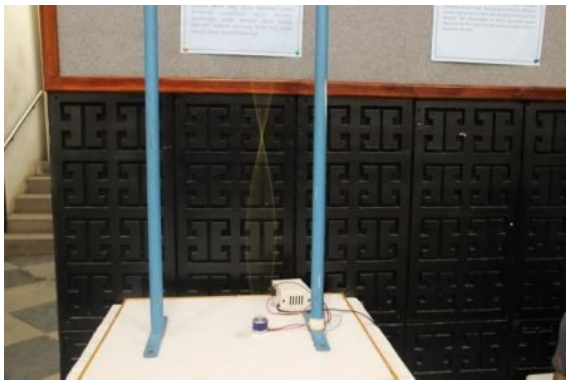
zÁgz ªÄÃ¯ ¸Á¬ÄÃ vgAUU¼Ä

zÁªÀiÄ: ¸Á¬ÄÃ vgAUU¼ ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: º®U, ZËPlÄ, ªÆÃlgï, ¥ªgï ¸¥ö, zÁg, PÆAr

ªiÁqÄª «zÁ£: º®UAiÆAzg ªÄz¦zº ªÆÃlgï C£Ä C¼ªÁr¹. ªÆÃlgïU £ÃgªÁVgÄªAv ZËPl£Ä º®UU ®A§ªÁV Ej¹. F Pn£ ªÄÃ¯ÁUz £qÄ«£º PÆArAiÄ£Ä Ej¹. PÆAr ªÄvÄ ªÆÃlgï£ MAzÄ §¢AiÄ £qÄª zÁgª£Ä Pn. ªÆÃlgï C£Ä ¥ªgï ¸¥ö£ÆA¢U ¸A¥Qð¹. ªÆÃlgï wgÄVzÁU zÁgz ªÄÃ¯ ¸Á¬ÄÃ vgAUU¼Ä ªÄÆqÄvª.

ªÆÃlgï£ wgÄUÄ«P¬ÄAzÁV zÁgª£Ä PªÄ§z¦ªÁV C®ÄV¹zAvÁUÄvz. EzjAzÁV zÁgz ªÄÃ¯ ¥¸j¸Äª vgAUª¦ PÆArAiiº ¥w¥º¸Ävz. F ¥w¥ºv vgAU ªÄvÄ ªÄÆ® vgAUU¼Ä MAzg ªÄÃ¯ÆAzÄ §gÄª¦zjAz ¸Á¬ÄÃ vgAUU¼Ä GAmÁUÄvª. EAvº vgAUU¼ vgAU zÆgª¦ ªÆÃlgï£ Dªvð£Á ªÃU ªÄvÄ zÁgz Gz¦ ºÁUÆ ©UÄ«£ ªÄÃ¯ Cª®A©vªÁVgÄvz.



STANDING WAVES ON A STRING

Objective: To demonstrate the standing waves on a string.

Materials Required: A plank, frame, motor, power supply, thread and a hook.

Description: Fix the motor connected to the power supply at the centre of a plank. Fix the frame perpendicular to the plank and in line with the motor. Put a hook at the centre of the top portion of the frame. Tie a tread between the hook and the motor. As the motor rotates, standing waves are formed on the thread.
As the motor rotates, the thread is shaken regularly and a wave propagates along the thread. This gets reflected at the hook. The incident and the reflected waves superpose to form the standing waves on the thread. The wavelength of these standing waves depends on the speed of the motor and the tension along the thread.

g°¸¦ ¥gz

z¦ÃAiÄ: J¯ï. ¹. r. ªiÁ¤ lgïU¼ PÁAiÄð ¤ªðºuAiÄ° ¥ÆÃ®g¦¸gï£ ¥Ávz ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Å: J¯ï. ¹. r. ªiÁ¤ lgï, Ut PAiÄAv, ¥ÆÃ®g¦¸gï, UÁf£ vm¦

ªiÁqÄª «zÁ£: J¯ï. ¹. r. ªiÁ¤ lgï£ ªÄÃ°gÄª ¥ÆÃ®g¦¸gï ¥zgª£Äß vU¬Äj. FU F ªiÁ¤ lgï C£Äß Ut PAiÄAvP¦ ¸A¥Qð¹, «zÄ¦vï ¸A¥Pð zÆgQ¹zg, §jAiÄ ©½AiÄ ¥gzAiÄAv PÁtÄvz. ¥ÆÃ®g¦¸gï C£Äß C¼ªr¹gÄª UÁf£ vmAiÄ£Äß ¥gzAiÄ ªÄÄAz Ej¹. avU¼Ä PÁtÄvª.

J¯ï.¹.r. ªiÁ¤ lgïU¼° °Qqï Q¸¯ïU½gÄvª. Eª¸ z¦«ÃP¦v ¨¼P£Äß ºÆgºÁPÄvª. Dzg, £ªÄ PtÄ Cz£Äß UÄgÄw¸®Ä ¸ªÄxðª®. ¥ÆÃ®g¦¸gï ºÁ¼Ai Ä£Äß Ezg ªÄÄAz Ej¹zÁU gZ£ÁvP ª¦wPgtUÆAq ¥zÃ±U¼Ä GAmÁUÄvª. EªÃ avU¼ÁV PÁtÄvª.

MYSTERY SCREEN

Objective: To demonstrate the role of polarizer in the working of LCD screens.

Materials Required: LCD monitor(in working condition), Polaroid sheet, glass plate.

Description: Remove the Polaroid sheet present on the LCD screen. If this monitor is now connected to the computer and switched on, what we see will be a white screen. Place a glass plate stuck with Polaroid sheet in front of this screen. The images will be visible.

The liquid crystals in the LCD monitors produce polarized light to which our eyes are not sensitive. When a polarizer is held in front of the screen, there will be regions of constructive interference which appear as the images.

E½eÁj£ ªÄÃ°gÄª UAmU¼Ä

zÁÃAiÄ: E½eÁj£ ªÄÃ¯ Z°¸Äª ª¸ÄU¼Ä P«Ä¸Äª zÆgª, ¸ªÄAiÄz ªUðz C£Ä¥Ávz°gÄvz JA§Äzg ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: E½eÁj£ ¥x UAmU¼Ä, ZAqÄ, PrU¼Ä, PlÄ

ªïÁqÄª «zÁ£: avz° vÆÃj¹gÄªAv, E½eÁj£ ¥xz ªÄÃ¯ Pl£Ä Ej¹. D Pn£° C¸ªiÁ£ zÆgU¼° UAmU¼£Ä Pn. UAmU¼ ªÄz¦¨ÁUz vÄ¢U PrU¼£Ä Pn E½eÁj£ ªÄÃ¯ GgÄ¼Äª ZAqÄ F PrU½U vÁUÄªAv Eg¨ÃPÄ. F ¥PÁgªÁV GAmÁz ±§¦ C¸ªiÁ£ ¸ªÄAiiÁAvg ºÆA¢gÄvz JAzÄ ¨Á«¸Äª¦zÄ ¸ºd. Dzg E°¦ ºÁUÁUÄª¦¢®.

F UAmU¼ £qÄ«£ CAvgª¦ £É¸VðP ¸AS¦U¼ ªUðU¼ C£Ä¥Ávz°ª. E½eÁj£ ªÄÃ¯ Z°¸Äª ª¸ÄU¼Ä Z°¸Äª zÆgª¦ Z®£AiÄ ¸ªÄAiÄz ªUðz C£Ä¥Ávz°gÄvz. DzPÁgt ±§¦U¼ £qÄ«£ CAvgª¦ ¸ªiÁ£ªÁVgÄvz.

THE BELLS AND THE INCLINED PATH

Objective: To demonstrate that the distance covered by the objects on an inclined plane is proportional to the square of the time taken.

Materials Required: Inclined track, bells, a frame, ball and sticks.

Description: Fix the frame to the inclined track as shown in the figure. The bells are fixed to the frame at unequal intervals. Sticks are attached to the clappers of each bell. The ball that rolls on the track touches these sticks and in turn the clappers hit the bell. We expect the sound to be produced at unequal intervals of time. But the sounds are produced with equal spacing in time.
The spacing between the bells are proportional to the squares of the natural numbers. The distance covered by the objects on an inclined plane is proportional to the square of the time taken. Hence the sounds are produced at equal intervals of time.

ªtð ªÀvÀÀ¸

zÀÄAiÄ: MAzÃ ªtðz JgqÄ bÁAiÄU¼£Ä§ UÄgÄw¸ÄªÀº D bÁAiÄU¼£Ä§ ¥vÀÃP¸Äª UrAiÄ ¥Ávz ¤gÆ¥u.

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: ªÀvÁPÁgz vm, avzº vÆÃj¹gÄªAv PrU¼£Ä§ ºÆA¢gÄª ZP, § tU¼Ä.

ªiÁqÄª «zÁ£: ªÀvÁPÁgz vmAiÄ ªÄÃ¯ ZPz wdÀRAqU½U Czðz¶gÄª wdÀRAqU¼£Ä§ ªiÁrPÆ½. CPÀ ¥PÀ wdÀRAqU½U MAzÃ § tz JgqÄ «©£§ bÁAiÄU¼£Ä§ ºa. F vmAiÄ ªÄÄAz ZPª¤§j¹ ¤zÁ£ªÁV wgÄV¹.

ZPz PrU¼Ä MAzÃ ªtðz CPÀ ¥PÀz bÁAiÄU¼£Ä§ ¥vÀÃQ¸Äª UrAiÄ ªÄÃ¯ §AzÁU, Cªgqæ ¨Ãg ¨Ãg bÁAiÄU¼AzÄ UÄgÄw¸¯ÁUÄªÀ¢®. bÁAiÄU¼£Ä§ ¥vÀÃQ¸Äª UrAiÄ£Ä§ £ÆÃrzÁU ªiÁvªÃ £ªÄ ªÄzÄ¼Ä Cª§U¼£Ä§ «©£§ bÁAiÄU¼AzÄ UÄgÄw¸®Ä ¸Áz§.

