

Ua ib Tus Kws Tshuaj Khes Mis!

Phau Ntawv Sau Hauv Chav Kuaj Mob

Siv phau ntawv sau tseg no txhawm rau sau tseg, kaw koj cov kev tshawb pom,
thiab sim cov kev tau ntsib tshiab ntawm tsev.

LUB NPE



GSK Science in the Summer™

In collaboration with



Nrhiav kom paub ntau ntxiv!

Ua ib tus kws
tshuaj khes mis
ntawm tsev!
Sim ua txoj dej num
ntawm nplooj
ntawv 24!

Cov Vev Xaib

Ua Ib Tus Kws Tshuaj Khes Mis! – scienceinthesummer.fi.edu/be-a-chemist
Lub chaw hauj lwm lub vev xaib rau 2026 GSK Kev Tshawb Fawb hauv Lub
Caij Ntuj Sov™

Lub Koom Haum Franklin – fi.edu/en/science-and-education/franklin-at-home

STEM cov hauj lwm thiab cov vis dis aus

Lub Koom Haum Tshuaj Khes Mis Asmeskas - www.acs.org/education

Cov chaw kawm paub, cov hauj lwm piv txwv, thiab ntau yam ntxiv

Kev tshawb fawb! KIDS | PBS – pbs.org/show/science-kids

Vis dis aus thiab kev sim tshuaj khes mis

Cov Phau Ntawv

11 Cov Kev Sim Ntawv Ua Tsis Tiav los ntawm Jenny Offill & Nancy Carpenter

Ada Twist, Kws Tshuaj Khes Mis los ntawm Andrea Beaty

Bartholomew thiab tus Oobleck los ntawm Dr. Seuss

Hloov Nws! Solids, Liquids, Gases thiab Koj los ntawm Adrienne Mason

Txhua Yam Kev Kawm Txog Tshuaj Khes Mis Yog Dab Tsi Tiag? los ntawm Alex Frith

Phau Ntawv Qhia Me Nyuam Yaus Kuaj Sim Txhua Yam Kev Tshawb Fawb los ntawm Tom Robinson

Kev Tshawb Fawb Txog Kev Ua Zaub Mov los ntawm Joan D'Amico & Karen Eich Drummond

Cov Kev Lees Paub

Cov Kws Sau Ntawv: Tara L. Cox, Rachel Castro-Diephouse

Cov Kws Tsim Qauv: Madeleine Bennett, Madelyn Lobb,
James Bailey, Zeph David, Audrey Lee

Kev nkag mus saib tau: Ua tsaug rau Txhua Qhov Kev Nkag
Mus Sab Laj rau kev tshuaj xyuas cov peev txheej no thiab
txhawb nqa txoj hauj lwm txuas ntxiv ntawm kev nce kev
koom nrog thiab kev nkag mus rau Kev Tshawb Fawb Lub Caij
Ntuj Sov™.

Tus txhawb nqa: Qhov kev pab cuam no ua tau los ntawm
kev muaj lub siab dawb txhawb nqa los ntawm GSK thiab kev
koom tes ntawm lawv pab pawg mob siab rau.

Cov Kws Qhia thiab Cov Koom Haum Ua Tswv Cuab: Ua
tsaug rau ntau lub koom haum thiab lawv cov kws qhia uas
tuav GSK Kev Tshawb Fawb Lub Caij Ntuj Sov™ cov kev pab
cuam thoob plaws lub teb chaws. GSK Kev Tshawb Fawb Lub
Caij Ntuj Sov™ ncav cuag ntau txhiab tus me nyuam txhua
lub caij ntuj sov ua tsaug rau koj txoj kev cog lus thiab kev pab
txhawb nqa uas tsis muaj nqi.

DAIM DUAB CREDITS

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Tshuaj Khes Mis Yog Dab Tsi?



Tshuaj khes mis yog “kev tshawb nrhiav ntawm cov khoom” — yam twg uas ua los ntawm, qhov lawv coj li cas, thiab lawv hloov pauv li cas.

Cov kws tshuaj khes mis cov lus nug tshawb nrhiav xws lil:

- Cov tshuaj khes mis twg ua cov khoom siv hauv ntiaj teb nyob ib puag ncig peb?
- Cov kuab tshuaj zoo sib xws los sis sib txawv li cas?
- Thaum peb sib tov cov kuab tshuaj ua ke, yuav muaj li cas tshwm sim—lawv puas tseem zoo li qub los sis tsim ib yam tshiab?

