

ZvcvciY

fygKv

mh©c_ ex t_ tK eû `fi Aew`Z, gvtS i tqtQ gnvk b`| gnvk tY` tKvb Ro c` vt_ P Aw` Zj bvB| A_P mh©
 t_ tK Zvc I Avtj v c_ extZ AvmtQ| mh©t_ tK Zvc tKvb Ro gva` tgi mrvnh` QvovB c_ extZ Avtm|
 we` y PyKxq Zi½ bvtgi GK ai tbi Zi t½i gva` tg th tKvb DĒB e` zZvc weik iY Kti | Zvc
 weik iYi Rb` DĒB e` zKxZj e` z ms` útk© Avmvi c_ qvRb nq bv ev DĒB e` zKYvi `vbišwi Z nI qvi
 c_ qvRb nq bv| weifbæZi½ `N© weikó Zvcxq weik iY e` z ZvcgvĪvi Dci wbfP Kti | G Aa` tq
 weik iYi weifbamĪ mæútk© Avtj vPbv Kiv nte|

cW - 1

weKxY©Zv̄tci êekó, Av̄ k©Kòe-z̄ Kòe-z̄ weKiY, weKiY ¶lgZv̄ I tkv̄Y ¶lgZv̄, Ges Kvk̄di m̄F̄|

D̄īk̄

G cW tk̄I Av̄cib -

- | Av̄ k©Kòe-z̄ K Zv̄ ej tZ cvīteb,
- | Kòe-z̄ weKiY ēv̄L̄v̄ Ki tZ cvīteb,
- | weKiY ¶lgZv̄ I tkv̄Y ¶lgZv̄i msÁv̄ w̄ tZ cvīteb,
- | Kvk̄di m̄F̄ ej tZ cvīteb Ges Gi c̄q̄M eȲv̄ Ki tZ cvīteb|

14.1.1 t weKxY©Zv̄tci êekó t weKiY c×w̄Z̄tZ th Zv̄c GK e-z̄ t̄K Ab̄ e-z̄ ev̄ GK v̄b t̄K Ab̄ v̄b m̄Áv̄ij Z nq, Zv̄tK weKxY©Zv̄c etj |

weKxY©Zv̄tci ḡtā v̄b̄ij w̄LZ êekó t̄ L̄v̄ hv̄q|

(1) weKxY©Zv̄c kb̄ ḡvāt̄gi gā w̄ t̄q th̄tZ cvīti |

(2) Av̄tj v̄K īnk̄fi ḡtZv̄ weKxY©Zv̄c I mij̄ti L̄v̄q P̄tj |

(3) Av̄tj vi ḡtZv̄ weKxY©Zv̄c c̄Z̄dj b I c̄Z̄mīt̄Yi m̄F̄ t̄ḡtb P̄tj |

(4) weKxY©Zv̄c Av̄tj vi t̄ēM̄ P̄tj |

(5) Av̄tj v̄K īnk̄fi ḡtZv̄ weKxY©Zv̄c k̄w̄³ i I ēw̄Z̄P̄vi (Interference), AceZ̄B̄ (Diffraction) I t̄c̄ij vi v̄qb (Polarization) nq|

(6) Av̄tj vi ḡtZv̄ weKxY©Zv̄c ēM̄q̄ m̄F̄ (Inverse square law) t̄ḡtb P̄tj | A_̄P̄ t̄Kv̄b Drm̄ t̄K weKxY©Zv̄tci c̄lej̄ Drm̄ t̄K e-z̄ īZ̄ji ēM̄P̄ ēv̄b̄ḡw̄Z̄K|

14.1.2 t Av̄ k©Kòe-z̄

t̄Kv̄b e-z̄ Dci weKxY©Zv̄c Av̄c̄w̄ZZ n̄tj m̄v̄avīYZ H Zv̄tci w̄KQyAsk e-z̄ z̄KZ̄R̄.c̄Z̄d̄ij Z, w̄KQyAsk tk̄v̄m̄ Z I ev̄Kx Ask e-z̄ gā w̄ t̄q m̄Áv̄ij Z nq|

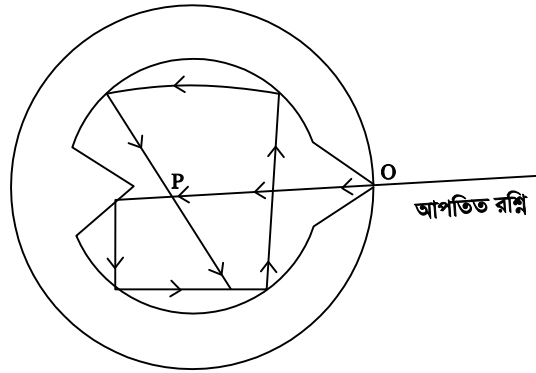
A_̄P̄ h̄w̄ t̄Kv̄b e-z̄ Dci Av̄c̄w̄ZZ weKxY©Zv̄tci r Ask c̄Z̄d̄ij Z, a Ask tk̄v̄m̄ Z I t Ask m̄Áv̄ij Z nq, Zv̄n̄tj Av̄ḡi v̄ij L̄tZ c̄v̄i

$$r + a + t = 1$$

h̄w̄ t̄Kv̄b e-z̄ Av̄c̄w̄ZZ weKxY©Zv̄tci t̄Kv̄b Ask c̄Z̄d̄ij Z ev̄ m̄Áv̄ij Z b̄v̄ K̄fi meUK̄B̄ tk̄v̄Y K̄fi, Zv̄n̄tj t̄m̄ e-z̄ Av̄ k©Kòe-z̄ ǣt̄j |

A_̄P̄ Av̄ k©Kòe-z̄ t̄¶t̄I, r=0, t=0 | a=1 n̄tj v̄t̄K|

Av`k@Kò.e`zntmte th me e`zK ñetePbr Kiv nq, Gt`i tKivUvB cKZ.c†¶ Av`k@Kò.e`z bq| Gt`i tkvY ¶gZv 100% Gi KvQvKvQ etj Gt`i Kò.e`z etj ñetePbr Kiv nq| thgbt- Kvtjv প্লাটিনাম 98% AvciZZ ñewKiY tkvY Ki†Z cv†i| còxtci Kvj i Zj 96% AvciZZ Zvc tkvY Ki†Z cv†i|



¶PÎÑ14.1

còxtci Kvj Øviv iO Kiv tKv Db† Zj†K Av`k@Kò.e`zntmte tbqv hvq bv| KviY H Zj AvciZZ ñewKi†Yi meUKB m`úY†te tkvY Ki†Z cv†i bv|

ñeÁvbx tdix GKvU Kò.e`z cwi Kíbv K†ib| ñb†P Zv eYØv Kiv ntjv|

GuU `B t`qj ñewkó ducv avZzibngZ GKvU tMj K| (¶PÎ 14.1) GtZ m¶¶ ñQ`º Av†Q| tMj†Ki ¶FZ†i cò còxtci agvqZ ñKlvq Kvtjv Kiv nq Ges evB†i cò ñb†Kj cvij k Øviv PKP†K Kiv nq| cwi enb I cwi Pj b còuq hv†Z Zvc ¶q bv nq| tmRb` t`qj `¶i Af`š†i evqkb` Kiv nq|