COLOUR CONTRAST

Objective: To demonstrate the role of the line of bifurcation in identifying the two shades of a colour.

Materials Required: Circular plate, a circular frame with spokes, colours.

Description: Divide the circle into as many sectors. Paint adjacent sectors with slightly different shades of a colour. Place the frame in front of the plate such that the spokes blocks the line bifurcating the two shades. We now perceive that as a single shade.

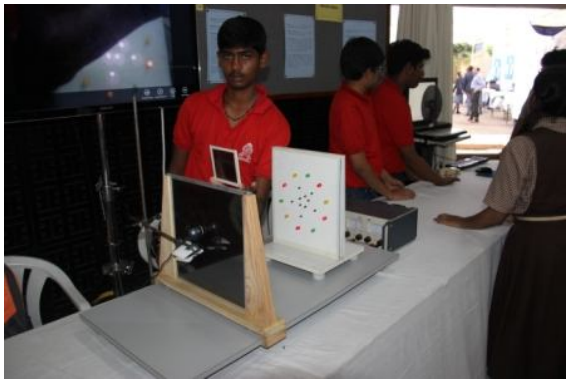
Our brain can recognize the two as different shades only when we see the line bifurcating them.

CªPA¥Ä «Qg t U¼Ä ªÄvÄ ¥ÆÃ®gÁAiiï ºÁ¼U¼Ä

zÁÃAiÄ: UÆÃZj¸Äª ¨¼PÄ ªÄvÄ CªPA¥Ä «Qg t U¼Ä KP¥PÁgªÁV z˧«ÃP˧vUÆA r gÄª¸¢® JA§Äzg ¤gÆ¥u.

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: ««z § t z ¨¼P£Ä¤ ¤ÃqÄª J¯ï.E. r .U¼Ä, CªPA¥Ä J¯ï.E. r .U¼Ä, ¥ªgï ¸¥ö˧, ¥ÆÃ®gÁAiiï ºÁ¼U¼Ä, PÁ¸ªÄgÁ

ªïÁqÄª «zÁ£: J¯Á J¯ï.E. r .U¼£Ä¤ ¥ªgï ¸¥ö˧£ÆA¢U ¸A¥Qð¹. ¨¼UÄwgÄª J¯ï.E. r .U¼ ªÄÄAz ¥ÆÃ®gÁAiiï ºÁ¼U¼£Ä¤ Ej¹. MAzÄ ºÁ¼ ¹¸gªÁVg°. E£Æ¤Az£Ä¤ wgÁV¹ Jgq£Ã ¥ÆÃ®gÁAiiï¤Az ºÆg§gÄª ¨¼P£Ä¤ PÁ¸ªÄgÁz ªÄÆ®P £ÆÃr. JgqÆ ºÁ¼U¼ z˧«ÃPg t CPª¸ MAzPÆ¸AzÄ ®A§ªÁVzÁ¸U J¯ï.E. r .U½Az §gÄª UÆÃZj¸Äª ¨¼PÄ PrvUÆ¼Ävz. Dzg CªPA¥Ä «Qg t U¼Ä PrvUÆA rgÄª¸¢®. F ¥ÆÃ®gÁAiiï ºÁ¼U¼Ä, UÆÃZj¸Äª ¨¼P£Ä¤ z˧«ÃP˧vUÆ½¸Ävª. Dzg CªPA¥Ä «Qg t U¼£Ä¤ z˧«ÃP˧vUÆ½¸Äª¸¢®. Jgq£Aiİ ¥ÆÃ®gÁAiiï C£Ä¤ wgÄV¸ÄvÁ ¸ÆPöªÁV UªÄ¤¹. ««z § t U¼Ä ¸A¥Æ t ðªÁV PrvUÆ¼Äª ¸Á¸£U¼Æ ¨Ãg ¨ÃgAiiÁVgÄvª.



INFRA RED LIGHT AND POLARISERS

Objective: To demonstrate that the polaroid suitable for visible light does not polarize Infra red radiations.

Materials Required: LED's giving different colours, infra red LED's, power supply, polaroid sheets.

Description: Connect all the LED's in series with the power supply. Place two Polaroid sheets in front of these glowing LED's. View the light coming out of the second Polaroid through a camera. Keeping one of the polaroid fixed, rotate the other. When the axes of polarization of the two sheets are perpendicular to one another, visible light will be cut off. But you can still continue to see IR through camera. The Polaroid sheet used here is made up of Hydroxy Phenol and it does not polarizes Infra red radiation. Infra red polarization happens with the polaroids made up of materials like Calcium fluoride, Barium fluoride and Poly ethylene.

If observed carefully, one can notice that the minimum intensity position of the second polaroid is different for different colours.

±§z ¥¸gt

zÀÃAiÄ: ±§z ¥¸gtz ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Å: ¹AQ, zÆq ¥nU

ªiÁqÄª «zÁ£: ¥nUAiÄ° ¸tzÆAzÄ gAz ªiÁr ¹AQAiÄ£Ä¸ ¹Q¹. ¹AQAiÄ£Ä¸ J¼zÄ »rzÄ ¥¯ï MAz£Ä¸ ºÆgr¹. ¨Ãg ¨Ãg PA¥£ÁAPU¼ ±§U¼Ä PÃ¼Ävª.

¹AQAiÄ vÄ¢AiÄ° GAmÁz ¥¯ï£° º®ªÁgÄ PA¥£ÁAPU½gÄvª. ¹AQAiÄÄzÞÆ ¸ÁUÄvÁ Cª¸ ¨Ã¥ðqÄvª. ¥nU C£Ägt¸Äª PÄºgzAv ªwð¸Ävz ªÄvÄ D ¨Ã¥ðl ±§U¼Ä eÆÃgÁV PÃ¼Ävª.

DISPERSION OF SOUND

Objective: To demonstrate the dispersion of sound.

Materials Required: Slinky, big carton.

Description: Make a small hole in the box and insert one end of the slinky into it. Stretch the slinky and send a pulse through it. One can hear sounds of different frequencies.

There are several frequencies in the pulse that is given at one end of the slinky. They get separated along the length of the slinky. The box here is a cavity resonator and reinforces those different frequencies and also makes the sound louder.

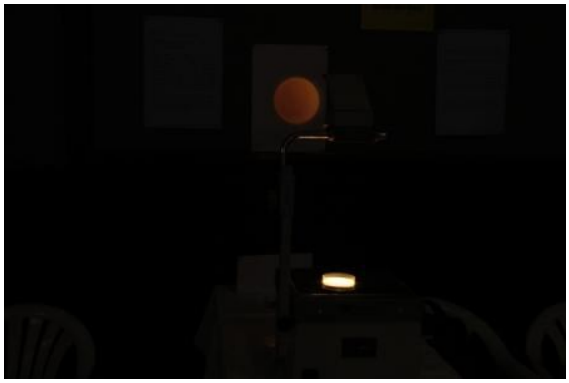
gP ZAz

zÀÃAiÄ: ¨¼Q£ ZzÄgÄ«PAiÄ ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Å: ¤ÃgÄ, qmÁ¯ï, UÁf£ ¥Áv, Nªgï ºqï ¥ÆePgï, ¥gz

ªïÁqÄª «zÁ£: UÁf£ ¥ÁvU ¸® ¤ÃgÄ ºÁQ £Á¯ïëzÄ º¤ qmÁ¯ï ¨g¹. Ez£Äß ¥ÆePgï£ ªÄÃ°r. ¥ÆePgï C£Äß D£ï ªiÁrzg, JzÄjVgÄª ©½AiÄ ¥gzAiÄ ªÄÃ¯ PA¥Áz ©A§ ªÄÆqÄvz. ¤Ãj£°gÄª qmÁ¯ï£ PtU¼Ä ¨¼P£Äß ZzÄj¸Ävª. PrªÄ vgAUzÆgz ¨¼PÄ GzÁºguU ¤Ã°ºZÄ ZzÄgÄvz ªÄvÄ ºZÄ vgAUzÆgz ¨¼PÄ GzÁºguU PA¥Ä PrªÄ ZzÄgÄvz. »ÃUÁV PrªÄ ZzÄjz PA¥Ä §tz ¨¼PÄ ¥gzAiÄ£Äß v®Ä¥Ävz.

¨Æ«ÄAiÄ ªÁvÁªgtz°gÄª C¤®U¼Ä ºÁUÄ zÆ½£ PtU¼Ä EzÃ ¥PÁgªÁV ¨¼P£Äß ZzÄj¸Ävª. ZAz Uºtz° ZAz£Ã ¥gz. ºÁUÁV Uºtz ZAz PA¥ÁV PÁtÄvz.



BLOOD RED MOON

Objective: To demonstrate the phenomenon behind the red colour of the eclipsed moon during totality.

Materials Required: A glass tank, water, dettol, projector and a screen.

Description: Place the glass vessel with water on an overhead projector. Add a few drops of Dettol to the water. The image projected on the screen appears red. The particles of dettol in water scatter the light. Lower wavelengths like blue scatter the most and the longer wavelengths like red scatter the least and reach the screen.

The air molecules and dust present in the Earth's atmosphere also scatter the sun light. Moon becomes the screen during a lunar eclipse and hence appears red during totality.

