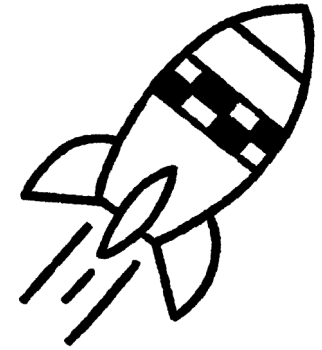


Faafin (Diffusion) iyada oo loo marayo walxo daloola (permeable material): tijaabo (experiment)



Sayniska

Cutub: Faafin (Diffusion)

Natiijo

Waxaan sharxi karaa indho-indhaynta faafinta (diffusion) iyada oo loo marayo xabadaha jelly (walxo daloola).

Erayada muhiimka ah

faafin (diffusion)

Faafin (Diffusion) waa dhaqdhaqaaq (movement) guud ee walxaha hoos u dhaca heerka xoojinta (concentration gradient).

dhaqdhaqaaq guud (net movement)

Dhaqdhaqaaqa guud (net movement) waa dhaqdhaqaaqa guud ee walxaha ka yimaada meel ilaa meel kale.

daloola (permeable)

Walax daloola (permeable) waa mid ay walxaha dareeraha awood u leeyihiin inay dhex maraan.

doorsoome (variable)

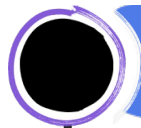
Tijaabo (experiment) sayniska, doorsoome (variable) waa arrin la beddeli karo, la isku midayn karo, ama la qiyaasi karo.

saadaalin (prediction)

Saadaalin saynis (scientific prediction) waa hadal la tijaabin karo oo ku saabsan natiijo suurtagal ah oo tijaabo (experiment) ah.

Qaabka casharka

Faafin (Diffusion) iyada oo loo marayo walxo daloola (permeable material): tijaabo (experiment)



Faafin (Diffusion) gudaha xabad jelly

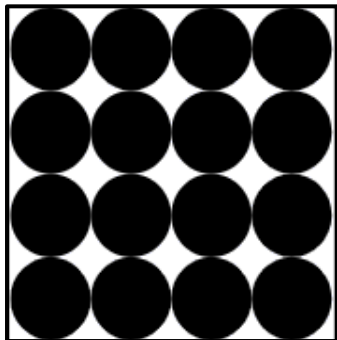


Beddelidda doorsoomayaasha (variables)

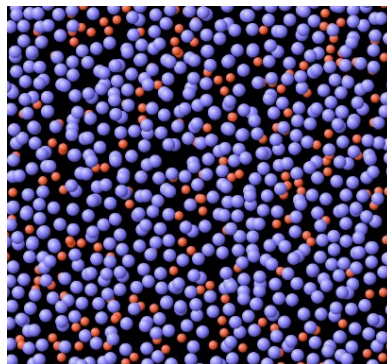
Dhammaan walxaha waxay ka kooban yihiin walxo yaryar (particles).

Marka walax ku jirto xaalad dareere (liquid) ama gaas (gas), walxaha yaryar (particles) waxay dhaqaaqaan wakhti kasta jihada random.

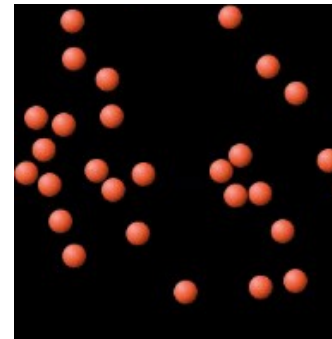
Dhaqdhaqaaqa (movement) joogtada ah ee walxaha ayaa sababa faafinta (diffusion).



