What are called Halogens?

17TH GROUP ELEMENTS

Continued from 11th November..

LEVEL I A

GENERAL CHARACTERISTICS

1 **Halogens means**
1) ore forming elements 2) sea salt products
3) inert gases 4) rare gases

2. **The electronic configuration of Halogens in their valence shell is**
1) ns^2 2) ns^2np^6 3) ns^2np^1 4) ns^2np^5

3. **The only non-metal, which is a liquid at room temperature**
1) O_2 2) F_2 3) N_2 4) Br_2

4. **The max. covalency of chlorine is**
1) 5 2) 7 3) 3 4) 1

5. **Out of the elements with atomic numbers given below which one would be a halogen ?**
1) 25 2) 35 3) 45 4) 55

6. **Iodine is more soluble in aqueous solution of KI because it forms soluble**
1) KI_2 2) KI_3 3) KI_4 4) K_2I_2

7. **The atomic number of astatine which belongs to sixth period is**
1) 53 2) 54 3) 85 4) 86

OXIDATION STATES

8. **Which of the following shows only one oxidation state in its compounds**
1) F 2) Cl 3) Br 4) I

9. **In the formation of inter halogen compounds bromine undergoes sp^3d^2 hybridisation in**
1) Ground state 2) 1st excited state
3) 2nd excited state 4) 3rd excited state

10. **In the third excited state the number of unpaired electrons in chlorine atom is**
1) 5 2) 7 3) 3 4) 1

11. **The number of lone pair of electrons present in the first excited state of chlorine atom is**
1) 1 2) 3 3) 5 4) 2

12. **The only type of attraction existing between molecules of Halogens are**
1) Hydrogen bond 2) Ion-dipole attraction
3) Vanderwaals forces 4) Covalent bonds

13. **Reducing halogen is**
1) F 2) Cl 3) Br 4) I

14. **The correct sequence of arrangements of the following compounds in order of decreasing oxidation number of iodine is**
1) ICl, HIO_4, I_2, HI 2) HIO_4, HI, I_2, ICl_5
3) HIO_4, ICl_5, I_2, HI 4) HIO_4, ICl_5, I_2, ICl

15. **Fluorine does not show positive oxidation state because**
1) It is most electronegative element
2) It forms only anions in ionic compounds
3) It cannot form multiple bonds
4) It shows non-bonded electron pair repulsion due to small size.

ELECTRON AFFINITY AND ELECTRO NEGATIVITY

16. **The electron affinity values (in kJ mol^{-1}) of three halogens X,Y and Z are respectively -349, -333 and -325. Then X, Y and Z respectively are**
1) F_2, Cl_2 and Br_2 2) Cl_2, F_2 and Br_2
3) Cl_2, Br_2 and I_2 4) Br_2, Cl_2 and I_2

BOND DISSOCIATION ENERGY

17. **The bond dissociation energy of F_2 is very low due to**
1) low density
2) repulsions between non bonding electrons
3) its low atomic number
4) attractions between non bonding electrons

18. **Halogen with highest bond energy**
1) F_2 2) Cl_2 3) Br_2 4) I_2

19. **High reactivity of fluorine than other halogens according to COULSON is**
1) High electronegativity
2) Lesser internuclear repulsions
3) Greater repulsions between non bonding electrons 4) High I.P.

CHEMICAL PROPERTIES

20. **The chemical reacitivity of halogens is in the order**
1) $F_2 > Cl_2 > I_2 > Br_2$ 2) $F_2 > Br_2 > Cl_2 > I_2$
3) $F_2 > Cl_2 > Br_2 > I_2$ 4) $F_2 > I_2 > Br_2 > Cl_2$

21. **The stability of hydrogen halides is in the order**
1) HF>HI>HBr>HCl 2) HI>HBr>HCl>HF
3) HF>HCl>HBr>HI 4) HCl>HBr>HI>HF.