ªÁvÁªgtz° ¨¼Q£ ªQÃ¨ª£

zÀÃAiÄ: ªÁvÁªgtz° GAmÁUÄª ¨¼Q£ ªQÃ¨ª£z ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: UÁf£ vÆn, UÁf£ ¥nU¼Ä, ¸PgAiÄ zÁªt, UÁdÄU¼ eÆÃquU §¼¸Äª CAlÄ, ¯Ã¸gï

ªiÁqÄª «zÁ£: UÁf£ vÆnAiÄ° ¸ªiÁ£ CAvgz° UÁf£ ¥nU¼£Äß CAn¹. ¥wAiÄAzÄ ¨ÁUPÆ ¨Ãg ¨Ãg…¥§®vAiÄ ¸PgAiÄ zªÁtª£Äß ¸Äj¬Äj. FU F ¨ÁUU¼ ªÄÆ®P ¯Ã¸gï ¨¼P£Äß ºÁ¬Ä¹. ¨¼PÄ ¨ÁUÄªÀz£Äß PÁtS ºÄzÄ.

¥wAiÆAzÄ ¨ÁUz° vÄA©¹gÄª ¸Pg zÁªtz ¸ÁAzvAiÄÄ ¨ÃgAiÄÃ DVz. ªQÃ¨ª£z PÁgt ¯Ã¸gï ¨¼PÄ ¨ÁUÄvz.

ªÁvÁªgtz°AiÄÆ EzÃ ¥PÁgªÁV ¸ÁAzvAiÄ° ªÀvÀ¸ªÁUÄªÀzjAz ¨¼PÄ ¨ÁUÄvz. £PvU¼Ä «Ä£ÄUÄªÀzÄ EzÃ «zÀªiÁ£¢Az.

ATMOSPHERIC REFRACTION

Objective: To demonstrate atmospheric refraction.

Materials Required: A glass tank, glass strips, sugar solution, an adhesive for glass, laser .

Description: Fix the glass strips at equal distances inside the glass tank using a suitable adhesive. Pour sugar solution of different concentrations into each portion in the increasing order. Send laser light through these columns of liquids. Light bends at each boundary.
The density of each column is different. The light undergoes refraction and hence bends.
There is a density gradient in the atmosphere too. This bends the light in similar manner. As a result we see the image of the sun two minutes prior to the actual sunrise and two minutes after the sunset.

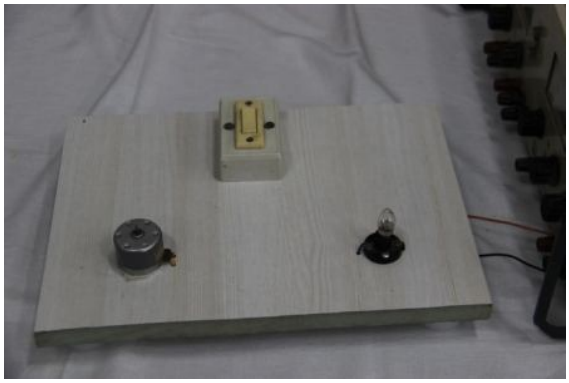
ªÆÃmÁgÄ wgÄUÄªÀzÆÃ? ¢Ã¥ ¨¼UÄªÀzÆÃ?

zÀÃAiÄ: ¨ÁiPï E.Jªiï.J¥ï.£ ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Å: ªÆÃmÁgÄ (6v), «zÄ¢ÃPÃ¥ (6v), ¥ªgï ¸¥öÉ

ªiÁqÄª «zÁ£: ªÆÃmÁgÄ ºÁUÄ «zÄ¢ÃPÃ¥U¼gq£Æß ¥ªgï ¸¥öÉ£ÆA¢U ¸gt ¸A¥Pðz°j¹. ¥ªgï ¸¥öÉ 6v «zÄvï «¨ªª£Äß GAlÄªiÁqÄªAwg°. F ¸A¥PðeÁ®z° «zÄvï ¥ª»¹zÁU, ªÆz®Ä ªÆÃmÁgÄ wgÄUÄvz. ¢Ã¥ ¨¼UÄªÀ¢®. ªÆÃmÁg£Äß wgÄUzAv »r¢lg, ¢Ã¥ ¨¼UÄvz. ªÆÃmÁgÄ ªÄvÄ ¢Ã¥U¼gqPÆ 6v £µÄ «¨ªÁAvg ¨ÃPÄ. Dzg, ¥ªgï ¸¥öÉ¤Az 6v £µÄ ªÇÃ¯ÃeÏ ªiÁvªÃ §gÄwz. ªÆÃmÁj£ «zÄvïgÆÃz ¢Ã¥z «zÄvïgÆÃzÇAv §ºÄ¥lÄ C¢PªÁVvz. F PÁgt¢Az¯Ã ¥ªgï ¸¥öÉ¤Az §gÄwgÄª ªÇÃ¯Ãf£ §ºÄ¥Á®Ä ªÆÃmÁjUÃ zÆgPÄvz.

ªÆÃmÁg£Äß wgÄUzAv »rzÁU Cxª Áºa£ vÆPª£Äß ºÃjzÁU, ¸A¥PðeÁ®z° ºa£ «zÄvï ¥ª»¸Ävz. FU §¯ï£° ¸ÁªÄxÀð JAzg VI ºZÁUÄvz ªÄvzÄ ¨¼UÄvz.



DOES THE MOTOR ROTATE OR THE BULB GLOW?

Objective: To demonstrate back emf.

Materials Required: Motor(6V), bulb(6V), power supply.

Description: Connect the motor and bulb in series with the power supply. Let the voltage provided by the power supply be 6V. When the current flows through this circuit, the motor rotates but the bulb does not glow. Hold the motor such that its rotation is stopped. Now the bulb glows.

Both the motor and the bulb require a voltage of 6V to function. The voltage provided by the supply too is 6V. The resistance of the motor is many times more than that of the bulb. Hence there is a maximum voltage drop across the motor and a very little across the bulb and hence only the motor functions in the beginning. When the motor is held, it is as if we have added load on it. So, more current is drawn into the circuit. Now the product VI i.e, power is more and hence the bulb glows.

ZAqÄ §l°£Æ¼U ©Ã¼Äªl zÃ?

zÁÃAiÄ: wgÄUt QÃ°(hinge)¤Az zÆg ¸ÁVzAv UÄgÄv¢Az GAmÁUÄª ªÃUÆÃvlµðQAv®Æ °a£ ªÃUÆÃvlµð °ÆAz®Ä ¸Ázl JA§Äzg ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Å: wgÄUt QÃ°¬ÄAz ZËPnU ¨z¥r¸¯ÁVgÄª ¥nl, JgqÄ §l®Ä, ZAqÄ

ªÁqÄª «zÁ£: avz° vÆÃj¹gÄªAv ¥nAiÄ vÄ¢Aiİ°gÄª §l°£° ZAq£Ãß Ej¹. EzQAv PÆAZ »Az E£ÆßAzÄ §l®£Ãß CAn¹. ¥nAiÄ£Ãß ¸® ªÄÃ¯w P¼U ©r. v£ß §l°¤Az ¨Ã¥ðlÄ ZAqÄ ¥nAiİ°gÄª E£ÆßAzÄ §l°£Æ¼U ©Ã¼Ävz. ZAqÄ §l°£ M¼U ©Ã¼¨ÃPÁzg, §l®Ä AiiÁªlzÆÃ MAzÄ °Avz° ZArVAv P¼VgÄ¨ÃPÄ. F wgÄUt QÃ°AiÄ ªÄÃ°£ ¥wAiÆAzÄ ¤¢ðµ Cª¢Aiİ° ¤¢ðµ PÆÃ¤ÃAiÄ ¥®lª£Ãß °ÆªÄzÄvz. zÆg«gÄª ©AzÄªl zÆq aÏvz MAzÄ ¨ÁUª£Ãß P«Ä¸Äª ¸ªÄAiÄ °ÁUÆ ¸«ÃÃ¥z ©AzÄªl aPÏ aÏvz CzÃ wdlRAqz ¨ÁUª£Ãß P«Ä¸Äª ¸ªÄAiÄU¼gqÆ ¸ª£ÁVª. °ÁUÁV zÆgz ©AzÄ«£ ªÃUÆÃvlðªl °aU EgÄvz. ©Ã¼ÄwgÄª ZAqÄ UÄgÄv¢Az ªÃUÆÃvlµð °ÆAzÄvz. Dzg, §l°gÄª ¸Á£z ªÃUÆÃvlµðªl EzQAv °Z. »ÃUÁV ZAqÄ §l°£Æ¼U ©Ã¼Ävz.

FALLING FASTER THAN ‘g’

Objective: To demonstrate that an acceleration greater than ‘g’ can be achieved in a hinged strip that is covering a certain angle.

Materials Required: A strip hinged to a rectangular frame, two cups attached to the strip and a ball.

Description: The two cups are fixed to the strip as shown in the figure and the ball is placed in the bowl that is close to the free end of the strip. The strip is lifted through a certain angle and then released. The ball that gets separated from its cup falls into the other cup on the strip.

For the ball to fall into the other cup, that cup must come below the ball at some stage. Each point on this hinged strip covers the same angle in a given time. The farther point covers a part of a bigger circle in the same time during which a closer point covers a part of a smaller circle corresponding to the same sector. Therefore the farther the point greater will be the acceleration. The ball has an acceleration ‘g’ where as the cup has a greater acceleration. Hence the ball falls in to the cup.