Txhua yam kuab tshuaj hauv peb lub ntiaj teb yog ua los ntawm cov tshuaj khes mis - thiab cov kws tshuaj pab peb nkag siab thiab siv lawv kom muaj kev nyab xeeb thiab zoo.

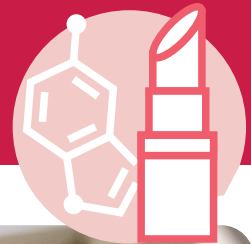
Tshuaj khes mis yog ib qho chaw **LOJ** heev uas muaj ntau txoj hauj lwm sib txawv.

Cov kws tshuaj khes mis tej zaum yuav:

- Sim cov khoom kom paub tseeb tias lawv muaj kev nyab xeeb rau tib neeg siv.
- Sim ua cov kuab tshuaj los tsim cov cuab yeej siv tshiab.
- Tshawb nrhiav txog seb cov tshuaj ua hauj lwm li cas los pab kom tib neeg muaj lub dag zog zoo.
- Saib xyuas huab cua, dej, thiab av kom peb lub ntiaj teb huv si.



Ua ib tus Kws Tshuaj Khes Mis Plev Ib Ce



Cov kws tshuaj khes mis plev ib ce niaj hnuv xws li tshuaj zawv plaub hau, xab npum, thiab plev kom zoo nkauj. Lawv ua tib zoo sib tov cov khoom xyaw ua ke thiab sim lawv kom paub tseeb tias lawv siv tau zoo.



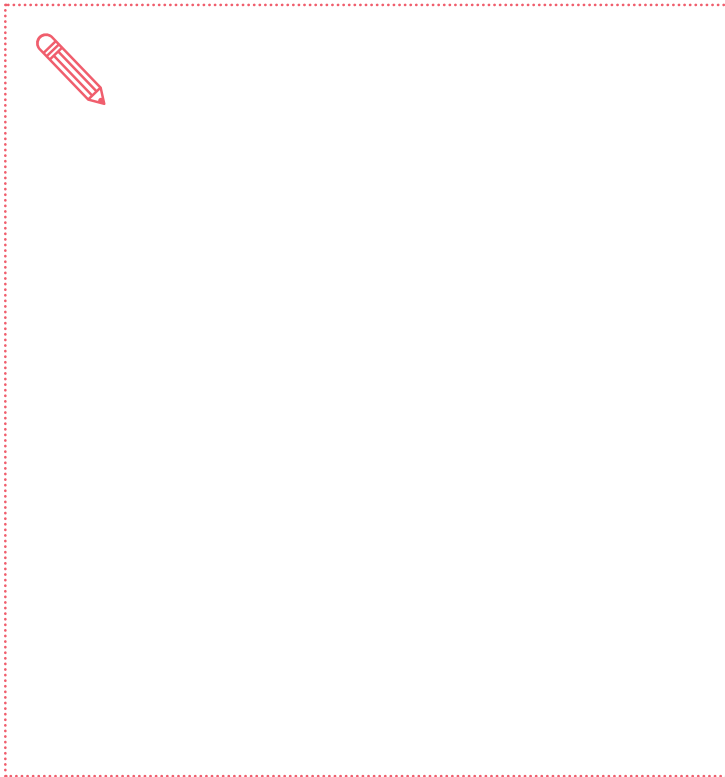
Nqe Lus Nug Tseem Ceeb: Cov kws tshuaj plev ib ce yuav tsim cov khoom siv saib xyuas tus kheej kom muaj kev nyab xeeb siv cov khoom xyaw uas pom muaj nyob rau hauv xwm li cas?



Koj Lub Khoos Kas

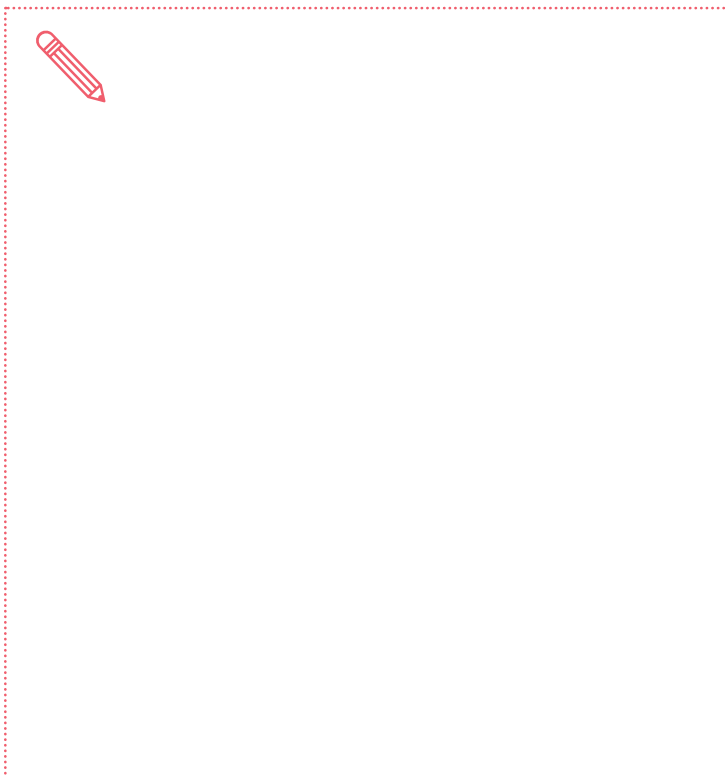
Tsim cov xim plev xim rau cov khoom xws li kev saib xyuas tawv nqaij, plev kom zoo nkauj, thiab plev ntsej muag.