22. **Bond dissociation energies of HF, HCl, HBr follow the order**
1) HCl>HBr>HF 2) HF>HBr>HCl
3) HF>HCl>HBr 4) HBr>HCl>HF

23. **The reaction of which halogens with water is endothermic**
1) F_2 2) Cl_2 3) Br_2 4) I_2

24. **Which of the following is the weakest acid**
1) HF 2) HCl 3) HBr 4) HI

25. **Which one of the following pairs of reactants does not form oxygen when they react with each other**
1) F_2, NaOH solution (hot, conc)
2) F_2, H_2O
3) Cl_2, NaOH solution (cold, dilute)
4) $CaOCl_2$, H_2SO_4 (dilute, small amount)

26. **Bleaching action of Cl_2 is due to**
1) oxidation 2) reduction
3) hydrolysis 4) decomposition

OXIDISING POWER

27. **The least powerful oxidant in presence of H_2O is**
1) F_2 2) Cl_2 3) Br_2 4) I_2

28. **Which is strongest oxidising agent**
1) F_2 2) Cl_2 3) Br_2 4) I_2

29. **F_2 is a stronger oxidizing agent than Cl_2 in aqueous solution. This is attributed to many factors except**
1) Heat of dissociation 2) Electron affinity
3) Ionisational potential 4) Heat of hydration

OXYACIDS OF CHLORINE

30. **Which of the following halogens does not form Oxyacids**
1) F_2 2) Cl_2 3) Br_2 4) I_2

31. **Shape of ClO_2 ion is**
1) Linear 2) angular 3) pyramid 4) None

32. **The type of Hybrid orbitals used by Chlorine atom in ClO_2 ion**
1) sp^3 2) sp^2 3) sp 4) 1 & 2

33. **Hybridisation of chlorine atom in ClO^-, ClO_2^-, ClO_3^-, and ClO_4^- respectively**
1) sp^2, sp^2, sp^2, sp^2 2) sp, sp, sp, sp
3) sp^3, sp^3, sp^3, sp^3 4) sp, sp^2, sp^3, sp^2

34. **The number of lone pairs on chlorine atom in ClO^-, ClO_2^-, ClO_3^-, ClO_4^- ions are**
1) 0, 1, 2, 3 2) 1, 2, 3, 4 3) 4, 3, 2, 1 4) 3, 2, 1, 0

35. **Shape of ClO_4^- ion is**
1) Octahedral 2) Tetrahedral
3) Pyramid 4) Square planar

36. **Number of sigma and pi bonds in ClO_4 ion**
1) 4σ and 4π 2) 4σ and 2π
3) 4σ and 3π 4) 3σ and 2π

37. **Oxidation state of chlorine in Chlorous acid is**
1) + 2 2) + 3 3) - 1 4) - 2

38. **The shape of chlorate ion is**
1) Angular 2) Pyramidal
3) Tetrahedral 4) Trigonal planar

FLUORINE

39. **Flourine is highly reactive because**
1) F-F bond energy is high
2) F-F bond energy is low
3) It is gaseous at room temperature
4) None of these

40. **Which of the following does not contain fluorine?**
1) Fluorspar 2) Cryolite
3) Fluorapatite 4) All the above

41. **Halogen that absorbs visible radiation of least wave length**
1) Cl_2 2) F_2 3) Br_2 4) I_2

42. **The halogen that is readily reduced**
1) F_2 2) Cl_2 3) Br_2 4) I_2

43. **Which acid can combine with its own salt**
1) HI 2) HBr 3) HCl 4) HF

44. **Generally in the isolation of fluorine the electrolytic cell is made with Copper because**
1) Fluorine can't react with copper
2) Copper fluoride formed acts as protective layer
3) Copper is a good conductor of electricity
4)Copper is cheap in cost

45. **Fluorine reacts with hot and conc. NaOH and the products formed are**
1) $NaF + H_2O + O_2$ 2) $NaF + H_2O + OF_2$
3) $HF + NaF + H_2O$ 4) $NaF + HF + O_2$

46. **Which of the following is used as rocket fuel?**
1) F_2 2) N_2 3) C_2H_2 4) CH_4

47. **Which is not formed in the reaction of Xe with F_2**
1) $XeOF_4$ 2) XeF_2 3) XeF_4 4) XeF_6

48. **What is the electrolyte used in the electrolytic method of preparation of fluorine?**
1) NaF 2) KHF_2 3) KF 4) $CaCl_2$