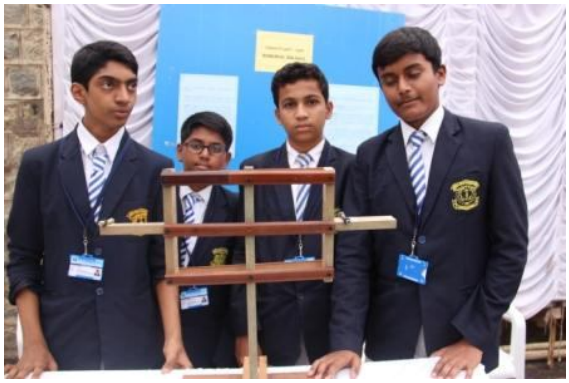
gÆÃ§gïªÁ¯ï vPÀr

zÁÃAiÄ: gÆÃ§gïªÁ¯ï vPÀrAiÄ PÁAiÄðªÉRjAiÄ ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: ªÄg E®ªÃ ¯ÆÃºz ¥nU¼Ä, ¸ÆÌU¼Ä, ªÁ±gïU¼Ä, £mïU¼Ä ªÄvÄ vÆPz §lÄU¼Ä

ªÀiÁqÄª «zÁ£: ªÄÃ¯ w½¹gÄª ¸ÁªÄVU¼£Äß §¼¹, avz° vÆÃj¹gÄªAvº gZ£AiÄ£Äß ªÀiÁr. ¸ªÄ£Áz vÆPz §lÄU¼£Äß ZvÄ¨ÄðeÁPÁgz PnU C¼ªÀr¸¯ÁVgÄª Cq¥nU¼ ªÄÃ¯ dgÄV¸ÄvÁ AiiÁªÀzÃ ¸Á£z¯ÁzgÆ Ejº. vPÀrAiÄ ¸ªÄvÆÃ®£z° ªÀvÀªÁUÄªÀ¢®.

E°gÄª ZvÄ¨ÄðeÁPÁgz PlÄ °APÃeïU½Az PÆrz. DzÀjAz F PnU C¼ªÀr¹gÄª Cq¥nU¼ ªÄÃ¯ ¸ªÀiÁ£ vÆPU½zÁU F ªÀª¸ÀAiÄ° ¨ÁªÄPªÀ ±Æ£ªÁVgÄvz. DzÀjAz vÆPU¼£Äß dgÄV¸ÄvÁ AiiÁªÀzÃ ¸Á£z°j¹zgÆ ¸ªÄvÆÃ®£ §z¯ÁUÄªÀ¢®. vÆPU¼Ä C¸ªÀiÁ£ªÁzÁU ªÀiÁvªÃ F vPÀrAiÄ° C¸ªÄvÆÃ®£ªÁUÄvz.



ROBERVAL BALANCE

Objective: To demonstrate the working of Roberval balance.

Materials Required: Strips of wood or metal, screws, washers, nuts and equal masses.

Description: Construct a Roberval balance as shown in the figure using the above materials. Slide the equal masses kept on the arms attached to the rectangular frame. The equilibrium of the balance is undisturbed.

The rectangular frame here is made up of linkages. And the arms are fixed to it. Hence there is no torque acting on the system when there are equal masses on the arms. Therefore the equilibrium is undisturbed.

Equilibrium is disturbed only when the masses place don the arms are unequal.

v¯P¼UÁz ¯ÆÃ®P

zÁÃAiÄ: v¯P¼UÁz ¯ÆÃ®Pz (inverted pendulum) PÁAiÄðªÉRjAiÄ ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: 'L' DPÁgz ¥n, E£ÆÌAzÄ ¥n, ¸Æ, £mïU¼Ä ªÄvÄ ªÁ±gïU¼Ä

ªiÁqÄª «zÁ£: avz° vÆÃj¹gÄªAv ¸Æ, £mïU¼Ä ªÄvÄ ªÁ±gïU¼£Ä§ §¼¹ 'L' DPÁgz ¥nAiÄ vÄ¢U E£ÆÌAzÄ ¥nAiÄ£Ä§ C¼ªÉr¹. D E£ÆÌAzÄ ¥nAiÄÄ ¸gÁUªÁV N¯ÁqÄªAwg°. FU Cz£Ä§ ªÄÃ¯w »rzÄ, 'L' DPÁgz ¥nAiÄ£Ä§ MAzÄ ¤¢ðµ GzÉ«gÄªAv ¨z¥r¹ PA¦¸zAv ªiÁr. E£ÆÌAzÄ ¥nAiÄÆ ¸º P¼U ©Ã¼z P®PÁ® v¯P¼UÁV PA¦¸Ävz. 'L' DPÁgz ¥nAiÄ£Ä§ ¨z¥r¸Äª ¸Á£ª£Ä§ §z°¸ÄvÁ PA¦¸Äª GzÉª£Ä§ ªÉvÉAiÄUÆ½¸ÄvÁ ºÆÃzAv MAzÄ ¤¢ðµ GzÉP D E£ÆÌAzÄ ¯ÆÃ®PªÉ v¯P¼UÁV PA¦¸Äª Cª¢ UjµªÁVgÄvz. E°gÄª JgqÆ ¥nU¼Æ ¯ÆÃ®PU¼Av CªÉU¼gqg ¸Á¨Á«P PA¥£ÁAPU¼Ä ºÆA¢PAiiÁzÁU 'L' DPÁgz ¥n¬ÄAz E£ÆÌAzÄ ¥nU Ujµ ¥ªiÁtz ±QAiÄ ªUÁðªuAiiÁUÄªÉzjAz CzÄ PA¦¸Äª Cª¢AiÄÆ UjµªÁVgÄvz.

INVERTED PENDULUM

Objective: To demonstrate the principle of an inverted pendulum.

Materials Required: Two strips- one L shaped and the other straight, screws, nuts and washers.

Description: Fix the straight strip to the L shape strip as shown in the figure. The straight strip should be to oscillate. Lift the straight strip to a certain height. Set the L shaped strip into oscillation by holding it at a certain point. The straight strip now left does not fall down but instead oscillates in that inverted position for some time. As you vary the oscillating length of the L shaped strip, the time for which the other strip oscillates like an inverted pendulum also varies with a maximum for a particular length of L shaped strip.

We have here two pendulums. When their natural frequencies match, there is a maximum transfer of energy. Hence the time for which the straight strip oscillates like an inverted pendulum also maximizes.

«zÄvï §gº

zÁÃAiÄ: «zÄvï «¨d£ ºÁUÆ CAiÆr£ï ªÄvÄ ¸ÁZïðU¼ £qÄ«£ gÁ¸ÁAiÄ¤P QAiÄAiÄ ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: ¯ÆÃºz vm, ¥ÆmÁ¹AiÄA CAiÆq¦qï zÁªt, ¸ÁZïð, PÁUz, ¥ªgï ¸¥ö¦

ªiÁqÄª «zÁ£: ¥ÆmÁ¹AiÄA CAiÆq¦qï zÁªtP ¸® ¸ÁZïð ¨g¹. PÁUzª£Ä Ezgº ££¹ ¯ÆÃºz vmAiÄ ªÄÃºj¹. ¥ªgï ¸¥ö¦£ lÄuÁvP vÄ¢AiÄ£Ä ¯ÆÃºz vmU ¸A¥Qð¹. z£ÁvP vÄ¢¬ÄAz PÁUzz ªÄÃ¯ UgAiÄ£Ä J¼¬Äj. AiiÁª¦zÃ ±Á» EgzAiÄÆ PqÄ¤Ãº §tz Ug ªÄÆqÄvz. ¥ÆmÁ¹AiÄA CAiÆq¦qï£ «zÄvï «¨d£¬ÄAzÁV K⁺ ºÁUÄ I⁻ CAiiÁtÄU¼Ä GAmÁUÄvª. I⁻CAiiÁtÄU¼Ä z£ÁvP vÄ¢¬ÄqU Zº¸Ävª. Cº CAiÆr£ï ªÄvÄ ¸ÁZïð£ £qÄ«£ gÁ¸ÁAiÄ¤P QAiÄ¬ÄAzÁV PqÄ¤Ãº §t ªÄÆqÄvz.

r.¹. «zÄvï£º ©gÄQ®z ¤Ãº Ug ªÄÆrzg, zÄªU¼Ä §z¯ÁUÄª J.¹. «zÄvï£º ©gÄPÄU¼Ä¼ ¤Ãº UgU¼Ä ªÄÆqÄvz.

ELECTRIC WRITING

Objective: To demonstrate electrolysis and the reaction between iodine and starch.

Materials Required: Metal plate, paper, potassium iodide solution, starch, power supply.

Description: Mix a small amount of starch to the potassium iodide solution. Place a paper dipped in the above solution on a metal plate. Connect the negative end of the battery to the metal plate and draw a line on the paper with the wire connected to the positive terminal. The line appears dark blue.

Potassium iodide electrolyses to form K^+ and I^- ions. The I- ions move towards the positive terminal. Iodine formed at this terminal reacts with starch to give dark blue colour.

A continous line is formed if the current is DC and a broken line if it is AC.

Wµðu¬ÄAz ªÄÃ¯ÃgÄª vÆPz §lÄ

zÁÃAiÄ: Wµðu¬ÄAz vÆPª£Ã ªÄÃ¯v§ºÄzÄ JA§Äzg ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Å: PÆ¼ª, zÁg, ºUÄgÁz ª¸Ä ªÄvÄ EzÀAv®Æ §ºÄ¥lÄ ºZÄ vÆP«gÄª ªÄvÆAzÄ ª¸Ä

ªiÁqÄª «zÁ£: PÆ¼ªAiÆ¼U zÁgª£Ã vÆj¹. zÁgz ªÄÃ®Ä¢U ºUÄgÁz ªÄvÄ PÆ¼ªAiÆ¼U vÆgz ª¸Äª£Ã Pn. zÁgz E£ÆÀAzÄ vÄ¢U ºZÄ vÆP«gÄª ª¸Äª£Ã Pn. avz° vÆÃj¹gÄªAv PÆ¼ªAiÄ£Ã »rzÄ, ºUÄgÁz ª¸Äª£Ã ¸®ªÄnU ºÆgU¼zÄ, wgÄV¹. P¼vÄ¢AiÄ°gÄª ¨Ágz ª¸Ä ªÄÃ¯ÃgÄª¹z£Ã PÁtÄªj. ªÄÃ®Ä¢AiÄ°gÄª ª¸Äª£Ã wgÄV¹zÁU zÁg ªÄvÄ PÆ¼ªAiÄ vÄ¢AiÄ £qÄª Wµðu GAmÁUÄvz. EzÆAzÄ ¸¢± (ªPgï). Ezg x- WlPU¼ ¤ª¼ §® ±Æ£ªÁUÄvz. Dzg y- WlPU¼Ä MAzÃ ¢Q£°gÄª PÁgt, ªÄÃ°Q£° ¤ª¼ §® GAmÁV ¨Ágz ª¸Äª£Ã ªÄÃ¯vÄvz.

