

5- v.kp vrjx

i'u 1- [kkyhy fn?kkRrjh i'ukph mRrj fygk-

1½ fuYI ckj ;kph v.kph jpuk Li"V djk-

mRrj %1½ukcy ikfjrkf"kd fotR;k fuYI ckju #njQkMP;k v.kfl/nkrkr dkgh egRokp cny n'kfoy vkgr-

2½ v.kP;k dndkr /kuiHkkfjr iKVkuI vlrkr] v.kdndkHkkorh _ .kiHkkfjr byDVkuI fof'k"V orGkdrh d{kk r fQjr vlrkr-

3½ byDVku ,dk d{kru nlÚ;k d{k r tkÅ 'kdrkr ijr nku d{kP;k e/; vlyY;k tkr r lfiykdj ekxku vkr fdok ckgj tkÅ 'kdr ukghr-

4½ ,dk d{kru nlÚ;k d{k r tk.;k lBh byDVkuu_dkgh fof'k"V Åtk 'kk"kyh ikfgt fdok mRlitr dyh ikfgt] dndkiklu nj tkrkuk d{kkph Åtk ikrGh ok<r tkr-

5½ fuYI ckj ;kuh fufujkG;k d{kke/khy tLrhr tLr byDVkuPkh l[;k 'kk/k.;k lBh 2n² g l= lfxry- d{kk Øekd (n) 1,2,3,4 ;kuk vuØe K,L,M,N v'kh uko fnyh vkgr-

∴ d{k r tLrhr tLr vl.kkj byDVku = 2n²

n = d{kpk Øekd

k (1)= 2, L (2)=8, M (3)=18, N(4) =32

;k d{kk mid{kkr foHkkxY;k tkrkr-

2½ #njQkM ;kp v.kp ik#i i; kxk}kj Li"V djk-

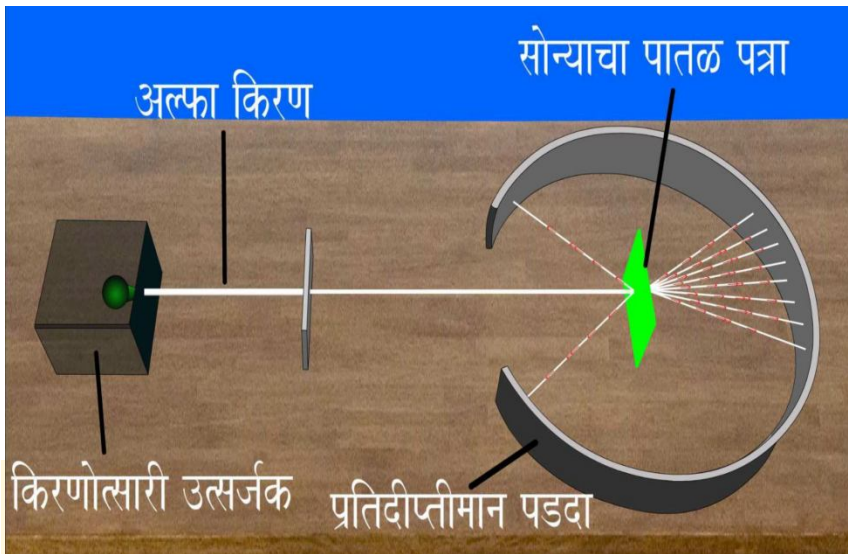
mRrj %1½1911 lkyh #njQkM ;kuh lku;kP;k i«;kP;k i;kxku v.kfo"k;d ekfgrh feGoyh-

2½ #njQkM ;kuh lku ;k /kkrPkk ikrG i«kk ?kou %0-00004 l- eh-½ R;k oj fdj.kkRlkjh eyn0;kP;k %jMhve% lkgk,;ku /kuiHkkfjr vYQk fdj.kkpk ekjk dyk-

3½ vYQk d.k Eg.ktp gfyvdp dnd gk;- lo.ki«khP;k ekx pedrk iMnk clfoyk o R;kP;k lkgk,;ku vYQk d.kkpk ekx fuf'pr dyk-

4½ fdj.kkR lkjh eyn0;krugk.kkÚ;k ikj.kkpk ilkj Fkkcfo.;klkBh r f'kl ;k /kkRP;k BkdG;kr Boy grk-