Cov xim pleev cov ntaub cochineal zoo li cas?



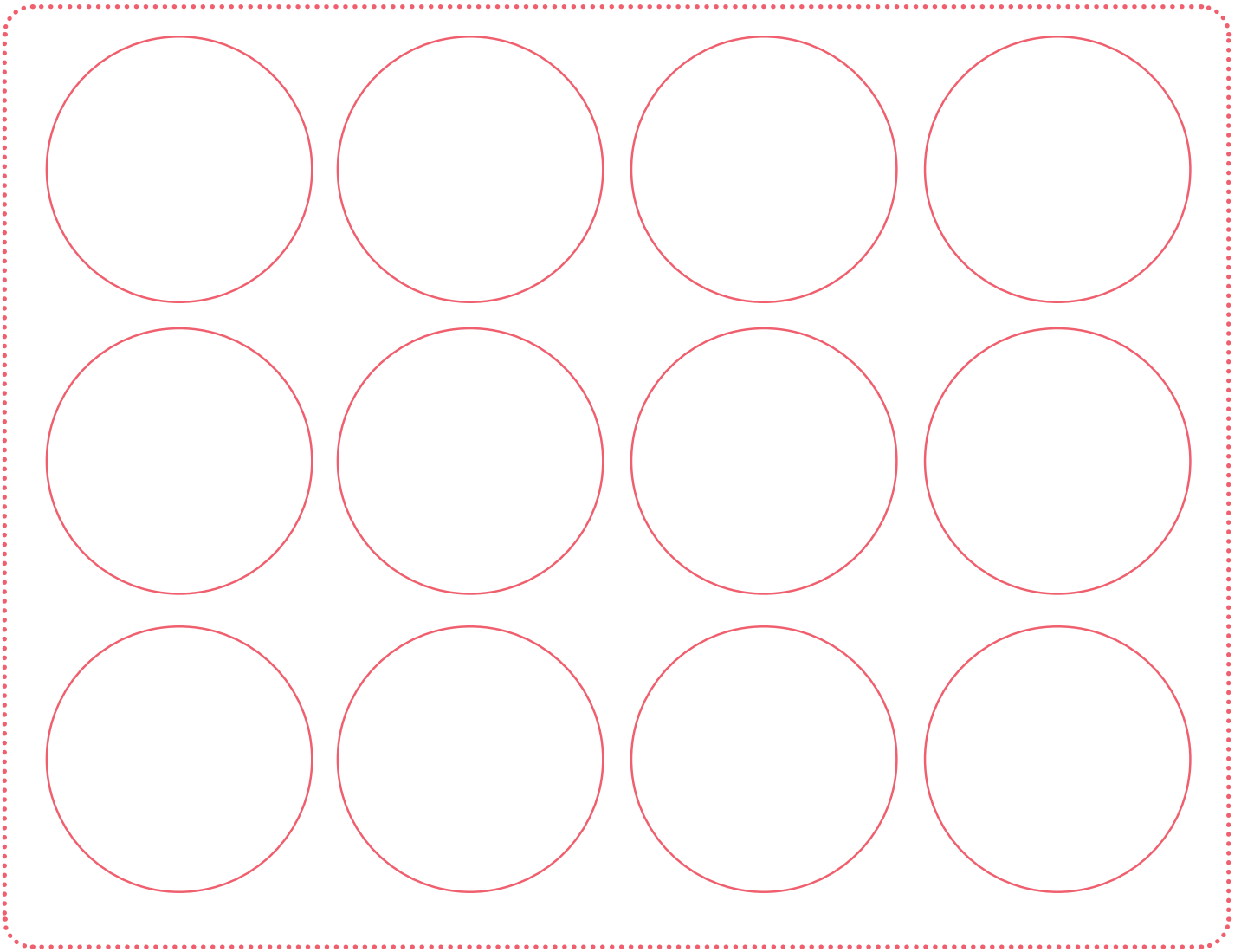
Tus kab cochineal (kah-chin-EE-ul) yog ib hom kab me uas los ntawm Nruab Nrab Teb Chaws Asmeskas.