FRICTION LIFTS THE WEIGHT

Objective: To demonstrate that friction can lift weights.

Materials Required: A pipe, thread, a heavy object and an object with less weight.

Description: Hold the pipe vertical and insert the thread through it. Tie the object with less weight to the top end of the thread and the heavy object to the other end. Pull the light weight slightly out and rotate. The heavy weight at the bottom end rises up.

Due to rotation, there is friction between the thread and the edges of the pipe. This is a vector. Its x components cancel out but the y components add up. Hence there is a net force in the upward direction and the heavy weight moves in the same direction.

CD AiÄ° gÆÃ»v

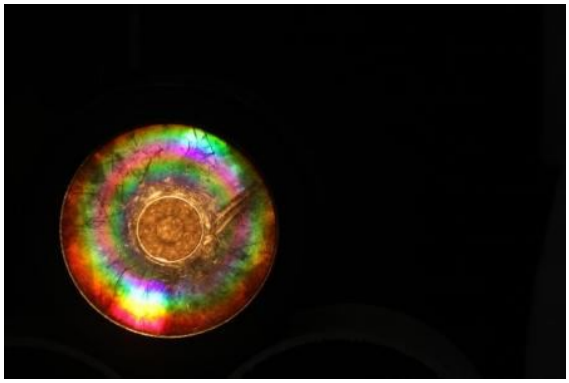
zÁÃAiÄ: CD U¼Ä «ªvð£ UÃnAUï£Av PÁAiÄð¤ªð»¸Ävª JA§Äzg ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: lAUï l£ï ¦®ªÄAmï EgÄª «zÄ¢Ã¥, C.F.L. «zÄ¢Ã¥, CD, CAlÄ ¥n

ªiÁqÄª «zÁ£: CD AiÄ ªÄÃ°gÄª ¹Pgï£ ªÄÃ¯ CAlÄ ¥nAiÄ£Ä ºÁQ J¼zÄ D ¸Pgï C£Ä ¸A¥Ætðª ÁV vU¬Äj. FU C.F.L. ¢Ã¥ ºÁUÆ lAUï l£ï ¦®ªÄAmï ¢Ã¥U¼£Ä F CD AiÄ ªÄÆ®P MAzÁz ªÄÃ¯ÆAzÄ £ÆÃr C.F.L. ¢Ã¥z ¸Äv §t §tz ª¦vU¼Ä ºÁUÆ lAUï l£ï ¢Ã¥z ¸Äv §tz° ¸vv ª¦vÀAiÄ«gÄª ª¦vÁPÁgz ¥m PÁtÄvz. CD AiÄÄ ªÄÃ¯ º®ªÁgÄ ¸ªiÁ£ÁAvgz UgU½gÄvª. EzjAzÁV CzÄ «ªvð£ UÃnAUï£Av P®¸ ªiÁqÄvz.

C.F.L. ¢Ã¥ª P® ¤¢ðµ vgAUzÆgz ¨¼P£Ä ªiÁvªÃ ºÆg¸Æ¸Ävz. DzPÁgt Czg gÆÃ»vª DAiiÁ §tz ª¦vU½Az PÆrz.

Dzg, lAUï l£ï ¢Ã¥ª J¯Á vgAUzÆgz ¨¼P£Ä ºÆg¸Æ¸Ävz. ºÁUÁV Czg gÆÃ»vª ¸vvªÁV ª¦vÀAiÄ«gÄª §tz ¥nAiÄAwgÄvz.



COLOURFUL COMPACT DISC

Objective: To demonstrate the diffraction spectrum in a CD.

Materials Required: Tungsten filament bulb, CFL bulb, CD, gum tape.

Description: Stick the gum tape on the sticker of the CD and pull the tape to remove that sticker completely. View a CFL bulb and tungsten filament bulb through this CD one at a time. CFL bulb shows concentric circles of different colours where as tungsten filament bulb shows a circular band of continuously varying colours. CD has many equispaced lines on it. As a result it works like a grating. And what we see is actually diffraction grating spectrum. CFL emits particular wavelengths and so its spectrum has concentric circles of different colours. A tungsten filament emits all wavelengths. Hence the spectrum is a continuously varying coloured band.

LED EAz «zÄvï

zÁ¸ÀAiÄ: LED AiÄ ªÄÃ¯ ¨¼P£Ä§ ºÁ¬Ä¹zÁU (¸t ¥ªiÁtz) «zÄvï GvÁz£AiiÁUÄvz JA§Äzg ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: LED ªÄ°«ÄÃlgï, ¯Ã¸gï

ªiÁqÄª «zÁ£: LED AiÄ vÄ¢U¼£Ä§ ªÄ°«ÄÃlgïU ¸A¥Qð¹. LED AiÄ ªÄÃ¯Ã¸gï ¨¼P£Ä§ ºÁ¬Ä¹. GAmÁz «zÄvï C£Ä§ ªÄ°«ÄÃlgï ¸Æa¸Ävz.

LED AiÄÄ ªÄÆ®vÞ qAiÆÃqï DVz. P-N dAP£ï£ £qÄª Egª r¦µ£ï ª®AiÄz° N jÃwAiÄ ª¸Ä«£ J¯PÁ¦£ïU¼Ä P jÃwAiÄ ª¸Ä«£ ºÆÃ¯ïU¼ÆA¢U ¸ÃjPÆArgÄvª. Ezg ªÄÃ¯ ¸ÆP ¨¼Q£ ¥ÆÃmÁ£ï ©zÁU ¦Ã J¯PÁ¦£ï ªÄvÄ ºÆÃ¯ïU¼Ä GAmÁUÄvª. F jÃw GAmÁz ¦Ã J¯PÁ¦£ï ªÄ°«ÄÃlgï£ ªÄÆ®P ¸ÁV ºÆÃ¯ï£ÆA¢U ¥Ä£Þ ¸ÃjPÆ¼ÄªÀzjAz, ªÄ°«ÄÃlgï£° ¸t ¥ªiÁtz «zÄvï ¥ª»¸Ävz.

CURRENT FROM AN LED

Objective: To demonstrate that a small amount of current is produced when light is shone on an LED.

Materials Required: LED, multimeter, Laser or torch.

Description: Connect the LED to a multimeter. Shine laser or light from any torch on LED. The multimeter reading shows the current produced.

LED is basically a diode. In the depletion region of its PN junction, the electrons from the N type material would have diffused into the hole of the P type material. When a photon of suitable energy is incident on this, a free electron and a hole are formed. The free electron so produced moves through the meter and recombines with the hole. This is what constitutes a small current which the meter reads.

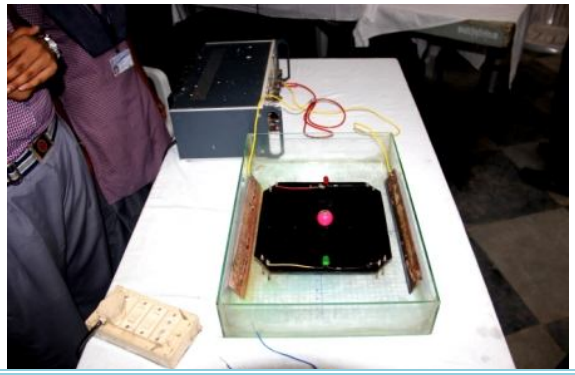
J¯PÆ°nPï vÆnAiÄ° LED

zÁÃAiÄ: J¯PÆ°nPï vÆnAiÄ° «¨ªÁAvgz ª¦vÁAiÄªÁUÄª¦zg ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: UÁf£ vÆn, G¥Ä ¤ÃgÄ, ¨Á¸ï J¯PÆÃqï ¥nU¼Ä, ¥ªgï ¸¥ö¦, LED U¼Ä

ªïÁqÄª «zÁ£: UÁf£ vÆnAiÄ° ¸® G¥Ä ¤Ãg£Ä vUzÄPÆ½, vÆnAiÄ §¢U¼° ¥ªgï ¸¥ö¦U ¸A¥Qð¸¯ÁVgÄª ¨Á¸ï J¯PÆÃqï ¥nU¼£Ä Ejï. LED AiÄ vÄ¢U½U ª¦gÄU¼£Ä ¸Ãjï ¥nU½U ®A§ªÁV F LED U¼£Ä Ejï. LED U¼ vÄ¢U¼ £qÄ«£ CAvgª£Ä §z°¸ÄvÁ ºÆÃzg MAzÄ ºAvz° CzÄ ¨¼UÄvz. CAvgª£Ä ªÄvÄ ºaïzg Czg ¨¼PÄ ¥RgUÆ¼ÄvÁ ºÆÃUÄvz. LED AiÄ vÄ¢U¼Ä ¥nU ¸ªiÁ£ÁAvgªÁVgÄªAv Ejïzg C ª¦U¼ £qÄ«£ CAvgª£Ä JµÃ ºaïzgÆ LED ¨¼UÄª¦¢®.