Walxaha adag (solid)



Walxaha dareeraha (Particles of a liquid)



Walxaha gaaska (Particles of a gas)

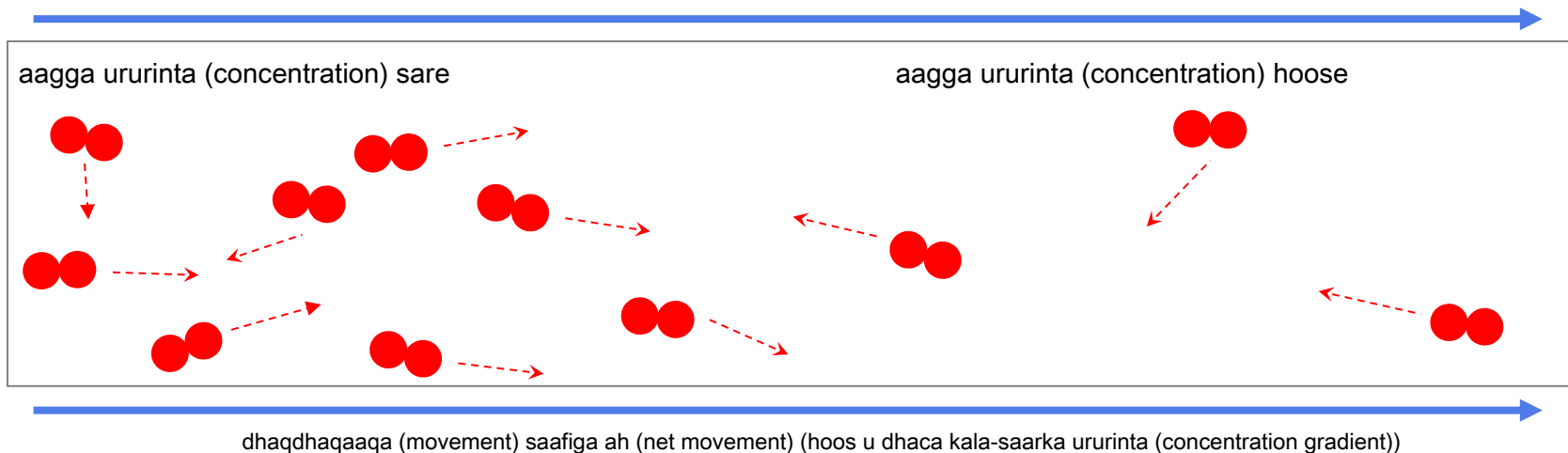
Marka ay jirto kala-saar ururinta (concentration gradient) ...

walxo badan ayaa dhaqaaqa:

laga bilaabo aagga ururinta (concentration) sare ilaa aagga ururinta (concentration) hoose.

Tani waa jihada dhaqdhaqaaqa (movement) saafiga ah (net movement).

kala-saar ururinta (concentration gradient)



Maxaa sababa faafinta (diffusion)?

a

ururinta (concentration) walxaha

b

dhaqdhaqaaqa (movement) walxaha ✓

c

maadada (substance) walxaha

Faafinta (Diffusion) walxaha hoos u dhaca kala-saarka ururinta (concentration gradient) waxaa loo yaqaan ...

a

dhaqdhaqaaqa (movement) ururinta (concentration).

b

dhaqdhaqaaqa (movement) kala-saarka (gradient).

c

dhaqdhaqaaqa (movement) saafiga ah (net movement).



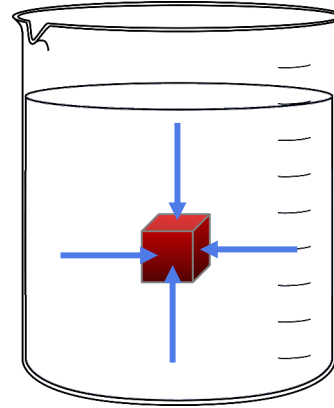
Faafitaanka (Diffusion) gudaha cube jelly ah

Qaar ka mid ah agabyada waa kuwo dhex mari kara (permeable).

Dareerayaashu waxay awood u leeyihiin inay dhex maraan agabyada dhex mari kara (permeable).



Cube jelly ah waa agab dhex mari kara (permeable).



Haddii aan jelly-ga gelinno dareere, qaybaha (particles) dareeraha ayaa ku faafi doona (diffuse) jelly-ga.