49. **Glass is soluble in**
1) HF 2) H_2SO_4 3) $HClO_4$ 4) Aqua regia

50. **The purpose of addition of KF to HF in the preparation of F_2 by electrolysis is**
1) to increase the conductance of HF
2) to decrease the oxidation potential of HF
3) to increase the F concentration
4) To decrease the KF concentration

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CHLORINE

51. **Chlorine is manufactured in Nelson's cell by**
1) Electrolysis of brine 2) Electrolysis of $CaOCl_2$
3) Electrolysis of $HClO_4$ 4) Electrolysis of ClO_2

52. **During the manufacture of Chlorine by the electrolysis of brine, the by-products are**
1) H_2 2) NaOH 3) NaOH + H_2 4) NaCl

53. **Chlorine reacts with NaOH under various conditions to give**
1) NaCl 2) NaOCl 3) $NaClO_3$ 4) All the above

54. **What are the products obtained when excess ammonia is reacted with chlorine?**
1) N_2 and NCl_3 2) N_2 and HCl
3) N_2 and NH_4Cl 4) NCl_3 and HCl

55. $2Br^- + X_2 \rightarrow Br_2 + 2X^-$. **In this reaction X_2 is**
1) Cl_2 2) Br_2 3) I_2 4) N_2

BLEACHING POWDER

56. **Chemically bleaching powder is called**
1) Calcium oxy Chloride
2) Calcium chloro hypochlorite
3) Calcium mono oxygen chloride
4) Calcium oxygen dichlordie

INTER HALOGEN COMPOUNDS

57. **The element which can displace three other halogens from their compounds is**
1) Cl 2) Br 3) I 4) F

58. **Hybridisation of Chlorine atom in ClF_3 molecule is**
1) sp 2) sp^2 3) sp^3 4) sp^3d

59. **Shape of ClF_3 molecule is**
1) tetrahedral 2) T shape
3) Linear 4) trigonal planar

60. **The number of covalent bonds, a halogen atom can form through sp^3d hybridization**
1) 2 2) 4 3) 5 4) 3

61. **In the known interhalogen compounds the maximum oxidation of halogen atom is**
1) 1 2) 5 3) 7 4) 8

62. **Hybridisation of iodine in IF_5 is**
1) sp^3d 2) sp^3d^2 3) sp^3d^1 4) sp^3

63. **Shape of IF_5 molecule is**
1) Pentagonal bipyramid 2) tetrahedral
3) square pyramid 4) square planar

64. **Hybridisation of iodine in IF_7 molecule is**
1) sp^3 2) sp^3d 3) sp^3d^2 4) sp^3d^3

65. **Shape of IF_7 molecule is**
1) Pyramid 2) Octahedral
3) Pentagonal bipyramid 4) tetrahedral

66. **Chlorine atom in its third excited state with fluorine to form a compound X. The formula and shape of X are**
1) ClF_5, Pentagonal 2) ClF_3, Tetrahedral
3) ClF_5, pentagonal bipyramidal
4) ClF_7, pentagonal bipyramidal

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LEVEL-I A KEY

1) 2 2) 4 3) 4 4) 2 5) 2 6) 2 7) 3
8) 1 9) 3 10) 2 11) 2 12) 3 13) 4 14) 3
15) 1 16) 2 17) 2 18) 2 19) 3 20) 3 21) 3
22) 3 23) 4 24) 1 25) 3 26) 1 27) 4 28) 1
29) 3 30) 1 31) 2 32) 1 33) 3 34) 4 35) 2
36) 3 37) 2 38) 2 39) 2 40) 4 41) 2 42) 1
43) 4 44) 2 45) 1 46) 1 47) 1 48) 3 49) 1
50) 1 51) 1 52) 3 53) 4 54) 3 55) 1 56) 2
57) 4 58) 4 59) 2 60) 4 61) 3 62) 2 63) 3
64) 4 65) 3 66) 4

LEVEL I B

1. **Radio active Halogen is**
1) I 2) At 3) Po 4) Br

2. **The Halogen which is solid at room temperature is**
1) I_2 2) Br_2 3) Cl_2 4) F_2