ñQ`º Gi ñecix ñ†K t`q†j i ñKQyAsk (P) tKšwYK AvKvZi (conical) Kiv nq| dtj AvciZZ ñeKxY`Zvc mivmvi còZdij Z ntq ñ†i th†Z cv†i bv| hLb o ñQ`º ñ†q ñewKiY tMj†K còek K†i ZLb evievi còZdij Z ntq ñewKiY tMj K KZR.m`úY†te tkvY Z nq| G t¶† e`z Kò.e`z ñntmte KvR K†i|

hLb G tMj K†K mlyg†te tKv D`P Zvcgv†vq DÈB Kiv nq, ñQ`º c† ñewKiY ñbMZ nq| G ñewKiY†K Kò.e`z ñewKiY etj| G t¶† e`z bq, o ñQ`º Kò.e`z ñewKiK i†c KvR K†i|

14.1.3 t Kòe`z ñewKiY

th e`z tkvY ¶gZv teik tm e`z ñewKiY ¶gZv teik| A_¶ DÈg tkvK DÈg ñewKiK nq ev `¶¶ tkvK `¶¶ ñewKiK| Kòe`z DÈg tkvK, AZGe GuU DÈg ñewKiKl e†U|

t`Lv tM†Q th, ñ`i Zvcgv†vq DÈB teóbx i Af`š†i ñewKiY i agv† Zvcgv†vi Dci ñb†P K†i, teóbx i t`q†j i cKvZ. ev teóbx i Af`š†i tKv e`z Dciv†Zi Dci ñb†P K†i bv| Avevi Av`k@Kò.e`z th ñewKiY ñb†MZ K†i, Zv c`v†_P tKv atg¶ Dci ñb†P K†i bv| i agv† Kòe`z Zvcgv†vi Dci ñb†P K†i| AZGe t`Lv hv†Q th, ñ`i Zvcgv†vq DÈB tKv teóbx i Af`š†i ñewKiY thgb i agv† Zvcgv†vi Dci ñb†P K†i, Av`k@Kòe`z KZR ñb:mZ ñewKiY i agv† Zvcgv†vi Dci ñb†P K†i|

ZvB, ñ`i Zvcgv†vq DÈB tKv teóbx i Af`š†i ñewKiY†K Kòe`z ñewKiY ejv nq|

th tKv Zi½ `†N¶ t¶† Kò.e`z tkvY ¶gZv thgb me¶aK; tKv ñb†Ø Zvcgv†vq ev th tKv Zi½ `†N¶ tejq Gi ñewKiY ¶gZv me¶aK| ZvB Kò.e`z KZR ñewKiY ev ñ`i Zvcgv†vq DÈB teóbx i Af`š†i ñewKiY†K cY¶ñewKiY ejv nq|

14.1.4 t weikiY qigZv I tkviY qigZv

weikiY qigZv t tkvb DEB Zj t_k wekiY^Zvtci cwi givY wbfP Kti Ztj i ZvcgvIv, t^Tdj I ckiZi Dci |

wb^0 ZvcgvIvi tkvb e^-z GK tmKtU cZ GKK t^Tdj t_k wekiY^Zvtci cwi givY I GKB ZvcgvIvi cZ tmKtU cZ GKK t^Tdj i Kde^-z_k wekiY^Zvtci cwi givY GB `yqi AbzvZtK H e^-z weikiY qigZv etj | Gi gvb o t_k 1 Gi gta" nq |

Ar`k^Kde^-z weikiY qigZv 1;

PKPtK `c^bi weikiY qigZv cZ kb" |

tkviY qigZv t tkvb e^-z Zj KZR. wb^0 mgTq tkvml Z wekiY^Zvtci cwi givY I H Ztj AvciZZ wekiY^Zvtci cwi givYi AbzvZtK H Ztj i tkviY qigZv etj |

Ar`k^Kde^-z AvciZZ wekiY^Zvtci meUKB tkviY Kti | G t^T AvciZZ Zvc I tkvml Z Zvtci cwi givY mgvb | Ziv tkviY qigZvi msAv GfiteI t`qv hvq |

tkvb Zj wb^0 mgTq hZUKzwekiY^Zvc tkviY Kti Ges GKB mgTq GKB t^Tdj weik^o Ar`k^ Kde^-z hZUKzZvc tkviY Kti GB `yqi AbzvZtK tkviY qigZv etj |

th e^-z tkviY qigZv teik tm e^-z weikiY qigZvI tekx |

Agmb GKw KvTjv Zj gmb PKPtK Ztj i t^Tq fivTjv weikiK |

14.1.5 t Kvk^di weikiY m^F

weAvbx Kvk^ tkvb e^-z weikiY qigZv I tkviY qigZv m^uKZ GKw m^F Avie^vi Ktib | m^Fw wb^e^c :

GKB ZvcgvIv tkvb wb^0 Zi 1/2 `^T N^ Rb" mKj e^-z weikiY qigZv I tkviY qigZvi AbzvZ a^e Ges G AbzvZ Ar`k^Kde^-z weikiY qigZvi mgvb |

e^vL^v t hiv `w e^-z weikiY qigZv h_v^tq e_1 I e_2 Ges tkviY qigZv h_v^tq a_1 I a_2 nq;

$$Zvtj \frac{e_1}{a_1} = \frac{e_2}{a_2} = a^eK = E_\lambda$$

GLv^b E_\lambda = Kde^-i weikiY ygZv |

Dctiv^3 mgxkiY t_k wmv^s-tbl qv hvq th, weikiY qigZv ewx tctj tkviY qigZvI ewx civq |

A_^ DEg tkvIK DEg weikiK |

14.1.6 t Kvk^di m^Fi c^qM

Kvk^di m^Fi mrv^th" tmsi eY^xi dbndvi tiLvi DrciEi we^s t 1801 wlv^t^ dbndvi tmsi eY^xtZ KZ, wj KvTjv tiLv t^L^Z civ | wZvb G^i DrciE m^u^k^e^vL^v w^Tz c^i^b | c^i KtqKRb weAvbx j^T Ktib th, tmv^wqv^g wklvi eY^xtK hiv tmsi eY^xi m^_ GK thv^M Z^bv Kiv nq, Zvtj t^Lv hvq th, tmv^wqv^g eY^xi nj^y tiLv `w tmsi eY^xi KvTjv tiLv (dbndvi tiLv) `w m^_ wgtj hvq | c^i Kvk^ Ziv weikiY m^F c^qM Kti tmsi eb^xi KvTjv tiLv, wj i DrciE e^vL^v Ktib | tmv^wqv^g t h^_o D^E^RZ Ktj `w nj^y tiLv weikiY Kti | Kvk^di m^F Abv^ti DEB mv^v

Avtjv Atc¶ivKZ.kxZj tmmWqvg evt®úí ga" w`tq tcØY Kiti H GKB Zi½`^N¶ Avtjv tkvlyi
Kitz cvti | t`Lv tM±Q th, DEB miv`v Avtjv Atc¶ivKZ.kxZj tmmWqvg evt®úí ga" w`tq cvWtj
tmmWqvg eY¶ xZ th Ae`v±b nj`y ti LvØq_vtK, H Ae`v±b`w Kvtjv ti Lv cvl qv hvq |

m±hP tK`^tji ZvcgvÎv A±bK tewk (KtqK tKvU wWwM± tmjwqvm) | G±K AvtjvK gÛj
(Photosphere) ejv nq | Gi Pvi w`tK AvtQ Atc¶ivKZ.kxZj M`vmax AveiY hvi ZvcgvÎv KtqK nivrvi
wWwM± tmjwqvm | G±K eb¶Ûj (Chromosphere) ejv nq |