#njQkMpk fodhj.k i;kx



i;kxrhy fujh{k.k %

1½ cgl[; vYQk d.k lo.ki«khruvkji kj xy-

2½ dkgh vYQk d.kkpk ex FkkM;k iek.kkr cnyyk grk-

3½dkgh vYQk d.kkpk ex t kLr iek.kkr cnyyk grk-

4½ [kip FkkM vYQkd.k lo.ki«khoj vknGu myV fn'ku fQjy grk-

i;kxrhy fu"d"k %&

1½ v.kpk lo /kuiHkkj o v.kp lo oLreku v.kP;k dnkr ,doVyy vlr- ;k ygku dnkyk R;kuh dnd vl uko fny-

2½ v.kdndkHkkorh orGdkj d{kke/; byDVku ifjHke.k djr vlrkr v.k ljpuk l;ekyiek.k vl 'kdr-

3½ v.ke/; ikVku o byDVkuP;k 0;frfjDr mnklhu vl d.kl/nk vl kor-

3½ vkn;kfxd {k=krrhy fdj.kkR lkjh leLFkkfudkp mi;kx fygk-

mRrj % 1½jfMvxxkQh& fcMkP;k oLr fdok yk[kMkp t kMdke ;rrhy Hkxk fdok ikdGh xek fdj.kkP;k lkgk;ku 'kk/krk ;rrk- ;klkBh dkckYV & 60] bfjfMve & 192 ;klkj[;k leLFkkfudkp mi;kx jfMvxxkQh dejr dyk tkrk- ;kf'kok; /kkrdkekrhy nk"k 'kk/.;klkBh g r= okijrkr-

2½ /kk^rph t^kMh] ?kur^k] i^krGh ;kp ekiu dj.k & 1½ v^Y;fefuve]
IYk^fL^Vd] y^k[^kM v'^{kk} iⁿkF^{kk}p de^h& v^f/^kd t^kMhP;k i«;kph fufer^h
dj^rkuk v^{ko}';d ro<^h t^kMh dk;e j^k[^k.k v^{ko}';d v^lr-

2½ m^Ri^knuk^r ,d^k c^kt^u fdj.k^kR l^kj^h n⁰; o n^lÚ;k c^kt^yk
fdj.k^kR l^kj ekiu ;= v^lr- ;k r=^kP;k l^kg^k,;ku i^fd^xe/^{kh}y o^Lrgh
ri^kl^rk ;r^kr-

3½ nh^fi^reku j^x o fdj.k^kR l^kj fⁿl^r j^x& 1½ i^oh ?^kM;kG^kp d^kV]
fo^f'^k"^V v'^{kk} o^Lr v/^{kk}j^kr fⁿl.;k l^kB^h j^Mh^ve] i^kef^Fk^ve] V^hf^Vve ;k
fdj.k^kR l^kj^h iⁿkF^{kk}p fe^J.k o^ki^jy t^rk g^kr-

2½ HID (High Intensity Discharge) fⁿ0;kr f^ØI^Vku &85 r^j ch^Vk
fdj.k^kpk L=^kr Eg.ku X-ray ;fu^Ve/; i^kef^Fk^ve &147 g l^eL^Fkk^fud
o^ki^jr^kr-

4½ fl^jf^ed o^Lre/; o^ki^j&fl^jf^ed i^klu cu^{fo}.;kr ;.k^kÚ;k V^kb^YI]
H^{kk}M^h] l^yV^I] Lo; i^kd?k^jk^rh^y H^{kk}M^h ;k^e/; p^edⁿk^j j^x o^ki^jr^kr-

4½ fdj.k^kR l^kj^h l^eL^Fkk^fud^kp d"^{kh} {^k=k^e/^{kh}y e^gR^o f^yg^k-

m^Rr^j %1½ j^ki^kph t^yn o^k< g^k.;k l^kB^h o v^f/^kd m^Ri^Uu fe^Gfo.;k l^kB^h
f^c;kuk x.^k/^{ke} n.^{kk}j^h t^ud o x.^kl=[;]koj fdj.k^kR l^kj^kpk mⁱ;kx
d[#]u R;kr e^yH^kr cⁿy d^jr^k ;r^kr-

2½ d^kc^kY^V&60 ;k fdj.k^kR l^kj^h l^eL^Fkk^fud^kpk mⁱ;kx v^Uuif^jj{k.k^kr
d^jr^kr-

3½ d^kn] c^Vk^V ;kuk e^kM ;Å u; Eg.ku R;koj d^kc^kY^V 60 e/^{ku}
m^Rl^ft^r g^k.k^kÚ;k x^ek fdj.k^kpk e^kj^k d^jr^kr-