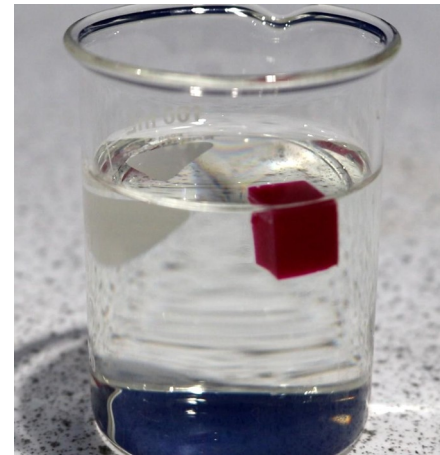
Faafitaanka (Diffusion) gudaha cube jelly ah

Waxaan gelin karnaa cube jelly midab leh oo gudaha acid ah.

- Qaybaha (particles) acid-ka ayaa ku faafi doona (diffuse) jelly-ga dhex mari kara (permeable).
- Qaybaha (particles) acid-ka ayaa sababa in jelly-gu noqdo mid aan midab lahayn.

Maxaad u malaynaysaa inaad arki doonto?

Sidee muuqaalka cube jelly-gu isu beddeli doonaa waqti ka dib?



Watch

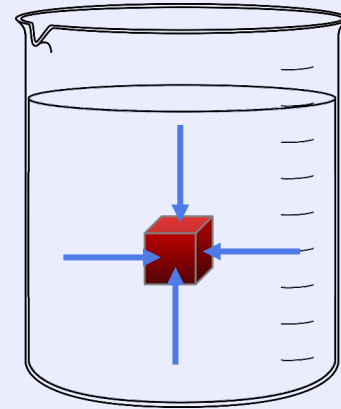


Daawo muujinta (demonstration) si aad u aragto waxa dhacaya.

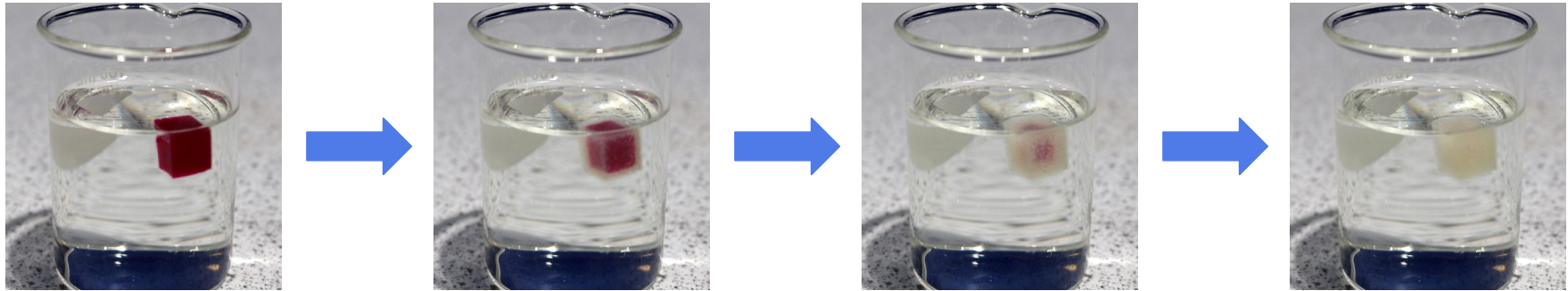
Faafitaanka (Diffusion) gudaha cube jelly ah

Qaybaha (particles) acid-ka ayaa awood u leh inay galaan jelly-ga sababtoo ah waa ...

- a** cube ah.
- b** agab ah.
- c** faafi (diffuse).
- d** dhex mari kara (permeable). ✓



Sawirradu waxay muujinayaan waxa dhacaya marka cube jelly midab leh la geliyo acid.



Qor sharaxaad sababta muuqaalka cube-ga isu beddelo.