3. **Halogens belong to the group**
1) VIA 2) VIB 3) VIIA 4) VIIB

4. **Outer most electronic configuration of the most electronegative element is**
1) ns^2np^3 2) ns^2np^4 3) ns^2np^5 4) ns^2np^6

5. **The number of p-electrons in bromine atom is**
1) 17 2) 7 3) 15 4) 13

6. **The elements which exists in the liquid state at 30°C.**
1) bromine 2) mercury 3) gallium 4) all of these

7. **Which of the following halogen is sublimes**
1) Cl_2 2) Br_2 3) I_2 4) F_2

8. **Oxidation state of iodine in ICl_2^- is**
1) + 1 2) - 1 3) + 2 4) - 2

9. **The excited state in which a heavier halogen has one lone pair in its square pyramidal molecule**
1) First 2) Second 3) Third 4) Fourth

10. **The halogen which can form both cations and anions is**
1) F 2) Cl 3) Br 4) I

11. **The Vanderwaals forces in halogens increase in the order**
1) $F_2 < Cl_2 < Br_2 < I_2$ 2) $I_2 > Br_2 > Cl_2 > F_2$
3) $F_2 < Br_2 < I_2 < Cl_2$ 4) $Br_2 < F_2 < Cl_2 < I_2$

12. **As the atomic number of halogens increases, the halogens**
1) lose the outer most electrons less readily
2) become lighter in colour
3) become less denser
4) gain electrons less readily

13. **The halogen with highest ionisation potential is**
1) F 2) Cl 3) Br 4) I

14. **Halogen with highest electron affinity is**
1) F 2) Cl 3) Br 4) I

LEVEL-I B KEY

1) 2 2) 1 3) 3 4) 3 5) 1 6) 4 7) 3
8) 1 9) 2 10) 4 11) 1 12) 4 13) 1 14) 2

What is called constraint?

NEWTONS LAWS OF MOTION, FRICTION & UNIFORM CIRCULAR MOTION

Continued from November 11th..

- If M_2 slides down then M_1 moves up on smooth inclined planes then the acceleration of system and tension in the string are given by, acceleration,

$a = \left(\frac{M_2 \sin\beta - M_1 \sin\alpha}{M_1 + M_2}\right) g$

Tension $T = \frac{M_1 M_2 B}{(M_1 + M_2)} (\sin\alpha + \sin\beta)$

Resultant Tension

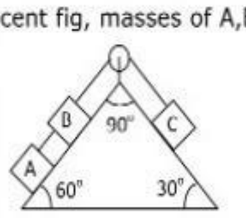
$T_R = \sqrt{T^2 + T^2 + 2T^2 cos|180 - (\alpha + \beta)|}$

$= \sqrt{2T^2[1 + \cos(\alpha + \beta)]}$

Note: If $M_2 \sin\beta = M_1 \sin\alpha \Rightarrow a = 0$

$\rightharpoonup$ System does not accelerate

W.E – 17: In the adjacent fig, masses of A,B and C are 1kg,3kg and 2kg respectively. Find a) the acceleration of the system b) tension in the string ($g=10m/s^2$)



Sol: a) In this case net Pulling force

$= m_A g \sin 60° + m_B g \sin 60° - m_C g \sin 30°$

$= (1)(10)\frac{\sqrt{3}}{2} + (3)(10)\left(\frac{\sqrt{3}}{2}\right) - (2)(10)\left(\frac{1}{2}\right) = 24.64N$

Total mass = 1+3+2 = 6kg

∴ Acceleration of the system

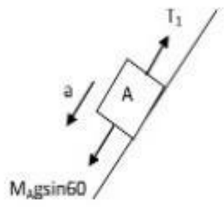
$a = \frac{24.64}{6} = 4.1 m/s^2$

b) For the tension in the string between A and B. FBD of Body A

$m_A g \sin 60 - T_1 = m_A a$

$T_1 = m_A g \sin 60 - m_A a$

$= m_A(g \sin 60 - a)$



$T_1 = (1)\left(10 \times \frac{\sqrt{3}}{2} - 4.1\right) = 4.56N$

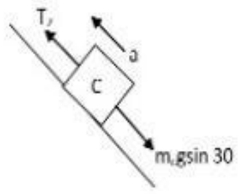
For the tension in the string between B and C