Cov xim pleev ntawm paj noob hlis zoo li cas?



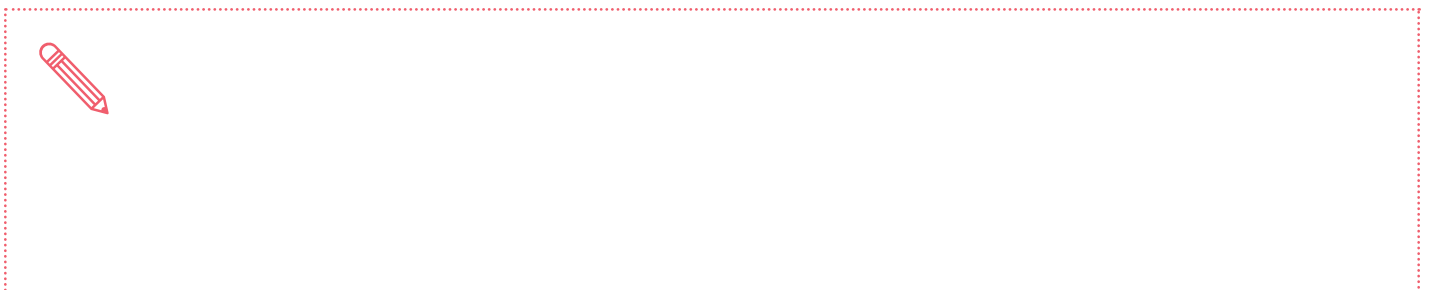
Cov taum pauv yog ib tsoob nroj uas los ntawm sab Es Xias.

Kev Kuaj Cov Xim

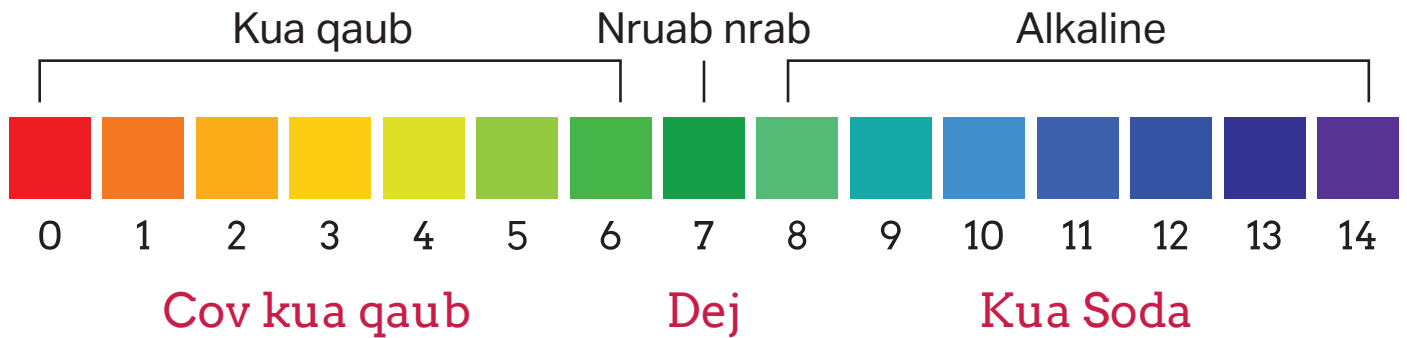


- 1 – Dej (dihydrogen monoxide)**
- 2 – Kua Qaub (acetic acid)**
- 3 – Kua Soda Liquid (sodium bicarbonate, aqueous)**

Yam khoom siv xyaw twg siv hauj lwm tau zoo tshaj plaws?
Hom xim twg siv tau nyab xeeb tshaj plaws?



pH Qhov Ntsuas



Qhov Qhia Pom

Koj nyiam tus kws tshuaj khes mis pleev ib ce li cas?
Cov kev txawj twg uas koj tau xyaum?

Muab Daim
Ntawv Lo Qhia
Txog Cov Txuj
Ci Lo Rau
Ntawm No!