LED U¼Ä ¨¼U®Ä C ª¦U¼ vÄ¢U¼£Ä ¸ÆP «¨ªÁAvg«gÄª ©AzÄU¼° Ej¸¨ÃPÄ. ¥nU ®A§ªÁVgÄª ¢Q£° LED AiÄ vÄ¢U¼ £qÄª MAzÄ ¤¢ðµ ºa£ CAvg«zÁU F «¨ªÁAvg zÆgPÄvz. Dzg, LED AiÄ vÄ¢U¼£Ä ¥nU ¸ªiÁ£ÁAvgªÁV Ejïz ÁU, D vÄ¢U¼Ä EgÄª ©AzÄU¼Ä ¸ªiÁ£ «¨ªz ©AzÄU¼ÁVgÄvª (Equipotential points) ºÁUÁV «¨ªÁAvgª¦ EgÄª¦¢®. DzPÁgt vÄ¢U¼ £qÄ«£ CAvgª£Ä JµÃ ºaïzgÆ LED ¨¼UÄª¦¢®.



LED IN AN ELECTROLYTIC TANK

Objective: To demonstrate that there is a gradient in potential in an electrolytic tank.

Materials Required: Glass tank, salt water, brass strips as electrodes, power supply, LED's .

Description: Take a small amount of salt water in the glass tank. Place the brass strips connected to the ends of a battery on the opposite sides of the tank. Connect wires to the ends of an LED and place it in the tank perpendicular to the electrodes. Switch on the power supply and increase the distance between the ends of the LED. It starts to glow at a point and there after its brightness increases with the increase in the separation between the ends. Now turn the LED so that it is now parallel to the electrodes. No matter whatever is the separation between the ends, the LED doesn't glow.

For the LED's to glow a particular potential difference is required. When its ends are placed perpendicular to the electrodes, that potential difference is available beyond a certain separation between the ends. The potential difference increases with separation and so the brightness. But when the ends are placed parallel to the electrodes, they are placed on an equipotential line. That is there is no potential difference along the line for any separation and hence no glow.

¹ÃqÆÃ«ÄÃlgï£ vv

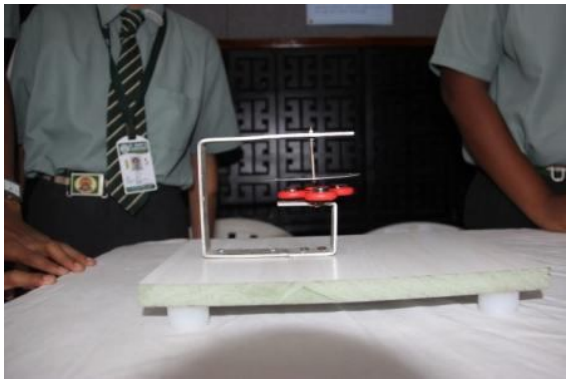
zÁÃAiÄ: ¹ÃqÆÃ«ÄÃlgï£ vvz ¤gÆ¥u

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: ¦qmï ¹£ïgï, ¤AiÆÃq¦«ÄAiÄªïï CAiÄ¸ÁAvU¼Ä, C®Ä¦«Ä¤AiÄA vm¦ ¹£ïgï C£Äï Ej¸®Ä ºÁUÆ C®Ä¦«Ä¤AiÄA£ vmAiÄ£Äï vÆV©q®Ä MAzÄ ª¦ª¸ï.

ªïÁqÄª «zÁ£: ¹£ïgï£°gÄª gAzU¼Æ¼U CAiÄ¸ÁAvU¼£Äï Ej¹. MAzÃ jÃwAiÄ zÄªU¼Ä ªÄÃ®ÄRªÁVg°. FU ¹£ïgï C£Äï wgÄV¹zg, Czg ªÄÃ¯ vÆV©ngÄª C®Ä¦«Ä¤AiÄA vmAiÄÆ ¸º CzÃ ¢Q¦£° wgÄU®Ä DgA©¸Ävz. Ezg §z®Ä vmAiÄ£ïÃ wgÄV¹zg, ¹£ïgï ¸º CzÃ ¢Q¦£° wgÄUÄvz.

PÁAvPÃv ªÄvÄ ¯ÆÃºz £qÄª ¸Á¥ÃP Z®£ EzÁU, Jr «zÄvï ¥ÃjvUÆ¼Ävz. EzjAzÁV §gÄª PÁAvPÃv ªÄvÄ PÁAvU¼ PÃvz £qÄ«£ CAvgQAiÄ¬ÄAzÁV, ¹£ïgï wgÄV¹zg vm; ºÁUÆ vm wgÄV¹zg ¹£ïgï wgÄUÄvª.

ªÁº£U¼° ªÃUª£Äï ¸Æa¸Äª ¹ÃqÆÃ«ÄÃlgïU¼Ä EzÃ vvz ªÄÃ¯ PÁAiÄð ¤ªð»¸Ävª.



PRINCIPLE OF SPEEDOMETER

Objective: To demonstrate the principle of speedometer.

Materials Required: Neodymium magnets, fidget spinner, an aluminium plate and a system to hold the spinner and suspend the plate above it.

Description: Place three Neodymium magnets into the holes of the fidget spinner all with the same pole up. Place the spinner on a support and let the aluminium plate be suspended above it with a suitable gap between the two as shown in the picture. Set the spinner into rotation. The plate rotates in the same direction. On the other hand if the plate is rotated, the spinner with magnets too rotates in the same direction.

When there is a relative motion between the magnetic field and the metal, eddy currents are induced in the metal. The magnetic field of these induced currents interacts with the magnetic field of the magnets and the plate is set into rotation in the same direction as that of the spinner. This is the principle of the speedometer.

AiiÁª ¢Ã¥ ºZÄ ¨¼PÄ ¤ÃqÄvz?

zÁÃAiÄ: «zÄ¢ÃU¼ ¥RgvAiÄÄ CªU¼° GAmÁUÄª ¥ªgï r¹¥Ãµ£ï ªÄÃ¯ Cª®A©vªÁVgÄvz JA§Äzg ¤gÆ¥u.

¨ÃPÁUÄª ¸ÁªÄVU¼Å: 10W ¢Ã¥, 60W ¢Ã¥, ¥ªgï ¸¥ö.

ªiÁqÄª «zÁ£: 10W ¢Ã¥ ªÄvÄ 60W ¢Ã¥U¼£Äß ¥ªgï¸¥ö£ÆA¢U ¸gt ¸A¥Pðz° Ej¸¯ÁVz. eÁ®z° «zÄvï ¥ª»¹zÁU 60W ¢Ã¥ ºZÄ ¥RgªÁV ¨¼UÄvz JAzÄ H»¸ÄªÅzÄ ¸ºd. Dzg 10W ¢Ã¥ªÃ ¥RgªÁV ¨¼UÄªÅz£Äß E° PÁtÄvÃª.

«zÄ¢ÃU¼ ¥RgvAiÄÄ CªU¼° GAmÁUÄª ¥ªgï r¹¥Ãµ£ï£ ªÄÃ¯ Cª®A©vªÁVgÄvz. ¸gt ¸A¥PðªÁz PÁgt JgqÆ ¢Ã¥U¼ ªÄÆ®P ¥ª»¸Äª «zÄvï “I” ¸ª£ÁVz. Dzg 10W ¢Ã¥z «zÄvïgÆÃz 60W ¢Ã¥z gÆÃzQAv ºagÄª PÁgt, CzPÃ ºa£ ªÇÃ¯Åeï zÆgPÄwz. ºÁUÁV Czg “VI” ºagÄvz. ªÄvzÄ ¥RgªÁV ¨¼UÄvz.

WHICH BULB GLOWS BRIGHTER

Objective: To demonstrate the brightness of the bulbs depends upon the power dissipated across them.

Materials Required: A 10 watt bulb, a 60 watt bulb, connecting wires, switch, battery.

Description: A 10 watt bulb and a 60 watt bulb are connected in series with a battery. When they both are switched on and the current flows through both of them, one might expect the 60watt bulb to glow brighter than the10watt bulb. But what we see is that the 10watt bulb that is brighter that the 60watt bulb.

The two bulbs are in series. So, the current through both of them is the same. The resistance of 10watt bulb is more than that of the 60watt bulb. Hence there is more of voltage drop across it and as a result the power dissipated i.e, the product of voltage drop and the current is more for this bulb. Therefore it glows brighter.

¥j¨«Ä¸Äª zªU¼ ªÄÃ°£ gZ£U¼Ä

zÁ¸ÀAiÄ: ¥j¨«Ä¸Äª zªU¼ ªÄÃ¯ ªÄÆqÄª ¥mU¼Ä ªÄvÄ ªÇÃmðPïU¼ ¤gÆ¥u.

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: UÆÃ¼ÁPÁgz ¥Ágz±ðP ¥Áv, wgÄUÄª ªÃ¢P, ¯Á¥ï¨ÁAiiï zª ¸Á§Æ£Ä, ¤ÃgÄ, § t.

ªiÁqÄª «zÁ£: ¯Á¥ï¨ÁAiiï zª ¸Á§Æ¤U ¸ªÄ ¥ªiÁtz ¤ÃgÄ ¨g¹ ¸® § t ¨g¹ UÆÃ¼ÁPÁgz ¥Ágz±ðP ¥ÁvU vÄA©¹. ¥ÁvAiÄ ¨ÁAiÄ£Ä ªÄZ¼¢Az ¨z¥r¹ wgÄUÄª ªÃ¢PAiÄ ªÄÃ¯ ¨zªÁV Ej¹. FU F ª¸ª¸AiÄ£Ä ¤zÁ£ªÁV wgÄV¹ ¤®ÄUqU v¤. zªzº ¥mU¼Ä ªÄvÄ ªÇÃmðPïU¼Ä ªÄÆqÄvª.

zªU¼Ä ¹UV ºÆA¢gÄvª. ¥ÁvU vÁVPÆArgÄª zªz ¥zgª Cw ºZÄ ªÃUzÆA¢U wgÄUÄwgÄvz. M¼ ¥zgU¼ ªÃUª P ªÄÃt Prª Egävz. ¥ÁvAiÄ wgÄUÄ«PAiÄ£Ä ¤°¹zÁU J¯Á ¥zgU¼Æ MªÄUÃ ¤®Äª¢®. »ÃUÁV ¨Ãg ¨Ãg ¥zgz zªª ¨gAiÄÄvz ªÄvÄ ««z gZ£U¼Ä ªÄÆqÄvª.