AvtjvKgÛj t_±K miv`v Avtjv eY¶Ûj tF` Kti Avmvi mgq eY¶Ûj Aew`Z nivrviW±Rb, bivrviW±Rb,
Av ±Rb, tmmWqvg cFwZ. wvrbvM`vm gva`tgi ga" w`tq AvtM | D³ M`vmax tg¶j`w DEB Ae`vq th
th ti Lv wvkiY Kitz cvti Atc¶ivKZ.kxZj Ae`vq mhPwK± t_±K AvMZGme Zi½`^N° tkvlyi
Kti | dtj AvZµvš-Avtjv cv_extZ tcvv±j tmSi eY¶ xi tkvll Z Astk Kvtjv ti Lv t`Lv hvq | GB
Kvtjv ti Lv`w B dbndvi ti Lv |

mvi mst¶lc

Av R Kòe`± th e`zAvciwZZ wvKxY°Zv±ci meUKB tkvlyi Kti, tKvb Ask cÛZdij Z ev mÁvuj Z
Kti bvr tm e`±K Av`kKòe`±ejv nq |

wvkiY ¶lgZv t wv`Ø ZvcgvÎvq tKvb e`± GKK t¶¶±dj n±Z cÛZ tm±K±Û wvKxY°Zv±ci cvigvY I
GKB ZvcgvÎvq GKK t¶¶±dtj i Kò.e`±n±Z cÛZ tm±K±Û wvKxY°Zv±ci cvigvY-G`±qi AbgvZ±K
H e`± wvkiY ¶lgZv etj |

tkvlyi ¶lgZv t tKvb e`± Zj KZR.wv`Ø mg±q tkvll Z wvKxY°Zv±ci cvigvY I H mg±q e`± Dci
tgvU AvciwZZ wvKxY°Zv±ci cvigv±Yi AbgvZ±K H Z±j i tkvlyi ¶lgZv etj |

Kv±di wvkiY m± t GKB ZvcgvÎvq tKvb wv`Ø Zi½`%±N°P Rb` mKj e`± wvkiY ¶lgZv I tkvlyi
¶lgZvi AbgvZ a`e Ges G AbgvZ Av`kKòe`± wvkiY ¶lgZvi mgvb |

cwVwEi gj'vqb

K. bePpK çkæ

mWk DËti i cwtk wK (√) wPý w b

- 1/ Av`kQò.e`zKvK etj ?
 (K) th e`zAvciZZ weKxY©Zvici meUKB çZdij Z Kti |
 (L) th e`zAvciZZ weKxY©Zvici meUKB e`z ga` w`tq mÂvuj Z Kti |
 (M) th e`zAvciZZ weKxY©Zvici meUKB tkvi Y Kti |
 (N) th e`zAvciZZ weKxY©Zvici wKQyAsk tkvml Z I wKQyAsk mÂvuj Z Kti |

- 2/ wbtPi tKvb AbçvZtK tkvi Y ¶lgZv ej v hvq?
 (K) $\frac{Kò.e`KZR.wbw`θ mgtq tkvml Z Zvc}{H Ztj AvciZZ weKxY©Zvc}$
 (L) $\frac{e`i Ztj AvciZZ weKxY©Zvc}{Kò.e`i KZR.wbw`θ mgtq tkvml Z Zvc}$
 (M) $\frac{wbw`θ mgtq e`i tKvb Zj KZR.tkvml Z Zvc}{GKB mgtq GKB t¶¶dj weikó Av`kQò.e`KZR tkvml Z Zvc}$
 (N) $\frac{wbw`θ mgtq Kò.e`KZR.tkvml Z Zvc}{GKB mgtq GKB t¶¶dj weikó wePbvaxb e`KZR.tkvml Z Zvc}$

- 3/ tKvbwU KvK¶di weikY mF bvtg cwi wPZ?
 (K) $\frac{e`i weikY ¶lgZv}{tkvi Y ¶lgZv} = Av`kQe`z weikY ¶lgZv|$
 (L) $\frac{e`i weikY ¶lgZv}{Kò.e`i weikY ¶lgZv} = e`z tkvi Y ¶lgZv|$
 (M) $\frac{e`i tkvi Y ¶lgZv}{e`i weikY ¶lgZv} = Kò.e`z weikY ¶lgZv|$
 (N) $\frac{e`i tkvi Y ¶lgZv}{Kò.e`i tkvi Y ¶lgZv} = e`z weikY ¶lgZv|$

L. ms¶¶B çkæ

- 1/ Av`kQò.e`zKvK etj ?
 2/ weikY ¶lgZv I tkvi Y ¶lgZvi msAv uj Lç|
 3/ KvK¶di weikY mFw uj Lç|

cW - 2

w÷tdtbi mĤ, Av`k©Kòe`z weKxY©eYġ xtZ kw³i e)Ub, fxb Gi mĤ, fxb Gi miY mĤ I Mġb nvDm vµqv

Dġik`

G cW tktI AvcibĤ

- | w÷tdtbi mĤ eYĖv KiġZ cviġeb|
- | Av`k©Kò.e`z weKxY©eYġ xtZ kw³i e)Utbj tj LuPĤ Gġk eYĖv KiġZ cviġeb|
- | fxb Gi miY mĤ eYĖv KiġZ cviġeb|

14.2.1 t w÷tdtbi mĤ (Stefan's law)

1879 *u`v`vġai Aġóij qvi c`v_9eÁvbx tRvġmd w÷tdb Kò.e`zġtġK weKxY©Zvġci tġġĤĤ GKġU mĤ cĖvb Kġib| mĤġU vbaġfc t*

tKvb Kòe`z cĖZ GKK tġġĤĤdj tġtġK cĖZ tmġKġŪ weKxY©Zvġci cwiġv e`z cig ZvcġvĤvi PZz© NvġZi mġvbgvġZK|

e`vL`v t hġ tKvb Kòe`z cig ZvcġvĤv T nq, Zvntġ e`vġi cĖZ GKK tġġĤĤdj tġtġK cĖZ tmġKġŪ weKxY©Zvġci cwiġvY E ntġ,

$$E \propto T^4$$

$$E = \sigma T^4 \text{ ----- (1)}$$

*GLvġb $\sigma = w\div tdtbi a^*eK|$*

G mĤġK w÷tdtbi PZzġvZ mĤ etġ | 1884 u`v`vġā tevĖRġvb ZvcMġZve`vi mġvġth` ZvġĤKfġte mĤġU cġvY Kġib| ZvB G mĤġK w÷tdb tevĖRġvb mĤI ej v nq|

hġ T₁ cig ZvcġvĤvi tKvb Kò.e`zT₂ cig ZvcġvĤvi Ab` GKġU Kòe`zĖvġv cwiġvġZ vġK, Zvntġ cĖg Kòe`vġ σT_1^4 cwiġvY Zvc MġY Kiġe| AZGe, cĖg Kò.e`zKZĤ.GKK tġġĤĤdj tġtġK GKK mġq vbmZ weKxY©Zvġci cwiġvY E ntġ,

$$E = \sigma (T_1^4 - T_2^4) \text{ ----- (2)}$$

$$\therefore \sigma Gi GKK = \frac{E}{T^4} Gi GKK$$

$$= \frac{J m^{-2} S^{-1}}{K^4} = \frac{W m^{-2}}{K^4} = W m^{-2} K^{-4},$$

$$\sigma Gi ġvb 5.672 \times 10^{-8} W m^{-2} K^{-4},$$

Kòe-æ"ZxZ Ab" th tKvb e-æ tñtñ :