4½ fo^{fo}/^k fi^dko^jh^y l'^{kk}/^{kuk}r v^uj[^kd Eg.ku L^Vk^fU'^kve & 90
o^ki^jy t^rk-

5½ o|d'^{kk}L=^ke/; fdj.k^kR l^kj^h l^eL^Fkk^fud^kp d^k.k^r mⁱ;kx g^kr^kr \

m^Rr^j % 1½ i^kf^yl^k;F^kfe^vk& ;k j^kx^ke/; r^kc^M;k j^Dri'^{kh}p j^Dr^kr^hy
i^ek.^k o^k<^r ;koj mⁱp^kj^kl^kB^h Q^kL^Qj^l & 32 o^ki^jr^kr-

2½ g^kM^kpk d^dj^kx & mⁱp^kj d^jr^kkuk L^Vk^fU'^kve & 89] L^Vk^fU'^kve &
90] v^kf.^k j^fM^ve & 223 o^ki^jr^kr-

3½ g^k;i^j F^kk;j^kb^fM>^e& ;k v^kt^kj^kP;k mⁱp^kj^kl^kB^h v^k;k^Mhu & 123
o^ki^jr^kr-

4½ V;ej vkG[k.k& enrhy V;ejoj mipkj djrkuk ckjku &10] vk;kMhu & 131] dkckYV & 60 pk okij rj 'kjhjkrhy ygku V;ej 'kk/k.; k l k Bh vlfud & 74 pk okij dyk tkrk-

5½ Øfe;e & 51 g vkrM;krrhy ifFkukpk {k; ek t.; k l k Bh rlp rkcM;k i 'khuk funf'kr dj.; k l k Bh mi; kx gkrk-

6½ Úgfu;e & 188 pk okij vfUtvklykLVh l k Bh okijY;k t k.kkÚ;k cyue/; chVk d.kkP;k fuferh l k Bh djrrk-

7½ lyfu;e & 75 pk okij ikpd fodkjkpk vH;k l dj.; k l k Bh gkrk] vk;u & 59 pk okij vfufe;k ; k jxkP;k funkuk l k Bh gkrk-

6½ byDVku l#i.kk p idkj l kxk-

mRrj%1½fLFkj byDVku l#i.k& (Stable Electronic configuration)
T;k eyn0;kP;k ckáre d{kr nku fdok vkB byDVku v l rkr] R;k eyn0;kP;k byDVku l#i.kk yk fLFkj byDVku l#i.k Eg.krrk-
mnk-

eyn0;	byDVku l#i.k	
1½ gfyve	2	f}d
2½ fuvku	2]8	
3½ vjxku	2]8]8	
4½ fØIVku	2]8]18]8	v"Vd
5½ >Ukku	2]8]18]18]8	

1½ ckáre d{kr nku byDVku v l .; kP;k fLFkrhyk f}d fLFkrh v l Eg.krrk-

2½ ckáre d{kr vkB byDVku v l .; kP;k fLFkrhyk v"Vd fLFkrh v l Eg.krrk-

2½ vfLFkj byDVku l#i.k %& T;k eyn0;kP;k ckáRre d{kr 1 r 7 ;kidh byDVku v l rkr- R;k eyn0;kP;k byDVku l#i.kk yk vfLFkj byDVku l#i.k Eg.krrk-

mnk-

eyn0;	byDVku l#i.k
1½ l kfMve	2]8]1
2½ vY;fefuve	2]8]3

7½ l ;tk] l ;tk dop o l ;tk byDVku Eg.kt dk;\ R;kph mnkgj.k fygk-

mRrj % l ;tk&^eyn0;kP;k ckáre d{kr v"Vd fLFkrh iklr gk.;k l k Bh fnyY;k fdok ?kryY;k byDVkuph l [;k Eg.kt R;k eyn0;kph l ;tk gk;^* l ;tk gk v.kpk eyHkr jk l k;fud x.k/ke vkg-

l ;tk dop& jk l k;fud vfHkfØ;e/; v.kP;k 'koVP;k Eg.ktp ckáre dopkrhy byDVku Hkkx ?krkr- R;keG v.kP;k ckáre dopkyk R;kp l ;tk dop v l Eg.krkr-

l ;tk byDVku& v.kP;k ckáre d{kr fQj.kkÚ;k byDVkukuk l ;tk byDVku Eg.krkr-

R;kP;k l [;o#u R;k eyn0;kph l ;tk Bjr-

mnk-

eyn0;	byDVku l#i.k	l ;tk
1½ gk;Mk tu	1	1
2½ gfyve	2	0
3½ l kfMve	2]8]1	1
4½eXuf" kve	2]8]2	2