Isticmaal ereyadan soo socda sharaxaadaada:

walxaha (particles) dhexmara (permeable) dhaqdhaqaaq saafi ah (net movement)
heerka uruurinta (concentration gradient) faafin (diffusion)

Qor sharaxaad sababta muuqaalka cube-ga u beddelmo. Isticmaal erayadan soo socda sharaxaaddaada:

walxaha (particles) dhexmara (permeable) dhaqdhaqaaq saafi ah (net movement)
heerka uruurinta (concentration gradient) faafin (diffusion)

- Walxaha aashitada waxay u dhaqaaqi karaan gudaha cube-ga sababtoo ah waa dhexmara (permeable).
- Waxaa jira uruurin sare oo ah walxaha aashitada bannaanka cube-ga.
- Dhaqdhaqaaqa saafi ah (net movement) ee walxaha aashitada wuxuu hoos ugu socdaa heerka uruurinta (concentration gradient) laga bilaabo bannaanka ilaa gudaha cube-ga.
- Walxaha aashitada waxay u dhaqaaqaan gudaha cube-ga sababtoo ah faafin (diffusion) oo ka imanaysa dusha kasta ee cube-ga una socota xaruntiisa.
- Walxaha aashitada waxay sababaan in jelly-ku u beddelo midab la'aan, laga bilaabo dusha kasta ee cube-ga ka dibna u dhaqaaqo gudaha xagga xarunta.

Qaabka casharka

Faafin (Diffusion) iyada oo loo marayo walax dhexmarta (permeable): tijaabo (experiment)
wax ku ool ah



Faafin (Diffusion) gudaha cube jelly ah



Beddelidda doorsoomayaasha (Changing variables)

Beddelidda doorsoomayaasha (Changing variables)



Tijaabo (experiment) saynis ah, doorsoome (variable) waa qodob la beddeli karo, la isku mid yeeli karo, ama la qiyaasi karo.

- Doorsoome madaxbanaan (Independent variable):
- Doorsoome ku-tiirsan (Dependent variable):

Kontorool doorsoomayaasha (Control variables) waa la isku mid dhigaa si isbeddelka doorsoomaha madaxbannaan (independent variable) kaliya uu u saameeyo natijada.

Doorsoomayaasha isbeddelaya (Changing variables)

Isku xir nooc kasta oo doorsoome (variable) tilmaantiisa saxda ah.

Doorsoome madaxbannaan (Independent variable)

a

Qodob si isku mid ah loo hayo.

Doorsoome ku-tiirsan (Dependent variable)

b

Qodobka la beddelayo.

Doorsoome kontorool (Control variable)

c

Qodobka la qiyaasayo.

Doorsoomayaasha isbeddelaya (Changing variables)

Ka hor inta aanan samayn tijaabo (experiment) saynis, waxaan samayn karnaa saadaal saynis.

Saadaal saynis (Scientific prediction):

Saadaasha saynisku waa hadal la tijaabin karo oo ku saabsan natiijada suurtagalka ah ee tijaabo (experiment).

Tusaale ahaan:

Saadaalinta saameynta
isbeddelka doorsoomaha madaxbannaan (independent variable)
ee ku yeelan doono doorsoomaha ku-tiirsan (dependent variable).

Saadaal saynis (Scientific prediction) had iyo jeer waa la tijaabin karaa iyadoo la adeegsanayo tijaabo (experiment).

Doorsoomayaasha isbeddelaya (Changing variables)



Kee yahay saadaal saynis (Scientific prediction) la tijaabin karo?

a

Diffusion waxaa keena qaybo dhaqaaqaya (movement).

Sharaxaad (Sharraxaad)

b

Waqtigii loo qaaday in cube jelly uu midabkiisa ku beddelo acid wuxuu ahaa 13 m 45 s.