$$E = e\sigma (T_1^4 - T_2^4)$$

GLvfb e = e-æ meKiy ñlgZv,

e Gi gvb 0 t-ñk 1 Gi gta" nñq-vñk,

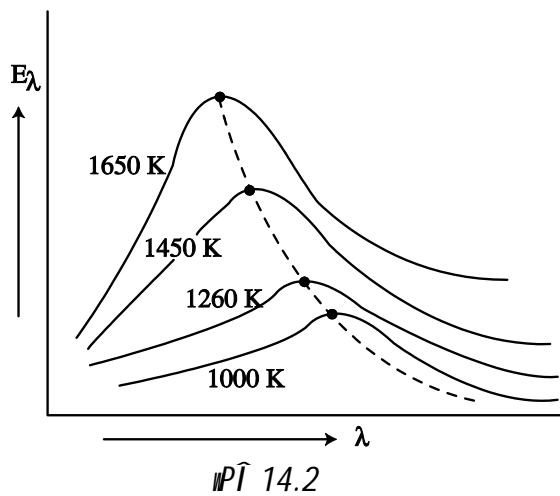
e Gi gvb wbfP Kti e-æ çñoi çKwzi Dci |

14.2.2 t Av`kKòe-æ meKiy eYñ tZ kw³ i eUb

meÁvbx jgvi | wçñkg wewfbæzi½ ãñP Rb" Kòe-æ kw³ eUb m=úwKZ Añk cixñv wixñv Kñib| Zuvv t-ñLb th, GKw Kòe-æ DEB Kiti Zv t-ñk çñg jvj, Zvici Kgjv, njy | tkñl te, bx iñoi Avñv wBMZ nq|

A_ñ Zvcgñv ewx i mñt_ mñt_ meñk meKiy Zvñci Zi½ ãñP ñz" Zi½ %ñP wñk AMñi nq| Kòe-zweKiyi Rb" jgvi | wçñkg th cixñvj ä djvdj tçtñQñb Zv 14.2 bs wñtñ t-ñLbv nñqñQ|

GLvfb tj L wñtñUñZ x Aññ Zi½%ñP I y Aññ meKiy ñlgZv E_λ wñtñ R Kiv nñqñQ|



tj Lwñtñ t-ñk eSv hvñ"Q th,

(1) Zvcgñv ewx tçtñ E_λ ewx çvq|

(2) tKvb wñw"ñ Zvcgñv Zi½%ñP ewx i mñt_ E_λ ewx çvq| GKUv wñw"ñ Zi½ ãñP (λ_m) Rb" E_λ meñk nq Ges Zi½ ãñP çieZñ ewx i Rb" meKiy ÿgZv nñm çvq|

(3) D"pzi Zvcgñv (λ_m) Gi mñePp gñbi Rb" Zi½ ãñP (E_λ) ñzñzi gñbi wñk mñi hvq|

14.2.3 t fxbi mĤ

RvgĤ c`v`e` fxb Kòe`z eYĤ xĤZ uewfbæZi½`^`tN`P Rb` kw³ eUḅ ueiqK mĤ cĤqb Kĥib|
GũU fxbi miY mĤ (Wien's displacement law) bvtg cwi ĤPZ|

fxbi miY mĤ

1893 uLbvtã ueÁvbx fxb ZvcMwZue`vi mrvth` cġvY Kĥib th,

Kòe`z`ĤK mĤePP cwiġw ueKxY`kw³i Rb` Zi½%N`e`z cig ZvcġvĤvi e`vbgwZK|

e`vL`v t hw`T ZvcġvĤvi Kòe`z meĤaK kw³i Rb` Zi½%N`e`λ_m nq, Zvntj

$$\lambda_m \propto \frac{1}{T}$$

$$\text{ev, } \lambda_m T = a^eK / GB a^eĤKi gvb 2.898 \times 10^{-3} \text{ mK}$$

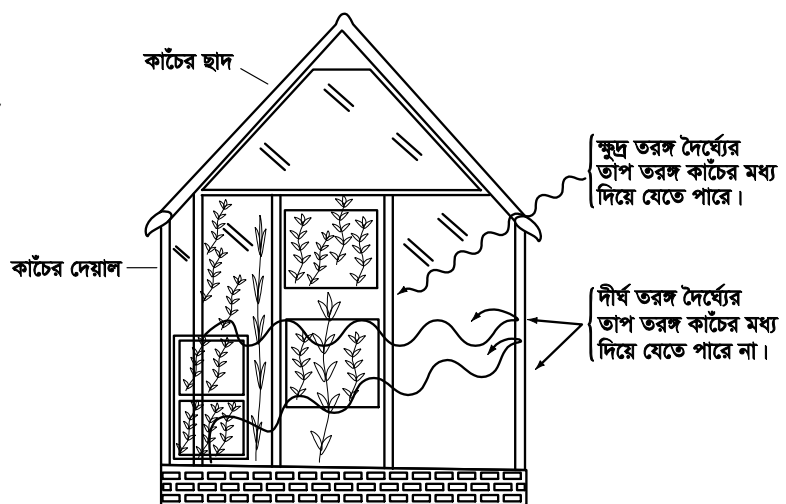
A_evej v hvq th, ZvcġvĤvT eĤx tĤtj λ_m nwm cġq|

A_Ĥ ZvcġvĤv eĤxi mĤ_ ueKxY`ZvĤci mĤePP gĤtbi Rb` Zi½`^`N`e`λ_m) ĤĤZi gĤtbi w`ĤK mĤi
hvq| ZvB G mĤĤĤK fxb-Gi miY mĤ ejv nq|

14.2.4 t fxbi miY mĤ I Mġb nuDR Ĥmqv

fxb Gi mĤvbynti ZvcġvĤv eĤxi mĤ_ ueKxY`ZvĤci mĤePP gĤtbi Zi½%N`e`nwm cġq| Avevi Lġ DĒB
e`z`ĤK uḅMz AĤcĤĤKZ.ĤĤz`Zi½`^`tN`e`Zvc Zi½`KvĤPi ga`w`Ĥq PĤj thĤZ cġti| uKšzKg DĒB
e`z`ĤK ueKxY`ZvĤci Zi½%N`e`nq`xN`hv KvĤtf` Kĥi thĤZ cġti bv| Zvc Zi½%G agĤK KvĤR
jvMĤq KvĤPi`Zix Mġb nuDR`Zix Kiv nq| kvZ cġvb`Ĥk cĤU kvĤZi KvĤY kvKmeĤR Drcv`b
e`vnZ nq| ZvB Mġb nuDR GKũU uḅw`Ĥ ZvcġvĤv eRġq tiĤL kvKmeĤR Drcv`b Kiv nq| GQvov
`ġvuc`Dw`c`msi ĤĤYI Mġb nuDR e`envi Kiv nq|

ĤĤz`Zi½%N`e`mĤKxY`Mġb
nuDRi KvP tf` Kĥi wFZĥi
cĤek KiĤZ cġti, uKšz
nuDRi ĤFZĥi DĒB MvQcġv
ev gvũ hLb Zvc ueKxY`Kĥi,
AĤ ZvcġvĤvi Rb` GB ZvĤci
Zi½`^`N`e`nq eo| dĤj G
Zvc KvP tf` Kĥi thĤZ cġti
bv Ges Mġb nuDRi Af`šĥi
hĤ_ó Mig`ĤK|