BANDS AND VORTICES ON A ROTATING FLUID

Objective: To demonstrate the formation of bands and vortices on a rotating fluid.

Materials Required: Spherical container, rotating platform, lifebuoy liquid soap, water, food colour.

Description: Lifebuoy liquid soap is mixed with equal amount of water and a little food colour. The spherical container is now filled with this mixture, closed properly and fixed to the rotating platform. When the arrangement is rotated slowly and brought to a halt, bands and vortices are seen in the liquid.

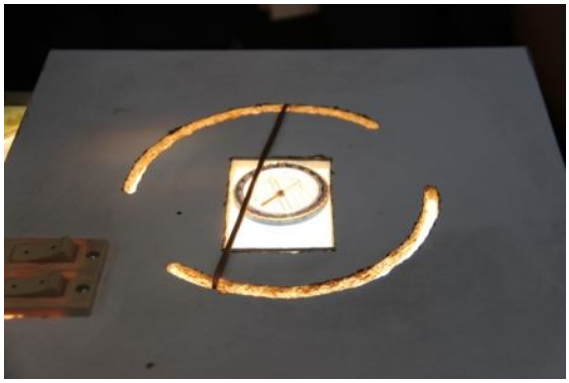
The fluid is viscous. The speed of the layer that is in contact with the container is maximum and the inner layers have decreasing speeds. When the rotation is stopped, all the layers do not come to rest at the same time. Because of this, the fluids of different layers mix and give rise to bands and vortices.

C¸ðqï£ ¥AiÆÃU

zÁÃAiÄ: «zÄvï ¥ª»¸ÄwgÄª ¸g½£ §½ Ej¹z ¢PÆaAiÄ PÆÃ¤ÃAiÄ ¥®lªÅ D ¸g½£ ¢Q£ÆA¢U §z¯ÁUÄvz JA§Äzg ¤gÆ¥u.

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: ¢PÆa, ¯ÆÃºz ¸g¼Ä, ªÄgz º®U, ¨Á¼lj.

ªÀÁqÄª «zÁ£: ªÄgz º®UAiÄ° ¢PÆaAiÄ£Ä PÆj¸¯ÁVz. º®UAiÄ° JgqÄ ªPÁPÁgz PÆgvU½zÄ, ¢PÆaAiÄ ªÄÃ°gÄª ¯ÆÃºz ¸g½£ ¢P£Ä §z°¸®Ä EªÅ G¥AiÄÄPªÁVª. ¸g½£ ªÄÆ®P «zÄvï ¥ª»¸zÃ EzÁU ¢PÆaAiÄ° ¸ÆfPÁAvªÅ ¨Æ«ÄAiÄ PÁAvPÃvP C£ÄUÄtªÁV ¤AwgÄvz. ¸g½£° «zÄvï ¥ª»¹zÁU Czg ¸Äv®Æ PÁAvPÃv GAmÁUÄvz. ¢PÆaAiÄÄ F JgqÆ PÃvU¼ ¥°v PÃvP C£ÄUÄtªÁV ¤®Ävz. ¸g½£ ¢PÄ §z¯ÁzAv ¥°v PÃvz®Æ §z¯Áªu GAmÁUÄvz. »ÃUÁV ¢PÆaAiÄ PÆÃ¤ÃAiÄ ¥®lªÇ §z¯ÁUÄvz.



OERSTED'S EXPERIMENTS

Objective: To demonstrate that the angle of deflection of the compass placed close to a current carrying wire depends on the orientation of the wire.

Materials Required: A magnetic compass, a metal rod, a wooden board and a power supply.

Description: The magnetic compass is fitted in the wooden board which has grooves to place the metal rod. The orientation of the metal rod with respect to the compass can be altered. The compass aligns itself in response to the Earth's magnetic field when there is no current flowing through the rod. Current passing through the rod creates a magnetic field. So, the compass now experiences a torque and aligns itself in response to the resultant of the two fields. Hence we see a deflection of the needle. As the orientation of the rod is changed, the resultant of the two fields also changes. Therefore the deflection too changes.

ªÄÄRªÁq ºÃU wgÄUÄwz

zÁÃAiÄ: zÉ¶ ¨ªÄAiÄ ¤gÆ¥u.

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: ªÄÄRªÁq ªÄvÄ wgÄUÄª ªÃ¢P

ªiÁqÄª «zÁ£: ªÄÄRªÁqz M¼¨ÁUz®Æ ¸º PtÄ, Q«, ªÄÆUÄ EvÁ¡¢ ªÄÄRz J¯Á ¨ÁUU½U §t ºZ¯ÁVz. F ªÄÄRªÁqª£Äß wgÄUÄª ªÃ¢PAiÄ ªÄÃº j¹ ªÃ¢PAi£Äß wgÄV¹zg ªÄÄRªÁqªÇ CzÃ ¢Q£° wgÄUÄvz. Dzg, P®ªÇªÄ «gÄz¹ ¢Q£° wgÄUÄwgÄªAv vÆÃgÄvz.

«gÄz¹ ¢Q£° wgÄUÄwgÄªAv vÆÃgÄ wgÄªÁzÄ ªÄÄRªÁqz M¼¨ÁU. F ¤ªÄß ªÄÃ¯ïöÉ §®P¹ wgÄVzg, §®¨ÁUz°gÄª ªÄÄR¨ÁUU¼Ä ºZÁV C£ÁªgtUÆ¼ÄvÁ ºÆÃUÄvª. ¸ÁªiÁ£¡ªÁV ªÄÄRªÁ JqP¹ wgÄVzÁU »ÃUÁUÄªÁz£Äß ¤jÃQ¸ÄvÃª. DzÄzjAz ªÄÄRªÁ JqP¹ wgÄUÄwz JA§ ¨ªÄU M¼¥qÄvÃª.

FACE MASK ILLUSION

Objective: To demonstrate an optical illusion.

Materials Required: A face mask and a rotating platform.

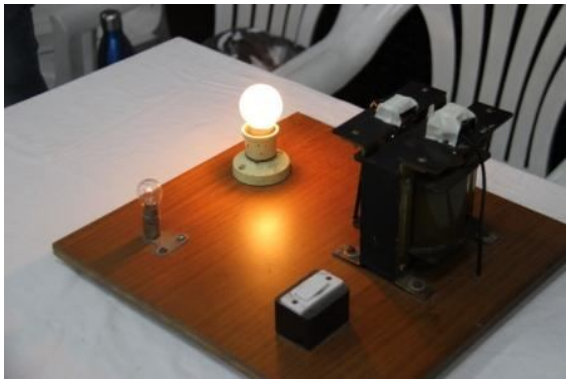
Description: In the face mask used here, the features like eyes, nose, mouth etc are painted even on the inner surface. The facemask is mounted on a rotating platform. As you rotate the platform, the face moves in the same direction, but sometime appears to move in the opposite direction. Note that the movement in opposite direction is seen when the face is a concave surface. As the surface rotates towards right, more of the right side part of the face is revealed. We usually expect this to happen when a face is rotated towards left. Therefore our brain falls into an illusion that the face is rotating towards left.

mÁ£ï¥Áªäðgï

zÁªÀAiÄ: mÁ£ï¥Áªäðgï£ ¥ö¯ªÄj ¸Ägï½AiÄ° ¥ª»¸Äª «zÄ¼vï Czg ¸PAqj ¸Ägï½AiÄ gÆÃzPvAiÄ ªÄÃ¯ Cª®A©vªÁVz JA§Äzg ¤gÆ¥u.

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: ¸¥ïqË£ï mÁ£ï¥Áªäðgï, 15W ªÄvÄ 25W£ «zÄ¼¢Ã¥U¼Ä.

ªïÁqÄª «zÁ£: 15W «zÄ¼¢Ã¥ª£Ä¼ mÁ£ï¥Áªäðgï£ ¥ö¯ªÄjU ¸A¥Qð¹. «zÄ¼vï ¥ª»¹zÁU ¢Ã¥ ¨¼UÄvz. FU 25W ¢Ã¥ª£Ä¼ ¸PAqjU ¸A¥Qð¹. F ¢Ã¥ªÇ ¨¼UÄvz ªÄvÄ 15W£ ¢Ã¥ª¼ ªÄÄAZVAv ºZÄ ¥Rgª ÁV ¨¼UÄvz. ¸PAqjU AiiÁª¼zÃ ¯ÆÃqï E®¢zÁU ¥ö¯ªÄjAiÄ «zÄ¼vï Czg gÆÃzPv¬ÄAz ªiÁv ¤zðjvªÁUÄvz. ¸PAqjU «zÄ¼¢Ã¥ ºÁQz PÆq¯Ã, EzÄ ¥ö¯ªÄj¬ÄAz ºa£ «zÄ¼vï C£Ä¼ ¥qAiÄÄvz ªÄvÄ ¥ö¯ªÄjAiÄÄ J.¹. ªÄ£ï¤Az ºa£ «zÄ¼vï ¥qzÄPÆ¼Ävz. »ÃUÁV ¥ö¯ªÄjU ¸A¥Qð¹gÄª ¢Ã¥ª¼ ªÄÄAZVAv ¥RgªÁUÄvz.



TRANSFORMER

Objective: To demonstrate the dependence of current in the primary of a transformer on the resistance in its secondary.

Materials Required: A step down transformer, 15watt bulb and a 25watt bulb.

Description: Connect a 15 watt bulb in series to the primary of the transformer. When the current is switched 'on' the bulb glows. Now connect a 6v, 25W motorcycle bulb across the secondary. The bulb in the secondary glows and the bulb in the primary glows brighter than before.