8½ fVik fygk-

1½ MkYVuP;k fl/nkrkph of" k"V;-

mRrj % 1½ n0; g v.kp cuyy vkg-

2½ v.k g vfoHkk tuh; o vuk'kor vkgr-

3½ v.k gk inkFkkpk vfoHkkT; d.k vkg-

4½ v.k r;kj djrk ;r ukgh] foHkk trk ;r ukgh fdok u"Vgh djrk ;r ukgh-

5½ ,dkp eyn0;kp lo v.k leku vlrr-

6½ fHkUu eyn0;kp v.k fHkUu vlrr] R;kp oLreku fHkUu vlr-

9½ #njQM ;kp dnh; ik#i ;kph of'k"V; fygk-

mRrj % 1½ v.kP;k dnke/; /kuiHkkjhr dnd vlr-

2½ dndke/; v.kp toGtoG lo oLreku ,doVyy vlr-

3½ dndkHkkorh byDVku ifjHke.k djr vlrr-

4½ lo byDVkukojhy __.kHkkj gk dndkojhy /kuiHkkjk,o<k vIY;ku fotkrh; iHkkjpk lryu gkÅu v.k gk fo|rn"V;k mnk lhu vlrr-

5½ ifjHke.k dj.kkj byDVku o v.kdnd ;kP;k njE;ku ikdGh vlr-

%10% dkj.k fygk-

1½ fuf"Ø; eyn0;kph l ;tk 'kU; vkg-

1½ fuf"Ø; eyn0;kph f}d o v"Vd fLFkrh i.k.i.k Hkjyyh vlr-

2½ gh eyn0; dk.kR;kgh eyn0;kP;k v.kcjkcj l ;kx ikor ukghr- Eg.ku fuf"Ø; eyn0;kph l ;tk 'kU; vlr-

2½ gk;Mk tuph l ;tk ,d vkg-

mRrj % 1½ gk;Mk tue/; ,d byDVku vkg-

2½ gk ,d byDVku gk;Mk tuP;k ckáre d{ke/; lkekoyyk vlrr-

3½ f}d fLFkrh i.k dj.;k lkbh gk;Mk tuyk ,dk byDVkuph xjt vkg- Eg.ku gk;Mk tuph l ;tk ,d vkg-

11½ vkfDI tuP;k leLFkkfudkp mi ;kx fygk-

vkfDI tu &16

vkfDI tu &17

vkfDI tu &18

16
0
8

17
0
8

18
0
8

mRrj % mi;kx % 1½ vkfDI tu & 16 g leLFkkfud fulxkr lokf/kd iek.kkr vk<Gr vlu R;kpk mi;kx lo lthokuk 'oluk lkbh rlp Toyu ifØ;ke/; gkrk-

2% vkfDI tu &16] 17 vkf.k 18 gh leLFkkfud fLFkj vlu 12 r 24 ;krhy leLFkkfud fdj.kkRlkjh rlp vLFkj vkgr-

3% vkfDI tu& 17 g leLFkkfud gk;Mktu vkf.k gfyveP;k Toyukru r;kj gkr-

4% vkfDI tu& 18 g leLFkkfud uk;Vktu vkf.k gfyveP;k dndkP;k l;kxkru r;kj gkr-

5% iFohP;k okrhoj.kkr 99-8% vkfDI tu 16] 0-04% vkfDI tu 17] rlp 0-2% vkfDI tu 18 vk<Gr-

12% tM ik.kh (Heavy water) fo"kh ekfgrh fygk-

mRrj % gk;Mktuph ,d.k rhu leLFkkfud vkgr- R;kuk gk;Mktu] M;Vfj;e] o VhfVve v'kh Lor= uko vkgr- M;Vfj;e vkf.k vkfDI tu ;kpk l;kx vlyY;k j.kyk tMik.kh fdok Heavy water vl Eg.krkr-

M;Vfj;e Eg.kt gk;MktuP;k dnLFkkuh ikVku cjkj ,d U;Vku vlrk- R;keG lkekU; gk;Mktui{kk R;kp otu tkLr vlr- vkfDI tu'kh l;kx ikoY;kurj R;kph lKk D₂O Eg.kt M;Vfj;e vkDIkbM v'kh gkr-

x.k/ke % 1% tM ik.kh g H₂O ;k lkekU; ik.;ki{kk x.k/keku oxG vlr- 2% ;k ik.;kph ?kurk lkekU; ik.;ki{kk tkLr vlr- rlp tM ik.;kph fonk0;rk lkekU; ik.;ki{kk 15% deh vlr-

mi;kx % 1%v.kHkVVhe/; ;jfu;e ;k /kkriklu fu?kkyy U;Vku g oxoku vlrk- R;kpk ox deh dj.;klkBh tM ik.;kpk mi;kx djrkr-