ĤĤN14.3

mekp'vcx 00Mób nvdR Gtd±0 wbtq th wclqul Avtj woz n'Q ev fiev n'Q Zv ntjv evqygÚtj Kveð WvB A· vBW ewxi Kvi tY cll exi µgk DEB nl qv|

Kvtpi gtZv Kveð WvB A· vDtwi ga" w tql ¶Zª Zi tzi wewKiY thtZ cvti wKšz`xN©Zi tzi wewKiY thtZ cvti bv| mh¶_tK AvMZ ¶:ª Zi tzi wewKiY evqygÚj tf` Kti cll extZ Avtm| wKšzc ll ex cõ hLb Zvc wewKiY Kti Zvi Zi ½ %N©nq `xN©hv evqygÚj i Kveð WvB A· vBW tf` Kti thtZ cvti bv| dtj cll ex µgk DEB ntZ Pj tQ| Avk¼v Kiv n'Q th, Gi dtj cll exi tgi" AÂtj i eid Mtj mgj 1 cwb i D" PZv evote Ges AtbK t` tki wv wAj Zwj tq hvte|

D`niY

1| 0.2m e`vmitaP GKul Kv t j v avZe tMvj K 20w ¶jgZv wewkó Zvc wewKiY Kti | Gi ZvcgvT v KZ?

$$[\sigma = 5.672 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}]$$

hw` tMvj tKi cig ZvcgvT v T Ges w÷ tdtbi a°eK σ nq, Zvntj w÷ tdtbi mFubymti cõZ GKK t¶T t_tK wewKi tYi nvi, $E = \sigma T^4$

$$\therefore S \text{ t¶T } t_tK \text{ Zvc wewKi tYi nvi} = S \times \sigma T^4$$

$$\begin{aligned} \text{GLv t b, } S &= 4\pi r^2 = 4 \times 3.14 \times (0.2)^2 \text{ m}^2 \\ &= 0.5024 \text{ m}^2 \end{aligned}$$

$$\sigma = 5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$$

$$\therefore 20 = 0.5024 \times 5.67 \times 10^{-8} \times T^4$$

$$\text{ev, } T^4 = \frac{20}{0.5024 \times 5.67 \times 10^{-8}}$$

$$\text{ev, } T^4 = 7.02 \times 10^8$$

$$\therefore T = 162.7 \text{ K}$$

Dt 162.7 K

2| 500K ZvcgvT vi GKul Kò.e`z300K ZvcgvT vi GKul Kòe`z0v iv cwitewZ ntq AvtQ| `w e`z ga`eZi°v evqyk b` i vLv ntqtQ| cll g e`wji Zvc wewKi tYi nvi wBYQ Ki"b|

$$(\sigma = 5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4})$$

$$\text{Avgiv Rvnb Zvc wewKi tYi nvi, } E = \sigma (T_1^4 - T_2^4)$$

$$\text{GLv t b, } T_1 = 500\text{K}$$

$$T_2 = 300\text{K}$$

$$\sigma = 5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$$

$$\therefore E = 5.67 \times 10^{-8} \{ (500)^4 - (300)^4 \}$$

$$= 5.67 \times 10^{-8} (625 \times 10^8 - 81 \times 10^8)$$

$$= 5.67 \times 10^{-8} \times 10^8 (625 - 81)$$

$$= 5.67 \times 544$$

$$= 3084.48 \text{ W m}^{-2}$$

Dt 3084.48 W m⁻²

3/ `y/ Kò.e⁻zA I B Gi cùZ GKK t`qÎ dj t₋tK wBMZ Zvckw³ i AbgvZ 16:1; A Gi ZvcgvÎv 3000K, B Gi ZvcgvÎv KZ?

aiv hvK, A e⁻z₋tK wBMZ Zvckw³ = E_A

B e⁻z₋tK wBMZ Zvckw³ = E_B

t`I qv AvtQ, $\frac{E_A}{E_B} = \frac{16}{1}$

Avevi, Avgi v Rvb $\frac{E_A}{E_B} = \left(\frac{T_A}{T_B}\right)^4$

$\frac{16}{1} = \left(\frac{3000}{T_B}\right)^4$

$\frac{3000}{T_B} = (16)^{1/4} = 2$

∴ T_B = $\frac{3000}{2} = 1500\text{K}$

Dt 1500K

4/ tKvb e⁻z₋tK mtePP wevKi tYi Rb^o Zi½ ^N^o12 × 10⁻⁶ m. e⁻z₋tK ZvcgvÎv KZ ?

aiv hvK, e⁻z₋tK ZvcgvÎv = T Ges mtePP wevKi tYi Rb^o Zi½ ^N^oλ_m

fixtbi mi Y m^ovbyviti,

λ_m T = a^oeK = 2.898 × 10⁻³ mK

∴ T = $\frac{2.898 \times 10^{-3}}{\lambda_m}$

GLv#b λ_m = 12 × 10⁻⁶ m.

∴ T = $\frac{2.898 \times 10^{-3}}{12 \times 10^{-6}}$

= 241.5K

Dt 241.5K

mvi mst¶c

w÷tdtþbi mĤ t tKvb Kðe^{-z}cĀZ GKK t¶ĴĴdj t_ĤK tmĤKtĪ th Zvc wewKiY Kti Zv H e^{-z} cig
ZvcgvĴvi PZZ[¶]NvĤZi mgvbgvWZK|

A_¶ Kð.e^{-z} ZvcgvĴv T Ges Kðe^{-z} cĀZ GKK t¶ĴĴdj t_ĤK cĀZ tmĤKtĪ wKxY[¶]ZvĤci cwi gvY
E ntj , E ∝ T⁴

$$ev, E = \sigma T^4$$

$$GLvþb, \sigma = w\div tdtþbi a^eK = 5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$$

hw T₁ ZvcgvĴvi Kðe^{-z}T₂ ZvcgvĴvi Avi GKw Kð.e^{-z}zðv v cwiþewZ_vĤK, Zvntj cĀg e^{-z}
KZĤ.GKK t¶ĴĴdj t_ĤK GKK mgĤq wKxY[¶]ZvĤci cwi gvY,

$$E = \sigma (T_1^4 - T_2^4)$$

ftþbi miY mĤ t ZvcgvĴv ewx_i mvĤ_v wKxY[¶]ZvĤci mte[¶]P gvĤbi Rb[¶] Zi ½[¶] N[¶](λ_m) ¶ĴZi gvĤbi
w_ĤK mĤi hvq| A_¶ λ_mT = a^eK|

cuVvEi gj`vqb

K. `be9PK cKæ

mWk DEti i cuK Wk (√) wPy w b

- 1/ tKvbU w:-tdtbi a`eKki GKK?
 (K) $W m^{-2} K^{-1}$ (L) $W m^{-2} K^{-4}$
 (M) $W m^{-2} K^{-2}$ (N) $W m^{-2} K^4$

- 2/ Zvc Zi½i Zi½ `N^o
 (K) ZvcgvÎv eW×i mvt_ nwm cvq |
 (L) ZvcgvÎv eW×i mvt_ eW× cvq |
 (M) mKj ZvcgvÎvq GKB_vtK |
 (N) tKvb e`z t¶tÎ eW× cvq tKvb e`z t¶tÎ nwm cvq |

