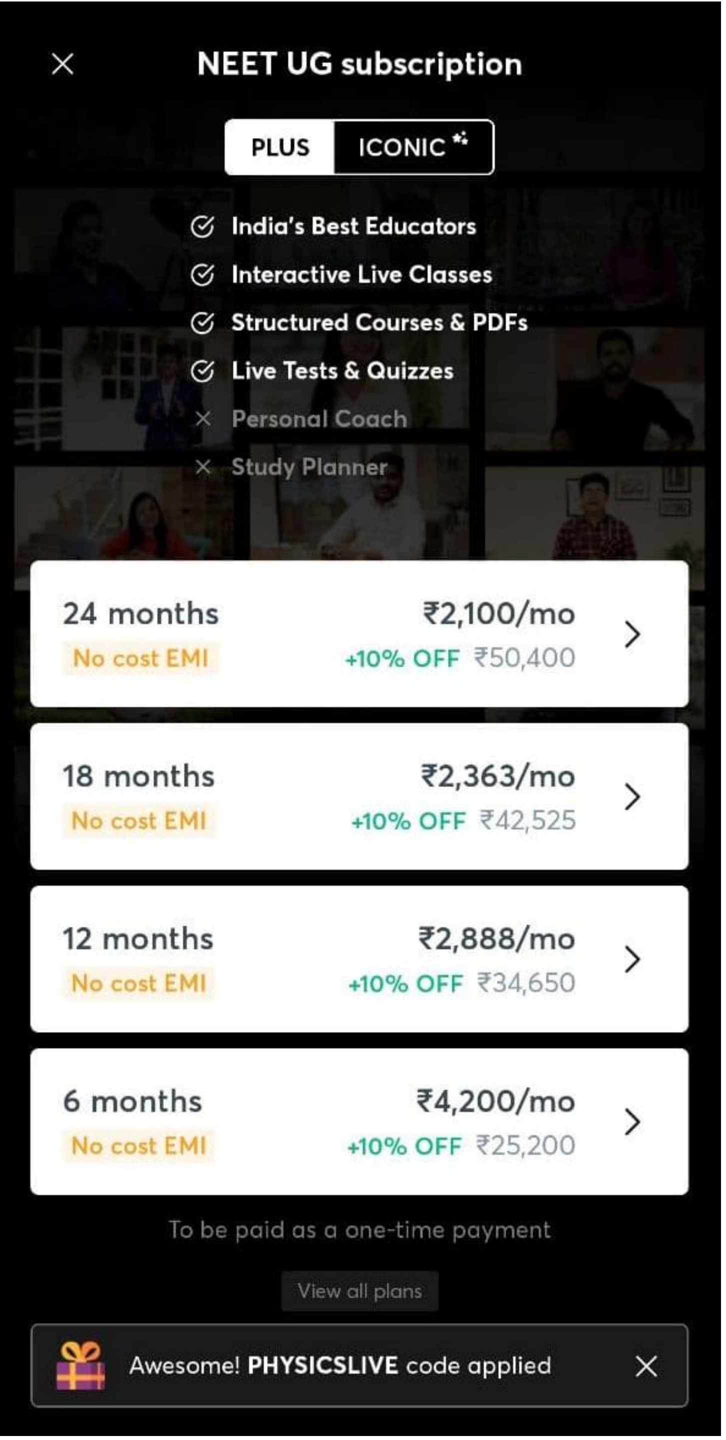