Indho-indhayn (Observation)

c

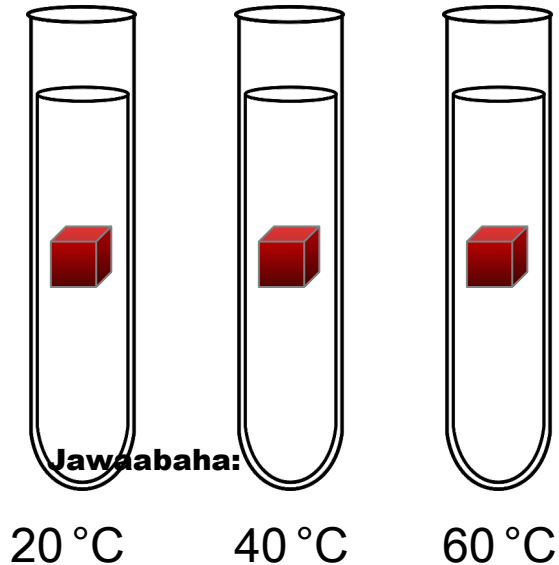
Isticmaalka aashito (acid) xoog leh ayaa ka dhigi doonta in xabagta jelly midabkeedu uu si dhakhso leh u lumo (turn colourless).

Saadaal (Prediction)



Beddelidda doorsoomayaasha (Changing variables)

Marka la baarayo faafinta (diffusion) aashitada (acid) gudaha xabagta jelly midabka leh, doorsoome (variable) aan beddeli karno waa heerkulka (temperature).

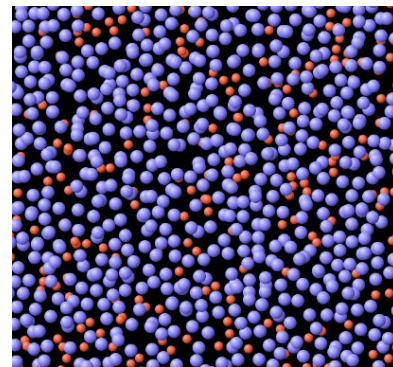


- Doorsoome madaxbannaan (Independent variable) Heerkulka (Temperature) aashitada (acid).
- Doorsoome ku-tiirsan (Dependent variable) Waqtiga loo qaato in midabka xabag kasta laga tirtiro (decolourise).

Uma baahna inaan kululeyno dareere (liquid) si faafintu (diffusion) u dhacdo.

Faafintu (Diffusion) waxay had iyo jeer ka dhacdaa dareere (liquid) sababtoo ah walxuhu (particles) si joogto ah ayuu u dhaqdhaqaaqaan (movement).

Laakiin kordhinta heerkulka (temperature) waxay kordhisaa xawaaraha (speed) ay walxuhu (particles) ku dhaqdhaqaaqaan (movement).



Walxaha (Particles) dareeraha (liquid)

Saadaasha (Prediction) sayniska (scientific) ee ugu badan ee saxda ah waa kee?

a

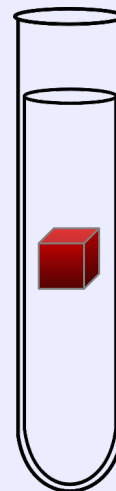
Heerkulka (Temperature) sare, waqtiga loo qaato in midabka xabagta laga tirtiro (decolourise) wuu dheeraan doonaa.

b

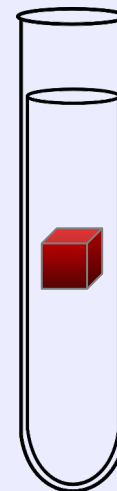
Heerkulka (Temperature) sare, waqtiga loo qaato in midabka xabagta laga tirtiro (decolourise) wuu gaaban doonaa.

c

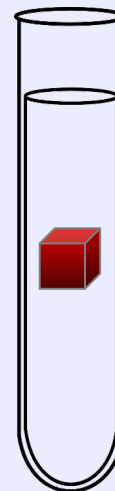
Kordhinta heerkulka saameyn kuma yeelan doonto waqtiga lagu qaato in midabka ka baxo cube-ka (decolourise).