- 3/ fxtbi miY mF λ_{mT} = a`eK; GB mF λ_m Wk eSvq ?
 (K) mteP ZvcgvÎvq Zi½ `N^o
 (L) th Zi½ `N^ometPtq Kg weWkiY nq |
 (M) th Zi½ `N^ometPtq teWk weWkiY nq |
 (N) meWvZvcgvÎvq Zi½ `N^o

- 4/ MÛo nvDR t_tK Zvc tei ntZ cvti bv Gi KviY -
 (K) mthP Zvtc Kvtpi Ni teWk DEB nq etj |
 (L) Nti tFZi Zvc Zi½i Zi½ `N^onwm cvq etj |
 (M) Nti tFZi Zvc Zi½i Zi½ `N^o`xN^onq etj |
 (N) Kvtpi Pvj_vtK etj |

- 5/ λ_{mT} = a`eK | GB a`eKki gvb KZ?
 (K) 2.898×10^{-3} (L) 2.898×10^{-4}
 (M) 8.298×10^{-3} (N) 2.898×10^3

L. msWjB cKæ

- 1/ Kð.e`zeWkiYi Rb` weÁvbx jgvi I wcsWkg-Gi ciX¶vj ä djvdj tj LwPÎ mn eYðv Ki`b |

cW - 3

vbDUtbi kxZj xKiY mF, w:tdtbi mF t_tK vbDUtbi kxZj xKiY mfi
cZcv`b, vbDUtbi kxZj xKiY c xVZtZ Zitji AvtcwK Zvc vbYq,
veikiy I tkvly mspuvš-Ktqkuw Nubv|

Dfik

G cW tktl Avctb -

- | vbDUtbi kxZj xKiY mF eYv KiTZ cvi teb|
- | wtdtbi mF t_tK vbDUtbi kxZj xKiY mF cZcv`b KiTZ cvi teb|
- | kxZj xKiY c xVZtZ Zitji AvtcwK Zvc vbYq cVj x eYv KiTZ cvi teb|
- | veikiy I tkvly mspuvš-KQycokè DEi wj LtZ cvi teb|

14.3.1 t vbDUtbi kxZj xKiY mF

vbDUB meEg cwi cvtkP Zjbrq tKvb DEB e-zKZK Zvc nftmi nvi I e-z ZvcgvIvi gta mpuK
vifcy Ktib| mFw kxZj xKiY mF brtg cwi wPZ| mFw vbwefc t

cwi cvtkP mF tKvb e-z ZvcgvIvi e'eatb Kg ntj veikiyi Rb H e-z ZvcgvIvi nftmi nvi e-z
I cwi cvtkP ZvcgvIvi e'eatbi mgvbwZK|

e'vL'v t aiv hvK, tKvb e-z ZvcgvIv = 0 I

cwi cvtkP ZvcgvIv = 0₀ |

hiv e-zat mgtq dQ cwi gvY Zvc eRb Kti

Zvntj, Zvc nftmi nvi = - $\frac{dQ}{dt}$

vbDUtbi kxZj xKiY mFvbyti ,

$$- \frac{dQ}{dt} \propto (\theta - \theta_0)$$

$$\text{ev, } - \frac{dQ}{dt} = k(\theta - \theta_0) \text{ ----- (4)}$$

GLv k = a'eK| G a'eK e-z cft tki tTIdj I cKwzi Dci wbfP Kti| (FYvZK wPy Zvc
eRb eSvq)|

Zvc eRb nftmi nvi E 0viv Ges ZvcgvIv tKj wftb cKvk Kij 4 bs mgvkiYtK tj Lv hvq -

$$E = K (T - T_0) \text{ ----- (5)}$$

ev, E \propto (T - T₀)

14.3.2 t w:tdtbi mF t_tK wDUtbi kxZj xKiY mF

w:tdtbi mF mKj ZvcgvIvi DEB e`z Rb` c`hvR`| Avi wDUtbi mF i'agvI Kg ZvcgvIvi e`eavtbi Rb` c`hvR`|

hiv T cig ZvcgvIvi GKwU KDe`zT0 ZvcgvIvi tKvb KDe`z gta` ivLv nq Zvntj c`lg e`w th nvti Zvc eRb` Kti Zv ntjv t

$$\begin{aligned}
 E &= \sigma (T^4 - T_0^4) \\
 &= \sigma (T^2 + T_0^2) (T^2 - T_0^2) \\
 &= \sigma (T^2 + T_0^2) (T+T_0) (T-T_0) \\
 &= \sigma (T^3 + T^2 T_0 + T_0^2 T + T_0^3) (T-T_0) \text{----- (3)}
 \end{aligned}$$

hLb ZvcgvIvi e`eavb Kg| A` hLb (T-T0)Gi gvb Kg nq ZLb wDUtbi kxZj xKiY mF c`qvm Kiv hvq|

(T-T0) Gi gvb AvZ qz`ati wbtj A` T I T0 c`q mgvb ati Avgiv wDUtbi kxZj xKiY mF tei KiZ cwi | T I T0 c`q mgvb ntj, T^2 T0 = T^3 ,

$$T T_0^2 = T^3, T_0^3 = T^3 \text{ nq|}$$

∴ 3 bs mgxKiYtK wj LtZ cwi

$$E = \sigma (4T_0^3) \times (T - T_0)$$

$$E = K (T - T_0) \text{ [GLvtb, } K = 4 \sigma T_0^3 \text{]}$$

∴ E ∝ (T - T0)

A` hiv` ZvcgvIvi e`eavb Kg nq Zvntj kxZj xKiYi nvi e`z ZvcgvIv I cwi cvtk` ZvcgvIvi cv`K`i mgvbwZK|

GwUB wDUtbi kxZj xKiYi mF|

14.3.3 t wDUtbi kxZj xKiY c`wZtZ Zitj i AvtcwJK Zvc wYq

wDUtbi kxZj xKiY mF Abgnvti tKvb e`z Zvc nvtmi nvi e`zl Zvi cwi cvtk` ZvcgvIvi cv`K`i mgvbwZK| Avevi tKvb cvtIi gta` Zij c`v`DEB Kti VvUv ntZ w`tj c`Z tmKtU Zvc nvtmi nvi wbf` Kti : (1) cvtIi Dbt` Zitji t`I dj, (2) Zij c`v` ZvcgvIv, (3) cwi cvtk` ZvcgvIv, (4) th cvtIi Zij ivLv nq tm cvtIi c`wZ. I Gi eivtc`oi t`I dtji Dci | Zvc nvtmi nvi Zij c`v` c`wZi Dci wbf` Kti bv| hiv` w` wfbwZij c`v`K উপরিলিখিত GKB kZvaxtb kxZj ntZ t` I qv nq, Zvntj Zvc nvtmi nvi GKB nte| kxZj xKiY c`wZtZ G bvwZ c`qvm Kti Zij c`v` AvtcwJK Zvc wYq Kiv nq|

Khe0vj x

c0tg bvonbmn GKUJ cwi 0vi I i0 K'vj wingUvtii fi wby0 Kiv nq| cix0Yxq Zi'tji Zvcgv1v K0 Zvcgv1vi tPtq 30°C D'P Zvcgv1vq DEB Kti K'vj wingUvtii wbi 0 `vM chS-Xjv nq| Gevi K'vj wingUvtiK Zvc nvm wbtivaK c0Kvt0 ti'tL bvonb w'tq AbeiZ bvon nq Ges GKUJ mje`x _vtg0Uvtii mrvvt0 wbi 0 mgq ASt Zi'tji Zvcgv1vi cvV tblqv nq| Zi'tji Zvcgv1v K0 Zvcgv1vi 10°C Dci tcs0vtbv chS-Gfvte cvV tblqv nq| Avevi Zijmn K'vj wingUvtii fi wby0 Kiv nq| 0 f'tii cv`R" t'tK Zi'tji fi cvlqv hvq|