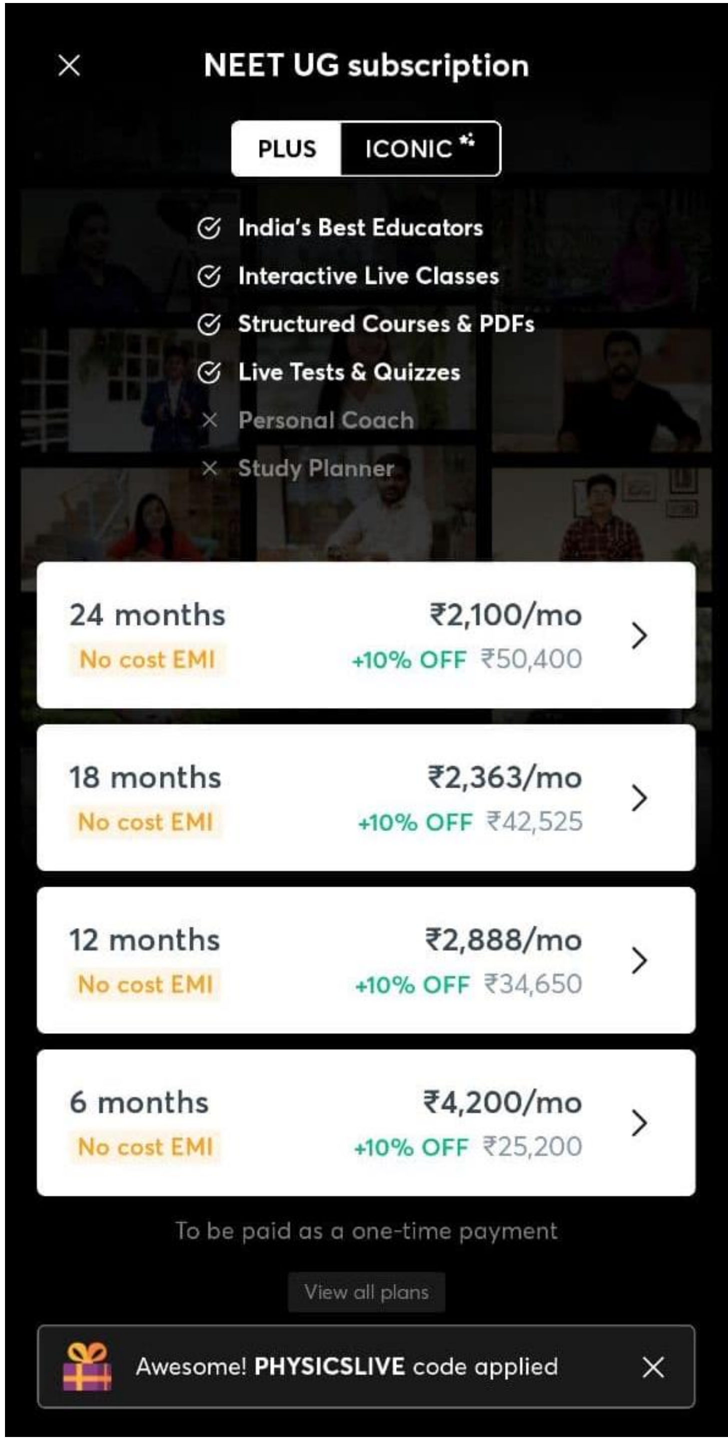