20 °C



40 °C



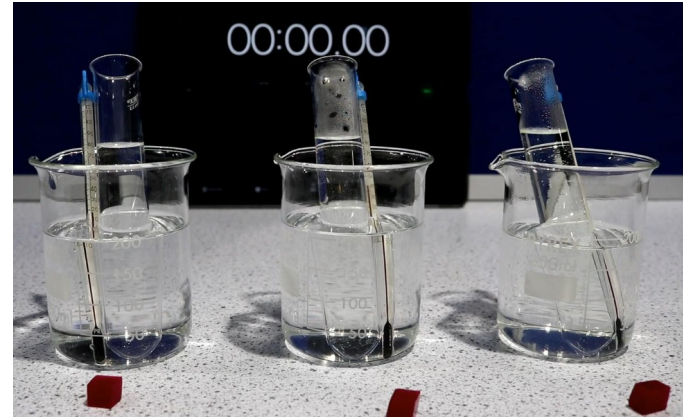
60 °C

Beddelidda doorsoomayaasha (variables)

Saadaal cilmiyeed (scientific prediction): Heerkulka sare, waqtiga lagu qaato in midabka ka baxo cube-ka wuu gaaban doonaa.

Daawo muujinta (demonstration) si aad u aragto waxa dhacaya.

Ma taageeray indho-indhayntii (observations) tijaabada (experiment) saadaashii?



Watch ▶

Beddelidda doorsoomayaasha (variables)

Yaa qeexaya indho-indhaynta (observations) tijaabada (experiment)?

a

Heerkulka sare, waqtiga lagu qaato in midabka ka baxo cube-ka wuu dheeraa.

b

Heerkulka sare, waqtiga lagu qaato in midabka ka baxo cube-ka wuu gaabnaa.

c

Heerkulka sare, waqtiga lagu qaato in midabka ka baxo cube-ka wuxuu la mid ahaa kii heerkulka hoose.



Heerkulka ($^{\circ}\text{C}$)	Waqtiga lagu qaato in midabka ka baxo cube-ka (s)
20	602
40	566
60	380

Yaa sharxaya indho-indhaynta (observations) tijaabada (experiment)?

a

Heerkulka sare, qaybaha (particles) aashitada waxay si dhakhso leh ugu faafaan (diffuse) xarunta cube-ka.

b

Heerkulka sare, qaybaha (particles) aashitada waxay si gaabis ah ugu faafaan (diffuse) xarunta cube-ka.

c

Heerkulka sare, qaybaha (particles) aashitada waxay ugu faafaan (diffuse) xarunta cube-ka isku heer (rate) sida heerkulka hoose.

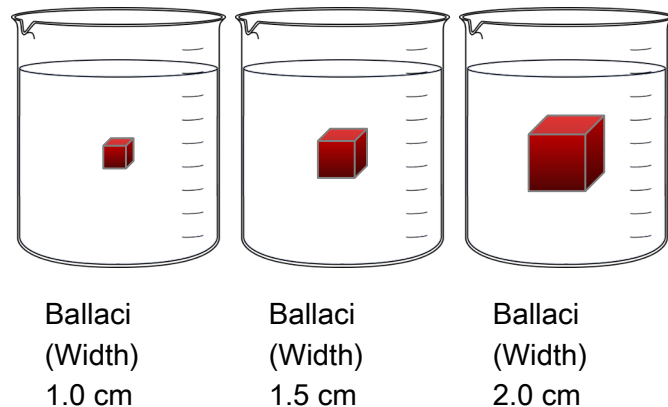


Heerkulka ($^{\circ}\text{C}$)	Waqtiga lagu qaato in midabka ka baxo cube-ka (s)
20	602
40	566
60	380

Marka la baarayo faafinta (diffusion) aashitada gudaha cube-ka jeliga midabka leh, doorsoome (variable) aan beddeli karno waa cabbirka cube-ka.

1) Aqoonso (Identify) doorsoomaha madaxbanaan (independent variable), doorsoomaha ku-tiirsan (dependent variable), iyo doorsoome ay tahay inaan xakameyno (control variable).

2) Qor saadaal cilmiyeed (scientific prediction) tijaabada (experiment) darsiga.



1) Aqoonso (Identify) doorsoomaha madaxbanaan (independent variable), doorsoomaha ku-tiirsan (dependent variable), iyo doorsoome ay tahay inaan xakameyno (control variable).