Ua Ib Tus Kws Tshuaj Khes Mis Txhaum Cai



Cov kws tshuaj khes mis txhaum cai siv kev tshawb fawb los pab daws cov teeb meem txhaum cai los ntawm kev tshawb nrhiav cov pov thawj uas tshuav ntawm qhov chaw ua txhaum cai.



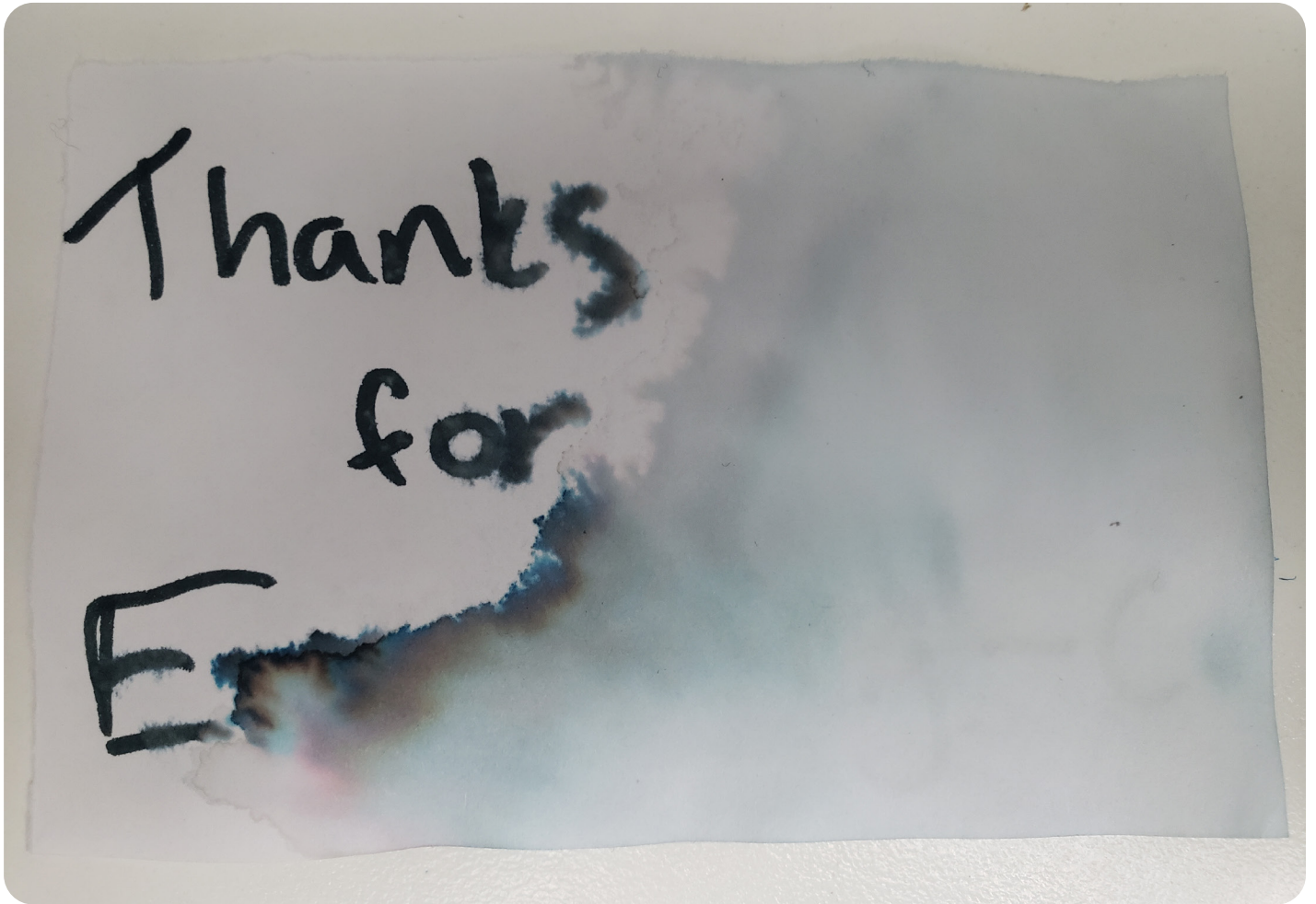
Lo lus nug tseem ceeb: Cov kws tshuaj khes mis txhaum cai yuav ua li cas los tshuaj xyuas cov tshuaj kom daws tau cov lus zais?



Koj Lub Khoos Kas

Sim cov kua mem los ntawm cov khoom siv sau ntawv sib txawv kom paub seb qhov twg tau sau tseg ib daim ntawv zais cia.