# SIR PRATEEK JAIN

. Founder @Physicsaholics
. Top Physics Faculty on Unacademy (IIT JEE & NEET)
. 8+ years of teaching experience in top institutes like FIITJEE (Delhi, Indore) , CP (KOTA) etc.
. Produced multiple Top ranks.
. Research work with HC Verma sir at IIT Kanpur
. Interviewed by International media.




# PHYSICSLIVE




Use code PHYSICSLIVE to get 10% OFF on Unacademy PLUS and learn from India's Top Faculties.

SUBSCRIBE

@Physicsaholics

@Physicsaholics_prateek

@NEET_Physics
@IITJEE_Physics

physicsaholics.com

Unacademy

CLICK

Links are also in the description of the video.

## For Video Solution of this DPP, Click on below link

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/56

Video Solution on YouTube:- https://youtu.be/xMBc7ljj-u4

# NEET & JEE Main
# Physics DPP

## DPP-1 calorimetry

**By Physicsaholics Team**

Q) If specific heat of a substance is infinite, it means--

(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

Ans. c

$$Q = m\,c.\Delta\theta \Rightarrow c = \frac{Q}{m.\Delta\theta};\text{when } \Delta\theta = 0 \Rightarrow c = \infty$$

Q) Two spheres made of same substance have diameters in the ratio 1 : 2. Their thermal capacities are in the ratio of -

(A) 1 : 2

(B) 1 : 8

(C) 1 : 4

(D) 2 : 1

Ans. b

formula for heat capacity $\Rightarrow ms$

$$\Rightarrow \rho \times \frac{4}{3}\pi R^3 \cdot s$$

$$\Rightarrow H.C \propto R^3$$

$$\Rightarrow \frac{(H.C)_1}{(H.C)_2} = \frac{1}{8}$$

Q) Liquids A and B are at 30°C and 20°C. When mixed in equal masses, the temperature of the mixture is found to be 26°C. Their specific heats are in the ratio of -

(a) 3 : 2

(B) 1 : 1

(C) 2 : 3

(D) 4 : 3

Ans. a

Heat given = Heat taken

$$m S_A (30 - 26) = m S_B (26 - 20)$$

$$\frac{S_A}{S_B} = 6/4 = 3 : 2$$

Q) The temperature of equal masses of three different liquids A,B and C are 12°C, 19°C and 28°C respectively . The temperature when A and B are mixed is 16°C, when B and C are mixed is 23°C; what is the temperature when A and C are mixed ?

(A) 31°C (B) 20.26°C

(C) 19.5°C (D) 28°C

Ans. b

Let $m$ be the mass of each liquid and $S_A, S_B, S_C$ be specific heats of liquids $A, B$ and $C$ respectively.
When $A$ and $B$ are mixed. The final temperature is $16^\circ C$.
$\therefore$ Heat gained by $A =$ heat lost by $B$
i.e., $mS_A = (16 - 12) = mS_B(19 - 16)$
i.e., $S_B = \frac{4}{3} S_A .....(i)$
When $B$ and $C$ are mixed. Heat gained by $B =$ Heat lost by $C$
i.e., $mS_B = (23 - 19) = mS_C(28 - 23)$
i.e., $S_C = \frac{4}{5} S_B .....(ii)$
From eq. (i) and (ii)
$S_C = \frac{4}{5} \times \frac{4}{3} S_A = \frac{16}{15} S_A$
When $A$ and $C$ are mixed, let the final temperature be $\theta$
$\therefore mS_A(\theta - 12) = mS_C(28 - \theta)$
i.e., $\theta - 12 = \frac{16}{15}(28 - \theta)$
By solving, we get,
$\theta = \frac{628}{31} = 20.26^\circ C.$

Q) Heat required to convert one gram of ice at 0°C into steam at 100°C is (given $L_{steam}$ = 536 cal/gm)-

(A) 100 calorie (B) 0.01 kilocalorie
(C) 716 calorie (D) 1 kilocalorie

Ans. c

Mass of ice=1 g

Temperature of ice = 0 °C

- The ice at 0°C is needed to convert to water at the same temperature i.e. 0°C

Heat required at this stage

= Mass of the ice x Latent heat of fusion of ice

=1 x 80 = 80 cal

- Now increase the water temperature from 0°C to 100°C by using the formula.

Heat required = Mass of water x rise in temperature x specific heat of water

= 1 x 100 x 1 = 100 cal

- Now convert water into vapour state at 100°C

Heat required for this

= Mass of water x Latent heat

= 1 x 536 =536 cal

Total heat required

=80 +100 +536 = 716 cal

Q) 300 gm of water at 25ºC is added to 100 gm of ice at 0ºC. The final temperature of the mixture is - :-

(A) 0 ºC (B) 2 ºC (C) 1 ºC (D) 3 ºC

Ans. a

We know that latent heat of fusion of ice is 79.7 Cal per gram.
Let final temperature be T.
Then

$$m_1 S\Delta T = m_2 L$$

$$300 \times 1 \times (25 - T) = 100 \times 75$$

$$(25 - T) = \frac{100 \times 75}{300}$$

$$25 - T = 25$$

$$T = 0^\circ\mathrm{C}$$

After that total energy left $= 4.7 \times 100$

Total mass of water $= 400$ g

Amount of water again converted into ice

$$m = \frac{470}{79.7}$$

$$m = 5.9 \text{ g}$$

Thus whole mass is converted into water at $0^\circ$C,and about 5.9 gwater is again converted into ice whose temperature is also $0^\circ$C.