Doorsoomaha madaxbanaan (Independent variable):

Doorsoomaha ku-tiirsan (Dependent variable):

wakhtiga (time) loo qaato in midabka ka baxo (decolourise) cube kasta.

heerkulka (temperature) aashitada (acid).

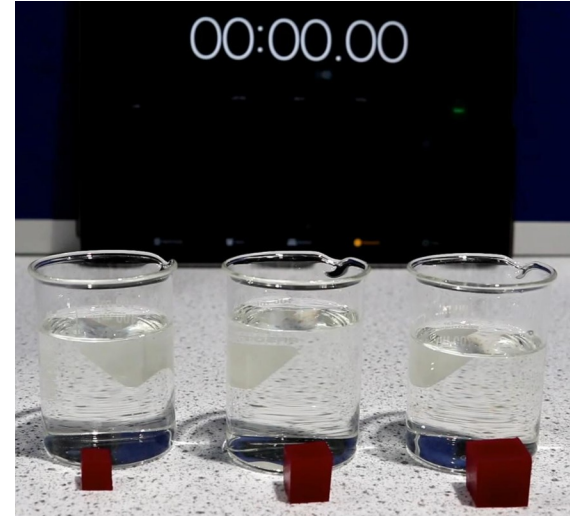
2) Qor saadaal cilmiyeed (scientific prediction) tijaabada (experiment) darsiga.

Wakhtiga (time) loo qaato in midabka ka baxo (decolourise) cube-ka wuxuu dheeraan doonaa cube ballaciisu (width) weyn yahay.

Daawo (Watch) muujinta (demonstration) si aad u aragto waxa dhaca.

3) Ma taageertay (support) indho-indhaynta (observations) tijaabada (experiment) saadaashaada (prediction)?

4) Sidee u sharxi lahayd (explain) indho-indhaynta (observations) tijaabada (experiment) darsiga?



Watch ▶

3) Ma taageereen indho-indheyntii tijaabada (experiment) saadaalintaada?

Haddii aad saadaalisay in waqtiga loo qaato in midabka ka baxo (decolourise) uu dheeraan doono cube ballaciisu weyn yahay, indho-indheyntu waxay taageertay saadaalinta.

4) Sidee u sharxi lahayd indho-indheynta tijaabada (experiment)?

Waqtiga loo qaato in midabka ka baxo (decolourise) cube ballaciisu weyn yahay waa dheer, sababtoo ah qaybaha asiidhka (acid) waa inay sii faafaan (diffuse) ka fog xagga sare ee cube si ay u gaaraan bartamihisa.

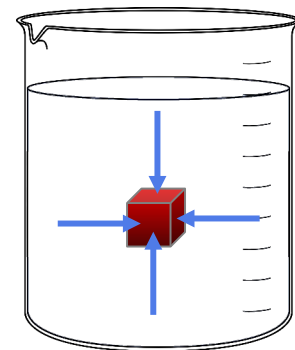
Soo koobid

Faafinta (diffusion) iyada oo loo marayo agab dhexmara (permeable material): tijaabo (experiment) wax ku ool ah

Qaybaha dareeraha (liquids) waxay awood u leeyihiin inay dhaqaaqaan (movement) iyagoo sii maraya agabyo dhexmara (permeable materials) iyagoo faafaya (diffusion).

Dhaqdhaqaaqa (movement) saafiga ah ee qaybaha dareeraha (liquid) wuxuu hoos u socdaa jihada xaddiga (concentration gradient) laga bilaabo dibadda agabka dhexmara (permeable material) ilaa gudihiisa.

Saadaalin cilmiyeed (scientific prediction) waa bayaan la tijaabin karo oo ku saabsan natiijo suurtagal ah oo tijaabo (experiment) ah.



Waxaan samayn karnaa saadaal ku saabsan saamaynta isbeddelka doorsoomaha madaxbannaan (independent variable) (tusaale: cabbirka cube) uu ku yeelan doono doorsoomaha ku-tiirsan (dependent variable) (tusaale: waqtiga midab-ka-baxa (decolourisation)) ee tijaabada (experiment).