Daim Daub Pov Thawj



Cov Kev Kuaj Cov Tee Dej Nrog Tau Los

Cwj Mem/Tus Cwj Mem Loj #	Muaj dab tsi tshwm sim rau cov kua cwj mem?

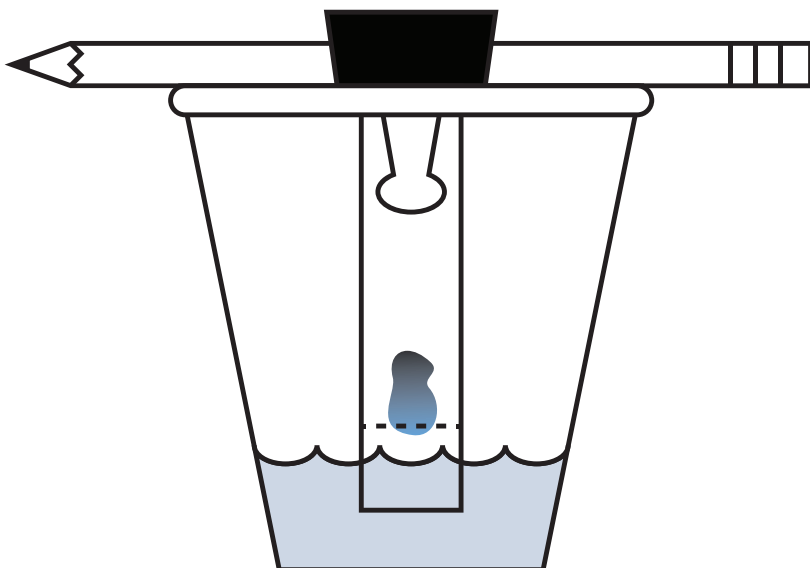
Koj xav sim cov cwj mem los sis cov cim twg ntxiv?



Kev Ntsuas Cov Kua Cwj
Mem Ua Pov Thawj



Kev Teeb Tsa Kuaj Xyuas
Chromatography



Cov ua tau los

Koj xav tias cwj mem twg los yog cwj mem twg tau sau cov ntawv pov thawj?
Sau los yog kos koj cov tswv yim ntawm no.



Qhov Qhia Pom

Koj nyiam tus kws tshuaj khes mis txhaum cai li cas?
Cov kev txawj twg uas koj tau xyaum?



Muab Daim
Ntawv Lo Qhia
Txog Cov Txuj
Ci Lo Rau
Ntawm No!

Ua Ib Tus Kws Tshuaj Khes Mis Cuab Yeej Siv



Cov kws tshuaj khes mis tshawb nrhiav txog yam khoom ua los ntawm thiab tsim cov khoom tshiab nrog cov khoom tshwj xeeb nyob ntawm lawv lub hom phiaj.



Lo Lus Nug Tseem Ceeb: Cov kws tshuaj khes mis cuab yeej siv tsim tau cov slime muaj zog dua thiab ncab tau zoo dua rau cov khoom ua si tshiab tau li cas?



Koj Lub Khoos Kas

Tsim ib qho khoom ua si slime tshiab uas muaj zog thiab ncab tau ntau dua li lwm cov qauv.

Tus Qauv Slime Formula

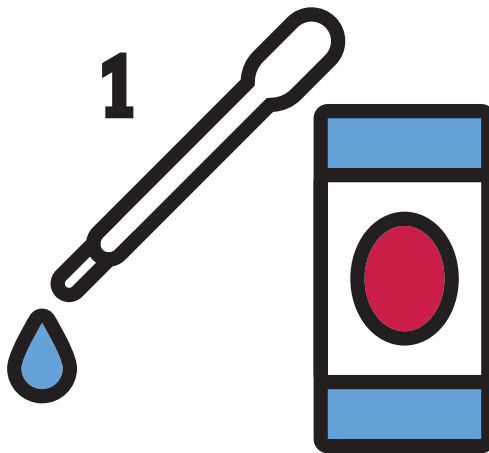


1 Diav ntawm Cov Kua Nplaum

1 Diav ntawm Cov Dej



Sib do ua ke



1 Pipette-puv ntawm Cov Kuaj Borax



Rov qab muab do kom sib xyaw


Cov Ntaub Ntawv Qhia Txog Cov Slime

Tau Kuaj Tus Qauv Tshuaj	Cov Slime Tau Los

Cov ua tau los

Daim ntawv qhia twg tau muab cov slime zoo tshaj plaws rau koj?

Koj yuav piav qhia txog qhov zoo nkauj, kev ncab tau, thiab qhov zoo tag nrho li cas?