After achieving the temperature of $0^\circ$C, latent heat of fusion is required firstly for conversion of water into ice then further lowering of temperature is possible. So the final temperature will be $0^\circ$C.

Q) A 1 g of ice is mixed with 1 g of steam. After thermal equilibrium is achieved, the temperature of the mixture is : -

A) 100°C (B) 55°C

(C) 75°C (D) 0°C

Ans. a

Total heat gained by ice is equal to the total heat lost by steam.

For ice to completely convert into water, heat required is $m_1 L_f = 1 \times 80 = 80cal$

For steam to completely convert into water, heat released is $m_2 L_v = 1 \times 540 = 540\ cal$

Hence, first 80 calories will not be enough for the steam to condense completely.

Now, to convert melted water to $100^o C$ from $0^o C$, heat required is $m_1 s(100 - 0) = 1 \times 1 \times 100 = 100cal$

So, total energy required to heat ice to water $100^o C$ is $100 + 80 = 180\ cal$.

Hence, even this amount of energy is not enough for the steam to condense completely. Hence, the final temperature of the mixture will be $100^o C$.

Note- finally the mixture will consist of both steam and water at $100^o C$.

Q) If x grams of steam at 100°C becomes water at 100°C which converts y grams of ice at 0°C into water at 100°C, then the ratio x/y will be –

(A) 1/3

(B) 1/2

(C) 1/4

(D) none

Ans. a

Heat releated by steam = Heat taken by ice

x gms $\qquad\qquad\qquad\qquad$ y gms

$$x \cdot L_{steam} = y \cdot L_{ice} + y S_w \Delta T$$

$$x \cdot 540 = y \cdot 80 + y \cdot 1 \cdot 100$$

$$x\, 540 = 180\, y$$

$$x/y = 1:3$$

Q) 5 g of steam at 100ºC is passed into 6 g of ice at 0ºC. If the latent heats of steam and ice are 540 cal/g and 80 cal/g, then the final temperature is–

(A) 0ºC
(B) 50ºC
(C) 30ºC
(D) 100ºC

Ans. d

Total heat gained by ice is equal to the total heat lost by steam.

For ice to completely convert into water, heat required is $m_1 L_f = 1 \times 80 = 80cal$

For steam to completely convert into water, heat released is $m_2 L_v = 1 \times 540 = 540\ cal$

Hence, first 80 calories will not be enough for the steam to condense completely.

Now, to convert melted water to $100^o C$ from $0^o C$, heat required is $m_1 s(100 - 0) = 1 \times 1 \times 100 = 100cal$

So, total energy required to heat ice to water $100^o C$ is $100 + 80 = 180\ cal$.

Hence, even this amount of energy is not enough for the steam to condense completely. Hence, the final temperature of the mixture will be $100^o C$.

Note- finally the mixture will consist of both steam and water at $100^o C$.

Q) The amount of heat required to raise the temperature of 1 kg of water through 1°C is called

(A) kilocalorie (B) calorie

(C) B.T.U. (D) calorie/°C

Ans. a

$\rightarrow Q = mS\Delta T$

$= 1000\,gm \times 1\,\frac{cal}{gm\,^\circ C} \times 1\,^\circ C$

$= 1000\,cal = 1\,kcal$

## For Video Solution of this DPP, Click on below link

Video Solution on Website:-

https://physicsaholics.com/home/courseDetails/56

Video Solution on YouTube:-

https://youtu.be/xMBc7ljj-u4

SUBSCRIBE

@Physicsaholics

@Physicsaholics_prateek

@NEET_Physics
@IITJEE_Physics

physicsaholics.com

Unacademy

CLICK

Links are also in the description of the video.

Chalo Niklo