FBD of body C

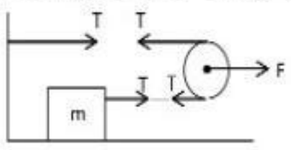
$T_2 - m_C g \sin 30° = m_C a$;

$T_2 = m_C(g \sin 30° + a)$

$T_2 = 2\left(10\left(\frac{1}{2}\right) + 4.1\right) = 18.2N$



- A force F is applied on the massless pulley as shown in the figure and string is connected to the block on smooth horizontal surface. Then



F = 2T and $T = ma_{block}$

- If the block moves a distance 'x' the pulley moves x/2 (total length of the string remains constant)

Therefore acceleration of the pulley

$= \frac{a_{block}}{2} = \frac{T}{2m} = \frac{F/2}{2m} = \frac{F}{4m}$.

Constrained Motion:

- **(a) constraint:** Restriction of the free motion of body in any direction is called constraint.

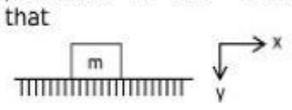
(b) Constrained Body: A body, where displacement in space is restricted by other bodies either connected to or in contact with it, is called a constrained body.

(c) Kinematic Constraints: These are equations that relate the motion of two or more particles.

(d) Types of Constraints :

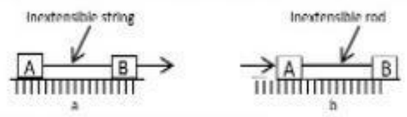
i) General constraints ii) Pulley constraints
iii)Wedge constraints iv) Mixed constraints

General Constraints: i) A body placed on floor : The floor acting as a constant restricts the kinematical quantities in the downward direction such that



$y = 0$; $v_y = 0$ and $a_y = 0$ for the body place on the floor.

ii) Two bodies connected with a string or rod.



The string/rod is inextensible.

∴ Displacements of A and B are equal in horizontal direction $\Rightarrow s_A = S_B$

Differentiating w.r.t time,

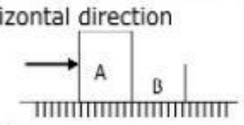
$\frac{ds_A}{dt} = \frac{ds_B}{dt} \Rightarrow v_A = v_B$

Again differentiating

$\frac{dv_A}{dt} = \frac{ds_B}{dt} \Rightarrow a_A = a_B$

iii) Two bodies in contact with each other

- Displacement of A and B are equal in horizontal direction



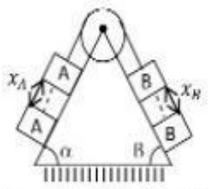
$\rightharpoonup = S_A = S_B$

By differentiating, we will get

$v_A = v_B$ and $a_A = a_B$ in horizontal direction

Pulley Constraints:

For example, the motion of block A is downwards along the inclined plane in fig. will cause a corresponding motion of block B up the other inclined plane. Assuming string AB length is inextensible, i.e., length of AB is constant.



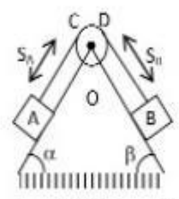
∴ The displacements of A (x_A) and (x_B) are equal ∴ $x_A = x_B$

Differentiating w.r.t. time, $\rightharpoonup v_A = v_B$

Once again differentiating w.r.t. time, $\Rightarrow a_A = a_B$ i.e., if one body(A)moves down the inclined plane with certain acceleration, then the other body will move up inclined plane with an equal acceleration (magnitude).

Alternate Method : First specify the location of the blocks using position co-ordinates S_A and S_B.

From the fig. the position co-ordinates are related by the equation $S_A + l_{CD} + S_B =$ Where l_{CD} = the length the string over arc CD constant L = total length of the string = constant Differentiating w.r.t. time, we get



L of =

$\frac{ds_A}{dt} + \frac{ds_B}{dt} = 0 \Rightarrow v_B = -v_A$

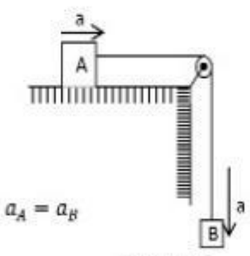
The negative sign indicates that when block A has a velocity downward, i.e., in the direction of positive S_A, it causes a corresponding upward velocity of block B, i.e, B moves in the negative S_B direction.