A large rectangular area with a dotted border, intended for writing an answer. A small pencil icon is located in the top-left corner.



Qhov Qhia Pom

Koj zoo li tus kws tshuaj khes mis cuab yeej siv li cas?

Cov kev txawj twg uas koj tau xyaum?



A large rectangular area with a dotted border, intended for writing an answer. A small pencil icon is located in the top-left corner.

Muab Daim
Ntawv Lo Qhia
Txog Cov Txuj
Ci Lo Rau
Ntawm No!

Ua Ib Tus Kws Tshuaj Khes Mis Kho Mob



Cov kws tshuaj lom neeg kawm txog cov tshuaj khes mis los pab tsim cov tshuaj tshiab.



Lo Lus Nug Tseem Ceeb: Cov kws tshuaj khes mis yuav tsim thiab tswj cov tshuaj khes mis li cas los tsim cov khoom tshiab?



Koj Lub Khoos Kas

Sim cov tshuaj khes mis los tsim cov tshuaj antacid tshiab.



Cov Ntaub Ntawv Soj Ntsuam Cov Antacid

Koj pom daim duab no nws qhia txog dab tsi?



Thaum koj ntxiv dej rau hauv, muaj dab tsi tshwm sim?



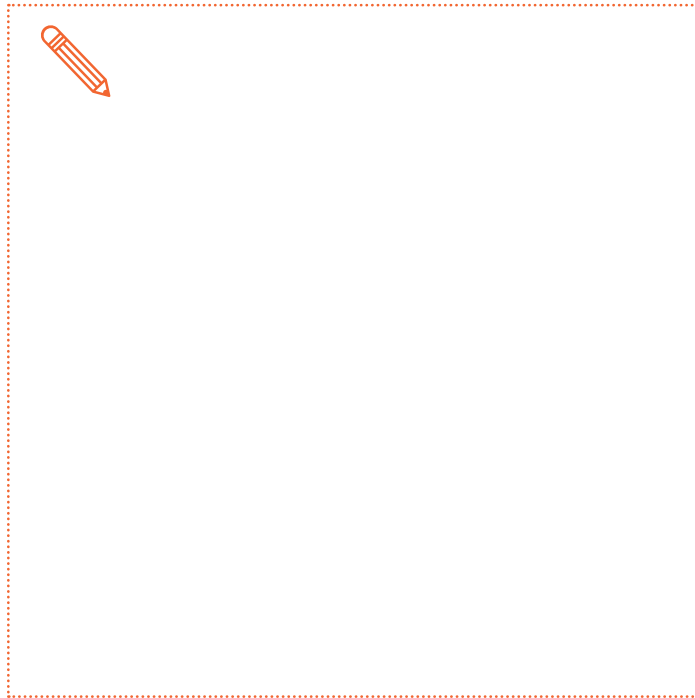
Kev Kuaj Xyuas Cov Tshuaj Sib Xyaws

A large rectangular area with a dotted border containing 12 empty circles arranged in a 3x4 grid. This area is intended for students to draw or write their answers for the experiment.

T – Tshuaj Plev Ib Ce ntawm Tartar (potassium bitartrate)
B – Cov Kua Soda Powder (sodium bicarbonate)
S – Cov Hmoov Piam Thaj (sucrose)

Lus Cim Tseg

Kos duab los yog sau ib yam dab tsi tseem ceeb los yog nthuav txog koj cov kev kuaj ntsuas.



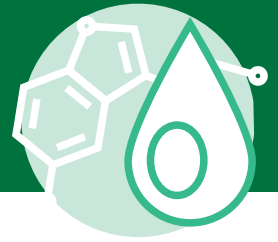
Qhov Qhia Pom

Koj nyiam tus kws tshuaj khes mis cuab yeej siv li cas?
Cov kev txawj twg uas koj tau xyaum?



Muab Daim
Ntawv Lo Qhia
Txog Cov Txuj
Ci Lo Rau
Ntawm No!

Ua Ib Tus Kws Tshuaj Khes Mis Dej



Cov kws tshuaj khes mis hauv dej kawm txog yam uas nyob hauv peb cov dej kom paub seb nws puas huv los sis muaj kuab lom. Lawv sim cov tshuaj sib txawv kom paub tseeb tias dej haus tau zoo thiab noj qab haus huv rau ib puag ncig.



Lo Lus Nug Tseem Ceeb: Cov kws tshuaj khes mis ua li cas thiaj ntxuav tau cov dej qias neeg kom nws muaj kev nyab xeeb rau tib neeg thiab ib puag ncig?