Gevi K'vj wingUvtiK clyivq cwi 0vi I k0 Kti H wbi 0 `vM chS-K0 Zvcgv1vi tPtq 30°C D'P Zvcgv1vi cwb w'tq cY0Kiv nq| GKB wbtqg kxZj ntZ t`lqv nq Ges wbi 0 mgq ASt Zvcgv1vi cvV tblqv nq| cwbmn K'vj wingUvtii fi gvcv nq Ges K'vj wingUvtii fi ev` w'tq cwbi fi wby0 Kiv nq|

Gevi Zij Ges cwbi mgq ebrg Zvcgv1vi tj LuP1 A1/2b Kiv nq| tj LuP1 t'tK Dfq Zi'tji GKB Zvcgv1v cwi mti kxZj ntZ c0qvRbxq mgq tei Kiv nq|

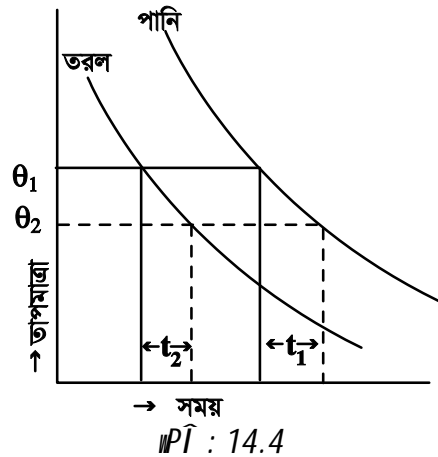
aiv hvK,

K'vj wingUvtii fi = m₁ kg

cwbi fi = m kg

cwbi Av'tciv0K Zvc = s

Zi'tji fi = m₂ kg



K'vj wingUvtii Dci`vtbi Av'tciv0K Zvc = S₁ J kg⁻¹ K⁻¹

Zi'tji Av'tciv0K Zvc = S₂ J kg⁻¹ K⁻¹

cwbi θ₁⁰ c t'tK θ₂⁰ c chS-kxZj ntZ mgq tbq = t₁ s

Zij θ₁⁰ c t'tK θ₂⁰ c chS-kxZj ntZ mgq tbq = t₂ s

AZGe, cwbi I K'vj wingUvtii kxZj xKi'tYi nvi = $\frac{(ms+m_1s_1)(\theta_1-\theta_2)}{t_1}$

Zij I K'vj wingUvtii kxZj xKi'tYi nvi = $\frac{(m_2s_2+m_1s_1)(\theta_1-\theta_2)}{t_2}$

GKB kZ0x0b _vKvi Rb" kxZj xKi'tYi nvi `0 mgvb nte,

∴ $\frac{(ms+m_1s_1)(\theta_1-\theta_2)}{t_1} = \frac{(m_2s_2+m_1s_1)(\theta_1-\theta_2)}{t_2}$

$$eV, t_1 (m_2 s_2 + m_1 s_1) = t_2 (sm+ m_1 s_1)$$

$$eV, m_2 s_2 t_1 = t_2 (sm+ m_1 s_1) - m_1 s_1 t_1$$

$$\therefore \text{wb}tY\text{q} \text{ Av}t\text{c}w\text{f}K \text{ Zvc}, S_2 = \frac{t_2(sm+m_1s_1)}{m_2t_1} - \frac{m_1S_1}{m_2} \text{----- (6)}$$

Zitji fi (m_2), cmbi fi (m), cmbi Avtciwfk Zvc $4200 \text{Jkg}^{-1} \text{K}^{-1}$ K'ij wiugluti i Zvcavi Y flgZv $m_1 s_1$ Ges tjLwP t_#K t_1 I t_2 Gi gvb ewmtq Zitji Avtciwfk Zvc 6bs mgrKiYi mrvvth" wbyq Kiv hvq|

14.3.4 t weKiY I tkvY mspvš-KtqKwU NUbv

(K) Mitgi w`tb m`v tcvkK I ktZi w`tb Kvjv tcvkK Avivgc0 tkb?

D`Ei t mrv`v is Zvcxq weKiYi D`Eg c0Zdj K| mrv`v tcvkK mthP ZvcfK c0Zdwj Z Kti wdwitq t`q, ZvB mrv`v tcvkK mn#R D`EB nq bv| Avi Kvjv is D`Eg tkvK| dtj Kvjv tcvkK mthP Zvc tkvY Kti D`EB ntZ cvti | ZvB Mitgi w`tb mrv`v tcvkK I ktZi w`tb Kvjv tcvkK Avivgc0 |

(L) ivbwi cvl wntmte bZb PKP#K cvtI i tPtq cjtbn Kwj gvLv cvl teuk Dc#hMx tkb?

D`Ei t Kwj gvLv cvl teuki fivM Zvc tkvY Kti `Z D`EB nq| wKszbZb PKP#K cvl teuk Zvc tkvY Kitz cvti bv, teuki fivM Zvc PKP#K Zj t_#K c0Zdwj Z ntq hvq| Kwj gvLv cvtI i tkvY flgZv teuk etj ivbwi Kv#R GiU teuk Dc#hMx|

(M) tgNgY ivZ Atcflv tgnvObwvZ teuk Migteva nq tkb?

D`Ei t w`tbi teyv f;c0 mhZvc tkvY Kti D`EB nq Ges ivtZi teyvq Zvc weKiY Kti kxZj nq| tgNgY ivZ f;c0 mn#R Zvc weKiY Kti kxZj ntq hvq| wKszRj xq evu Zvc A`Q gva`g etj f;c0i Zvc tgnNi ga` w`tq mAvij Z ntZ cvti bv| dtj tgnvObwvZ teuk Mig teva nq|

(N) gi" AA#j w`tb c0U Mig I ivZ c0U kxZ teva nq tkb?

D`Ei t gi" AA#j i evqyi`v`K| i` evqyD`Eg Zvc cwi evnx gva`g A`f i` evqy ga` w`tq Zvc mn#R thZ cvti | w`tbi teyv mthP Zvc mn#RB f;c0 tc0vq I f;c0 AZ`š-D`EB nq| dtj gi" AA#j w`tb c0U Mig teva nq|

Avei ivtZi teyvq f;c0 Zvc weKiY Kti | i` evqy ga` w`tq mn#RB Zvc evqyUj t` Kti P#j hvq| dtj f;c0 kxZj ntq hvq| ZvB ivtZi teyv tmLv#b L# kxZ AbfZ nq|

D`wiY

250 g f#i i GKwU Zvgvi K'ij wiugluti 8g cmb wbtq 50°C t_#K 40°C Zvcgvivq VvUv ntZ mgq tbq 70 tm#K0 Ges GKB K'ij wiugluti mgvb AvqZ#bi 10g Zij c`v`wbtq 50°C t_#K 40°C Zvcgvivq VvUv ntZ mgq tbq 60 tm#K0| Zvgvi Avtciwfk Zvc $380 \text{Jkg}^{-1} \text{K}^{-1}$ ntj Zij c`v`Avtciwfk Zvc KZ?