Again differentiating w.r.t. time,

$\frac{dv_B}{dt} = -\frac{dv_A}{dt} \Rightarrow a_B = -a_A$

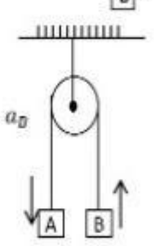
Similarly

1)



$x_A = x_B \Rightarrow v_A = v_B \Rightarrow a_A = a_B$

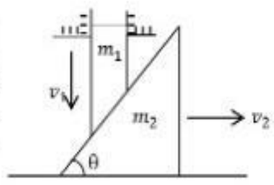
2)



$x_A = x_B \Rightarrow v_A = v_B \Rightarrow a_A = a_B$

Wedge constraint: For wedges in contact the constraint is that velocity and acceleration along common normal is same for both bodies

W.E.18: a) Find the relation between velocity of rod and that of wedge at any instant.

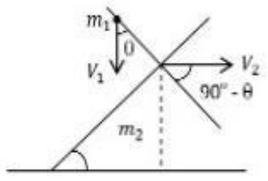


Sol: Component of velocity along perpendicular to the contact plane must be equal.

$v_1 \cos\theta = v_2 \cos(90° - \theta)$

$v_1 \cos\theta = v_2 \sin\theta$

$\tan\theta = \frac{v_1}{v_2}$



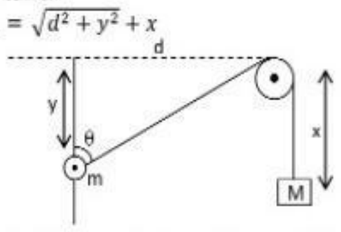
INTERMEDIATE special JUNIOR

Mixed constraints :

Ring sliding on a smooth rod :

- Consider a ring of mass m connected through a string of length L with a block of mass M. If the ring is moving up with acceleration a_m and a_M is the acceleration of block. As the length of the string is constant.

$L = \sqrt{d^2 + y^2} + x$



Since, L is constant, differentiating with respect to time t, we get

$\frac{dL}{dt} = \frac{1}{2}\frac{2y}{(d^2+y^2)^{\frac{1}{2}}}\left(\frac{dy}{dt}\right) + \frac{dx}{dt} - 0$

Since $\frac{dy}{dt} = v_m$ and $\frac{dx}{dt} = v_M$ and

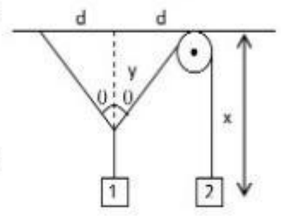
$\cos\theta = \frac{y}{\sqrt{d^2+y^2}}$ so $v_M = -v_m \cos\theta$

By differentiating, relation between a_m and a_M can be obtained, however, while doing so remember that $\cos\theta$ is not constant, but it is variable.

Two blocks connected with pulley: If the blocks are connected as shown in fig. then the length of the string is

$L = 2\sqrt{d^2 + y^2} + x$

Since, L is constant,



Differentiating with respect to Time t, we get

$\frac{dL}{dt} = \frac{2\times 2y}{2(d^2+y^2)^{\frac{1}{2}}}\left(\frac{dy}{dt}\right) + \frac{dx}{dt} = 0$

$\Rightarrow 2v_1 \cos\theta + v_2 = 0$; $v_2 = -2v_1 \cos\theta$

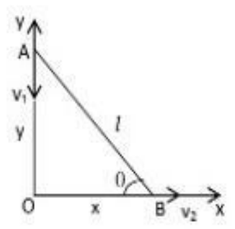
W.E - 19: A rod of length 'l' is inclined at an angle 'θ' with the floor against a smooth vertical wall. If the end A moves instantaneously with velocity v_1. What is the velocity of end B at the instant when rod makes 'θ' angle with the horizontal.