When there is no load in the secondary, the primary current is decided by the reactance or the AC resistance of the coil in the primary. When we connect a bulb in the secondary, that is, offer some load, more current is drawn in from the primary which, in turn, draws a larger current from the AC Mains. Hence the bulb in the primary now glows brightly.

Z®£AiÄ ¸ªÄ¸À

zÀÅAiÄ: ¹ìg ºÁUÆ ªÀvÀAiÄªÁUÄª ªÃUÆÃvÀµðU¼° Z®£AiÄ ªÀvÁ¸z ¤gÆ¥u.

¨ÃPÁUÄª ¸ÁªÄVU¼Å: avz° vÆÃj¸ÄªAvº JgqÄ ¥xU¼Ä, KPgÆ¥z ¹Ã¯ï ZAqÄU¼Ä.

ªÀiÁqÄª «zÁ£: JgqÆ ¥xU¼ ªÄÃ¯ ¸ªÀiÁ£ Jvgz°, ¹Ã¯ï ZAqÄU¼¤ìj¹ GgÄ¼®Ä ©r. £ÃgªÁz ¥xz ªÄÃ°£ ZAqÄ ªÆz®Ä v¼ ªÄÄlÄvz JAzÄ H»¸ÄªÀzÄ ¸ºd. Dzg qÆAPÁz ¥xz ªÄÃ°£ ZAqÄ ªÆz®Ä v¼ ªÄÄlÄvz.

£ÃgªÁz ¥xz° GgÄ¼Äª UÆÃ°Ai Ä ªÃUÆÃvÀµð §z¯ÁUÄªÀ¢®. Dzg qÆAPÁz ¥xz°£ º¼z° P¼UÄgÄ¼Äª UÆÃ°Ai Ä ºa£ ªÃUÆÃvÀµð ¥qAiÄÄvz. ¢§ ºwzÁU Czg ªÃUÆÃvÀµð PÄApvUÆAqgÆ, F Pqvªà CzÄ º¼ E½AiÄÄvÁ ¥qz ªÃUÆÃvÀµðQÀAv PrªÄ EgÄvz. »ÃUÁV F ZAqÄ £Ãg ¥xz ZArVAv ªÆz®Ä v¼ ªÄÄlÄvz.

¥xU¼ NgPÆÃ£, ZAqÄU¼£Ä Gg½ ©qÄª ¸Á£ ªÄvÄ qÆAPÁz ¨ÁUz ªPvU¼Ä F ZAqÄU¼ ¥ì¥ÆÃnAiÄ ¥°vÁA±ª£Ä ¤zðj¸Ävª.

RACE TRACK PARADOX

Objective: To compares the motion in constant and variable acceleration.

Materials Required: Two tracks – one straight and the other curved as shown in the figure and identical steel balls.

Description: The tracks are inclined at the same angle and their start and finish points are the same, too. Suppose we release simultaneously two identical spheres on the two tracks. Sphere rolling on which of the two tracks reaches the bottom end first? Opposed to our intuition and common reasoning, the sphere taking the longer path reaches first!

The sphere on the straight path has a constant acceleration while, the sphere on the longer path encounters curvature where it accelerates much more than the other sphere for a short time interval. Even though it has to climb up the slope, the acceleration reduced in this process is less than the acceleration that it gained earlier. This depends on a number of factors such as the angle of inclination, point of release of the spheres, the shape of the curvature.

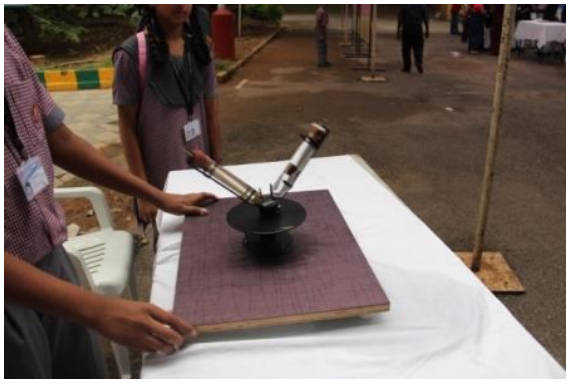
¸An¥Æ¦eï£ vv

z¦ÃAiÄ: ¸An¥Æ¦eï£ vvz ¤gÆ¥u.

¨ÃPÁUÄª ¸ÁªÄVU¼Å: avz° vÆÃj¹gÄªAv ºÆÃ®gïU¼£Ä§ ºÆA¢gÄª wgÄUÄª ªÃ¢P, JgqÄ ¥uÁ¼U¼Ä, ¹Ã¯ ZAqÄ PÁPïð ªÄvÄ ¤ÃgÄ

ªiÁqÄª «zÁ£: JgqÆ ¥uÁ¼U¼° ¤ÃgÄ vÄA©¹. MAzP¦ ¹Ã¯ ZAq£Ä§ ºÁQ. E£Æ¦AzP¦ PÁPïð C£Ä§ ºÁQ. ¥uÁ¼U¼ vgz vÄ¢AiÄ£Ä§ ªÄÄa ªÃ¢PAiÄ°gÄª ºÆÃ®gïU¼° Ej¹. FU ªÃ¢PAiÄ£Ä§ wgÄV¹zg, ¹Ã¯ ZAqÄ PÃAz¢Az zÆg ¸jAiÄÄvz ªÄvÄ PÁPïð PÃAzzqU ¸jAiÄÄvz.

ªÃ¢P wgÄVzÁU ¤ÃgÄ, ¹Ã¯ ZAqÄ ªÄvÄ PÁPïð ªÄÆgg ªÄÃ®Æ ¸ªÄ£Áz PÃAzÁ©UÁ«Ä §® GAmÁUÄvz. PrªÄ ¸ÁAzvAiÄ ª¸Ä ºZÄ ªÃUÆÃv¦µð ºÆAzÄvz. »ÃUÁV ¤ÃjVAv PrªÄ ¸ÁAzvAiÄÄ¼ PÁPïð PÃAzzqU ¸jAiÄÄvz ªÄvÄ ¤ÃjVAv ºZÄ ¸ÁAzvAiÄÄ¼ ¹Ã¯ ZAqÄ PÃAz¢Az zÆg ¸jAiÄÄvz.



PRINCIPLE OF CENTRIFUGE

Objective: To demonstrate the principle of centrifuge.

Materials Required: A rotating platform that is fitted with holders, test tubes, steel ball, cork, water.

Description: Fill both the test tubes with water. Put a steel ball in one and a cork in the other and seal the ends. Place the test tubes on the rotating platform that has holders as shown in the figure. When the platform is rotated, the steel ball is thrown towards outside and the cork is pulled towards the centre.

The ball, cork and water all experience a force towards centre. The less dense one accelerates more. Hence the cork that is less dense than water, moves towards the centre. And the ball that is more dense than water, moves away from the centre.

This is the principle of the centrifuge.

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zÀÃAiÄ: ¨¼Q£ ªQÃ¨ª£z° ªiÁzÀªÄz zÁ¤w ¸ÁAzvAiÄ ªÄºvz ¤gÆ¥u.

¨ÃPÁUÄª ¸ÁªÄVU¼Ä: ¤ÃgÄ, ¨¤Ã£ï, UÁf£ ¨Á l °, ¯Ã¸gï, ¥gz

ªiÁqÄª «zÁ£: UÁf£ ¨Á l °AiÆ¼U ¤Ãg£Ä¤ vUzÄPÆ½. EzP¤ ¨¤Ã£ï ¸Ãj¹. F JgqÆ zªU¼Ä ¨gAiÄÄªÀ¢®. ¤ÃjVAv Prª Ä ¸ÁAzvAiÄ° ¨¤Ã£ï ¤Ãj£ ªÄÃ¯ vÃ®Ävz. ¨¤Ã£ï¤Az ¤ÃjU ¸ÁUÄª ¨¼Q£ Qg t ®A§zqU ¨ÁUÄvz JAzÄ H »¸ÄªÀzÄ ¸ºd. Dzg E° CzÄ ®A§¢Az zÆgP¤ ¨ÁUÄvz. ªiÁvª® Qg t z D¥Áv PÆÃ£ª£Ä¤ §z°¸ÄvÁ ºÆÃzg MAzÄ ºAvz £Avg ¸A¥Æ t ð DAvjP ¥w¥®£ªÁUÄvz.

F JgqÆ ¥°vÁA±U¼Ä, ¨¼PÄ ¸ÁAz ªiÁzÀªÄ¢Az «g¼ ªiÁzÀªÄP¤ ¸ÁVzÁU ªiÁvªÃ DU®Ä ¸Áz¤. ¨¤Ã£ï£ ª¸Ä ¸ÁAzv ¤Ãj£zQ¤Av PrªÄ¬ÄzÀgÆ Czg ªQÃ¨ª ¸ÆZP ¤Ãj£zQ¤Av ºaU Ez. »ÃUÁV ¨¼QU ¨¤Ã£ï ¸ÁAz ªiÁzÀªÄ ªÄvÄ ¤ÃgÄ «g¼ ªiÁzÀªÄªÁUÄvz.

Rarer or Denser

Objective: To demonstrate the importance of optical density in refraction.

Materials Required: Water, Benzene, glass bottle, laser, screen.

Description: Take some water in a glass bottle. Add Benzene to it. The liquids are immerscible and benzene being less denser than water, floats on it. A laser beam going from benzene to water is generally expected to bend towards the normal. But actually it moves away from the normal. As the angle of incidence is increased, we also see total internal reflection.

Both of these results are possible when light travels from a denser to rarer medium.

It is the material density of the benzene that is lesser than that of water. But its refractive index is greater than that of water. Therefore, for light, benzene is denser medium and water is rarer medium.