g#b Kiv hvK, Zij c`vt_@ Avtcm7K Zvc = S
 t`l qv AvtQ-

$$K'vj\ wmgUvti\ i\ fi = 250g = 0.25\ kg$$

$$cm\ bi\ fi = 8g = 0.008\ kg$$

$$Zij\ c`vt_@\ fi = 10g = 0.01\ kg$$

$$Zvgvi\ Avtcm7K\ Zvc = 380\ Jkg^{-1}\ K^{-1}$$

$$cm\ bi\ Avtcm7K\ Zvc = 4200\ Jkg^{-1}\ K^{-1}$$

∴ K'vj\ wmgUvi\ l\ cm\ b\ KZR.Zvc\ nvtmi\ cm\ i\ gvY

$$= 0.25 \times 380 \times (50-40) + 0.008 \times 4200 \times (50-40)$$

$$= 950 + 336$$

$$= 1286\ J$$

$$\therefore K'vj\ wmgUvi\ l\ cm\ b\ KZR.Zvc\ nvtmi\ nvi = \frac{1286}{70} = 18.37\ J\ S^{-1}$$

Avevi, K'vj\ wmgUvi\ l\ Zij\ c`v_@KZR.Zvc\ nvtmi\ cm\ i\ gvY

$$= 0.25 \times 380 \times (50-40) + .01 \times S(50-40)$$

$$= (950 + 0.1S)J$$

$$\therefore K'vj\ wmgUvi\ l\ Zij\ KZR.Zvc\ nvtmi\ nvi = \frac{950 + 0.1S}{60}$$

kxZj\ xKi\ Y\ mF\ c0qM\ Kti\ tj\ Lv\ hvq,

$$18.37 = \frac{950 + 0.1S}{60}$$

$$ev, 1102.2 = 950 + 0.1S$$

$$ev, 0.1S = 1102.2 - 950$$

$$ev, 0.1S = 152.2$$

$$\therefore S = \frac{152.2}{0.1} = 1522\ Jkg^{-1}\ K^{-1}$$

$$Dt\ 1522\ Jkg^{-1}\ K^{-1}$$

cvtVĒi gj`vqb

K. `be`PK cĳæ

mĳK DĒti i cĳk ĳK (√) ĳPy ĳ b

- 1/ tKvbĳU ĳbDUĳbi kxZj xKiY mĴ ?

(K) $E = K(T - T_0)$	(L) $E = \sigma T^4$
(M) $E = \sigma(T^4 - T_0^4)$	(N) $\lambda_m T = a^* e K /$
- 2/ ĳbDUĳbi kxZj xKiY mĴ cĳZcv`b Kiv hvq -

(K) fĳĳbi mĴ t_ĳK	(L) Kvkĳdi mĴ t_ĳK
(M) ĳ÷tđĳbi mĴ t_ĳK	(N) ĳbDUĳbi MĳZ mĴ t_ĳK
- 3/ ĳw` tKvb e`ĳ0 sec mgĳq 200 J Zvc eRĳ Kĳi Zĳnĳj H e`ĳKZĳ.Zvc nĳĳmi nvi

(K) -20J	(L) -20JS ⁻²
(M) -20 JS ⁻¹	(N) 20WS ⁻¹

L. mĳĳĳB cĳæ

- 1/ ĳbDUĳbi kxZj xKiY mĴĳU ĳj Lĳ|
- 2/ ĳ÷tđĳbi mĴ t_ĳK ĳbDUĳbi kxZj xKiY mĴĳU cĳZcv`b Ki`b|
- 3/ tgNgĳ ivZ Aĳcĳĳv tgNv`QbĳivĳZ teĳk Mig teva nq tKb?
- 4/ gi` Aĳĳĳ ĳ`ĳb cĳĳU Mig I ivĳZ cĳĳU kxZ teva nq tKb ?

iPbvĳj-K cĳæ

- 1/ Av`kĳĳ. e`ĳKĳĳ eĳj ? Av`kĳĳ. e`ĳKĳĳe`ĳKĳĳe`Zix Kiv hvq ?
- 2/ (K) tKvb e`ĳ ĳĳĳKiY ĳĳgZv I tkvĳY ĳĳgZv eĳĳZ ĳK eĳĳvq?

(L) Kvkĳdi ĳĳĳKiY mĴ e`vL`v Ki`b
(M) Kvkĳdi mĴ cĳqM Kĳi tmsi eYĳ xi dbndvi tiLvi Drcĳĳ ĳĳĳĳĳ Ki`b
- 3/ Kĳ. e`ĳ ĳ÷tđb Gi mĴĳU eYĳv Ki`b| ĳ÷tđĳbi a`eĳKi ĳvb KZ?
- 4/ fĳĳbi miY mĴ eYĳv Ki`b| fĳĳbi mĴ t_ĳK ĳKĳĳe Mĳb nĳDR ĳĳqĳ e`vL`v Kiv hvq eYĳv Ki`b|
- 5/ ĳbDUĳbi kxZj xKiY mĴĳU eYĳv Ki`b| ĳ÷tđĳbi mĴ t_ĳK ĳbDUĳbi kxZj xKiY mĴ cĳZcv`b Ki`b|
- 6/ ĳbDUĳbi kxZj xKiY mĴĳi mĳnĳth` Ziĳj i Avĳcĳĳĳ K Zvc ĳbYĳ cĳĳvj x eYĳv Ki`b|

MwVvZK cêce

- 1/ 400K Zvcgvîv ñeikó GKwU Kò.e⁻zcîZ ðmþKþÛ ñK cwi gVY k³ ñeikY Ki ðe ñbYq Ki "b/ ($\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-2} \text{ K}^{-4}$)
- 2/ 0.3m e⁻vmvta⁹ GKwU Kvjv avZe tMvj K 20w 9lgZv ñeikó Zvc ñeikY Kþi | Gi Zvcgvîv ñbYq Ki "b/ ($\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-2} \text{ K}^{-4}$)
- 3/ 400K Zvcgvîvi GKwU Kòe⁻z200K Zvcgvîvi GKwU Kòe⁻zðvi v cwi ðewóZ AvtQ | cÛg e⁻ñi Zvc ñeikYi nvi ñbYq Ki "b/ ($\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-2} \text{ K}^{-4}$)
- 4/ ñKò.e⁻zA I B Gi cîZ GKK t9îdj t_þK ñbMz Zvcw³i AbgvZ 81:1; A Gi Zvcgvîv 1800 K; B Gi Zvcgvîv KZ?
- 5/ tKvb e⁻z_þK mte⁹⁹ ñeikYi Rb⁻ Zi ½ % N⁹ 15 × 10⁻⁶ m. e⁻ñi Zvcgvîv ñbYq Ki "b/
- 6/ 200g fþi i GKwU Zvgvi K⁻vj ñingUvþi 5g cwb ñbþq 55⁰ C t_þK 45⁰ C Zvcgvîvq VvÛv nþZ mgq j vM 70 sec | GKB K⁻vj ñingUvi mgvb AvqZþbi 6g Zij c⁻v⁹ ñbþq 55⁰ C t_þK 45⁰ C Zvcgvîvq VvÛv nþZ mgq þbq 60 sec | Zvgvi Avtçw⁹K Zvc 380 Jkg⁻¹ K⁻¹ nþj Zij c⁻v⁹ Avt Zvc KZ?