Sol: let at any instant, end B and A are at a distance x and y respectively from the point 'O'.

Thus we have,

$x^2 + y^2 = l^2$ ..... (1)

Here l is the length of the rod, which is constant



Differentiating eq. (1) with respect to time, we get

$\frac{d}{dt}(x^2 + y^2) = \frac{d}{dt}(l^2); 2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$

If $\frac{dx}{dt} = v_2$ and $\frac{dy}{dt} = -v_1$

$x(v_2) + y(-v_1) = 0$

$\rightharpoonup v_2 = \left(\frac{y}{x}\right) v_1 = v_1 \tan\theta$

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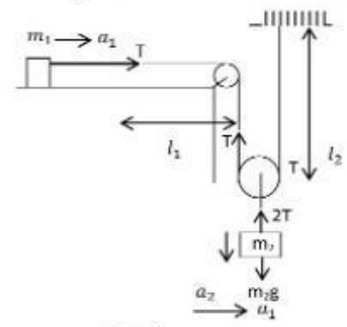
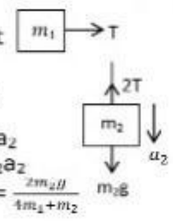
W.E – 20: In the fig, find the acceleration of m_1 and m_2



Sol: $l_1 + 2l_2 = \text{constant}$



$a_1 = 2a_2$; $T = m_1 a_1$

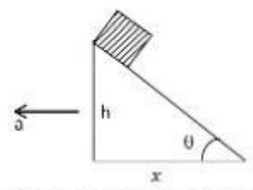
$m_2 g - 2T = m_2 a_2$;

$m_2 g = 2m_1 a_1 + m_2 a_2$

$m_2 g = 2m_1(2a_2) + m_2 a_2$

$a_2 = \frac{m_2 g}{4m_1 + m_2}$, $a_1 = \frac{2m_2 g}{4m_1 + m_2}$

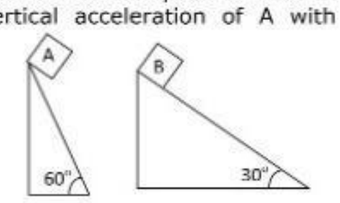
W.E - 21: For what value of 'a' the block falls freely ?



Sol: In the time the wedge moves a distance 'x' towards left with an acceleration a the block falls from a height 'h' with acceleration 'g'

$x = \frac{1}{2}at^2, h = \frac{1}{2}gt^2 \Rightarrow \frac{x}{h} = \frac{a}{g} \Rightarrow \cot\theta = \frac{a}{g} \Rightarrow a = g\cot\theta$

W.E - 22: Two fixed frictionless inclined planes making an angles 30° and 60° with the vertical are shown in the figure. Two blocks A and B are placed on the two planes. What is the relative vertical acceleration of A with respect to B ?



Sol: $mg\sin\theta = ma \Rightarrow a = g\sin\theta$

Where a is along the inclined plane

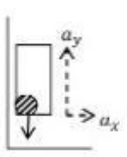
∴ vertical component of acceleration is $g \sin^2\theta$ $a_r = a_{AB} = a_A - a_B$

∴ relative vertical acceleration of A with respect to B is $g(\sin^2 60° - \sin^2 30°) = \frac{g}{2} - 4.9 ms^{-2}$ (in vertical direction)

W.E - 23: A solid sphere of mass 2kg rests inside a cube as shown. The cube is moving with velocity $\vec{v} = (5t\hat{i} + 2t\hat{j}) ms^{-1}$ where 't' is in sec and 'v' is in m/s. what force does sphere exert on cube ?

Sol: As given, $\vec{v} = 5t\hat{i} + 2t\hat{j}$;

$\therefore a_x = \frac{dv_x}{dt} = 5, a_y = \frac{dv_y}{dt} = 2$



When cube is moving with above acceleration along x and y-axes, the forces that exert on cube are

$F_x = -ma_x = -2 \times 5 = -10N$

$F_y = -(mg + ma_y) = -(20 + 2 \times 2) = -24N$

Net force, $F = \sqrt{(F_x)^2 + (F_y)^2}$

$= \sqrt{(10)^2 + (24)^2} = 26$ N