Koj Lub Khoos Kas

Txheeb xyuas cov dej los ntawm cov qauv dej ntwis kom paub tseeb tias nws huv thiab muaj kev nyab xeeb.

Tsim ib lub lim dej thiab sim ua kom nws huv sai li sai tau.

Kev Soj Ntsuam Yooj Yim



Cov Txiaj Ntsig Los Ntawm Kev Lim Dej

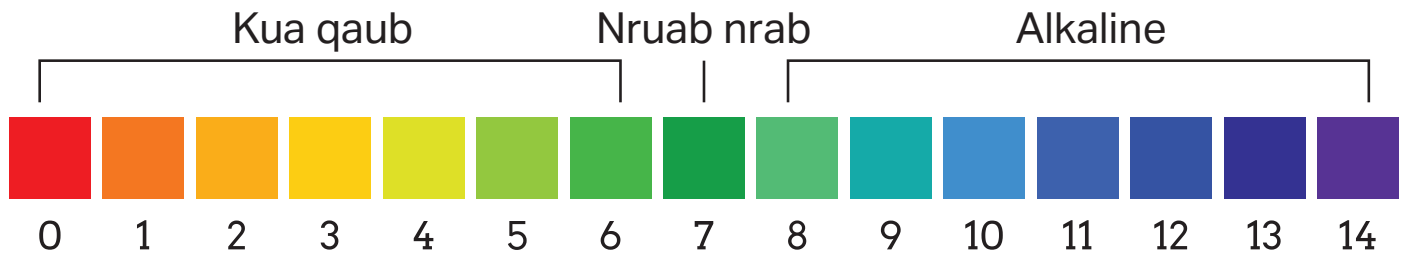
Cov txheej txheem twg ua hauj lwm zoo tshaj plaws?



Koj tau ua rau cov dej muaj cov acidic tsawg li cas?



pH Qhov Ntsuas



Qhov Qhia Pom

Koj nyiam tus kws tshuaj khes mis dej li cas?
Cov kev txawj twg uas koj tau xyaum?

Muab Daim
Ntawv Lo Qhia
Txog Cov Txuj
Ci Lo Rau
Ntawm No!



Ua ib tus kws tshuaj khes mis ntawm Tsev!

Vim li cas qee cov pancakes thiaj sib dua thiab fluffy thaum lwm tus tig mus rau hauv qhov chaw tus thiab chewy? Cov lus teb nyob hauv kev kawm tshuaj khes mis - tshwj xeeb, ib qho protein hu ua gluten. Txoj hauj lwm no yuav pab koj tshawb nrhiav seb kev sib xyaw ua ke cuam tshuam li cas **cov gluten** thiab yam uas hloov pauv koj lub ncuav ci tau li cas.

Yam uas koj xav tau:

- 2 khob hmoov
- 2 khob mis nyuj + 1 tbsp kua txiv qaub (los yog mis nyuj)
- 2 tbsp piam thaj
- 2 tsp kua hmoov
- ½ tsp kua soda
- ½ tsp ntsev
- 1 qe
- 3 tbsp cov mis khov
- Cov roj ua khoom noj
- Cov tais, khoom tsoo, diav, lauj kaub, cuab yeej ntsuas



Yam uas koj yuav ua:

1. Sib tov cov khoom xyaw ntub (mis nyuj, kua txiv qaub, qe, laum huab xeeb) rau hauv ib lub tais.
2. Sib tov cov khoom xyaw qhuav (hmoov, dej qab zib, kua hmoov, kua soda, ntsev) rau hauv lwm lub tais.
3. Muab cov khoom xyaw ntub thiab qhuav maj mam do sib xyaw kom txog thaum sib xyaw. Nov yog koj lub **ncuav ua thooj**.
4. Muab daus mus ua 3 tais
 - **Tais A:** Tso cia kom yaj.
 - **Tais B:** Sib xyaw kom txog thaum xyaw ua ke.
 - **Tais C:** Sib tov kom txog thaum sib xyaw, tom qab ntawd sib tov ntxiv 3-5 feeb.
5. Ua lub ncuav ci los ntawm txhua tais. Thaum cov npuas tsim, tig thiab ua noj kom txog thaum daj ua xim kub.
6. Muab txhua qhov no coj los sib piv:
 - Lub ncuav ci siab thiab su tuaj npaum li cas?
 - Lawv qab npaum li cas?
 - Lub ncuav ci twg yog lub zoo tshaj plaws?

Kawm paub ntau ntxiv:

<https://www.scientificamerican.com/article/bring-science-home-gluten-pancakes/>