2% ijek.k fj;DVje/; ekMjVj (Moderator) vkf.k dyV (coolant) Eg.ku mi;kx gkrk- o U;Vhuk fMVDVj ;=ke/; tM ik.;kpk mi;kx djrkr-

3% 'kjhj'kkL= vkf.k tho'kkL= ;ke/; eVckfyd jV rikl.;klkBh o fVfVve vkf.k M;Vfjve P;k mRiknukl kBh tM ik.;kpk mi;kx gkrk-

i'u 2½ Iglc/k vkG[kk-

1½ ----- % lyeifMx v.kik#i %% #njQkM % dndh; v.kik#i

mRrj % FkkeIu

2½ ikVku % ----- %% byDVku % __.kiHkkj

mRrj % /kuiHkkj

3½ A : v.koLrekukd % % ----- % v.kØekd

mRrj % Z

4½ ikVku % dnd % % ----- % dop

mRrj % byDVku

i'u- 3½ IR; fd vIR; r fygk-

1½ v.ke/khy ikVkuph I[;k o byDVkuph I[;k Ieku ulr-

mRrj % vIR; %v.ke/khy ikVkuph I[;k o byDVkuph I[;k Ieku
vIr-½

2½ v.kdndkyk ikVkueG /kuiHkkj iklr gkrk-

mRrj % IR;

3½ U;Vkup oLreku g ikVkuP;k oLrekuki{kk tkLr vIr-

mRrj %vIR; %U;Vkup oLreku g ikVkuP;k oLrekukbrdp vIr-½

4½ dndke/; v.kp toGtoG lo otu ,doVyy vIr-

mRrj % IR;

i'u 4½ uko I kxk-

1½ fu;=d Eg.ku dk.kr eyn0; okijrkr \

mRrj %ckjku] dMfeve] cfjfyve

2½ eyn0;krhy vov.kd.k dk.kr \

mRrj %ikVku] U;Vku] byDVku

i'u 5% ,dk okD;kr mRrj fygk-

1% v.kHkVVh Eg.k t dk;

mRrj %v.kÅtP;k okijku ekB;k iek.kkr ohtfuferh dj.;kp l;=
Eg.ktp v.kHkVVh gk;-

2% v.kp eyHkr x.k/ke dk.kr

mRrj %iR;d v.kyk vdkj o olreku vlr g v.kp eyHkr x.k/ke
vkgr-

3% v.kph f=T;k Eg.k t dk;

mRrj %dndkP;k dnfcniklu ckáre d{k;rP;k vrjkyk v.kph
f=T;k vl Eg.krkr-

4% U;fDyvku l Eg.k t dk;

mRrj %v.kdndke/; /ku iHkkjhr ikVku vkf.k iHkkjfgR U;Vku ;kpk
leko'k gkrk ;kukp ,df=ri.k U;fDyvku l vl Eg.krkr-

5% f}d fLFkrh Eg.k t dk;

mRrj %ckáre d{kr nku byDVku vl.;kP;k fLFkrhyk f}d fLFkrh
vl Eg.krkr-

6% v"Vd fLFkrh Eg.k t dk;

mRrj %ckáre d{kr vkB byDVku vl.;kP;k fLFkrhyk v"Vd fLFkrh
vl Eg.krkr-

7% leLFkkfud Eg.k t dk;

mRrj %leku v.kvd ijr fhkUu v.kolreku vlyY;k eyn0;kuk
leLFkkfud vl Eg.krkr-

8% Fkkelu ;kuk v.k Hkn.kkj 'kkL=K vl dk Eg.krkr

mRrj %v.k vtU l{ed.kkpk vkg g lx.kkj Fkkelu g ifgy
'kkL=K gkr Eg.ku R;k l v.k Hkn.kkj 'kkL=K vl EgVy tkr-

9% v.kP;k fdrh o dk.kR;k d{kk vl rkr

mRrj %v.kP;k e[;r% pkj d{kk vlu R;k K,L,M, o N ;k vkgr

10% U;Vkupk 'kk/k dk.kh ykoyk

mRrj % tEl pMfod ;kuh U;Vkupk 'kk/k ykoyk