1st session

What do you know about matter?

Answer this quiz please : **http://www.vtaide.com/png/matter.htm**

Classify matter

	Compound	Mixture
1 Composition	A compound has a fixed composition. The percentage of each element in a particular compound is always the same.	A mixture does not have a fixed composition. The percentage of each substance in a mixture is not always the same.
2 Properties	A compound has its own set of properties. It does not have the properties of its elements.	A mixture does not have its own set of properties. It has the same properties as the substances it is made of.
3 Melting and boiling points	A compound has a fixed melting point and (at sea level) a fixed boiling point.	A mixture does not have fixed melting and boiling points. A mixture melts and boils over a range of temperature.
4 Separation	A compound cannot be broken into simpler substances by physical means. A chemical reaction is needed to do this.	A mixture can easily be separated into its substances by physical means.

Matter Anything with mass and volume.			Mass = Particles in a space Volume = Takes up space
Substance Matter with constant composition		Mixture Matter with variable composition	
Element Substance made up of only one type of atom	Compound Two or more elements that are chemically combined	Heterogeneous Mixture Mixtures that are made up of more than one phase	Homogeneous Mixtures Also called solutions. Mixtures that are made up of only one phase
Examples – gold, silver, carbon, oxygen and hydrogen	Examples – water, carbon dioxide, sodium bicarbonate, carbon monoxide	Examples – sand, soil, chicken soup, pizza, chocolate chip cookies. Orange Juice, sand and salt	Examples – salt water, pure air, metal alloys, seltzer water. $CO_2 \cdot H_2O$, NaCl

NAME _____
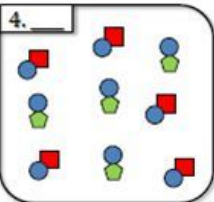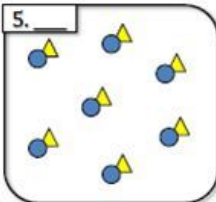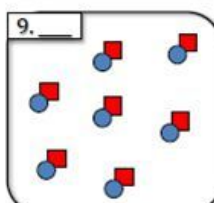
Elements, Compounds and Mixtures 1
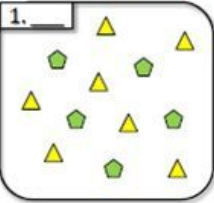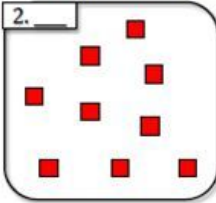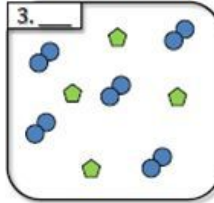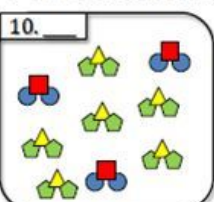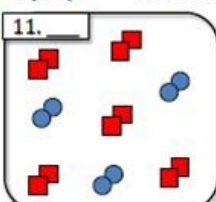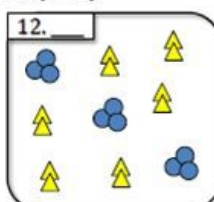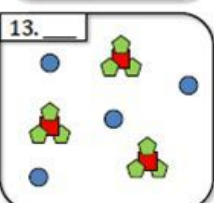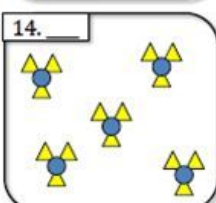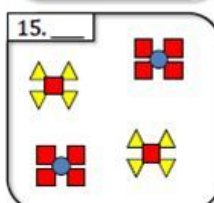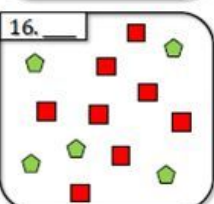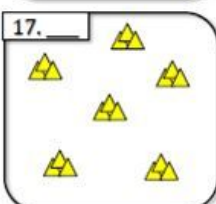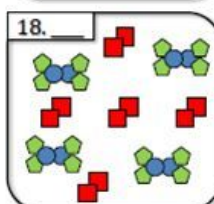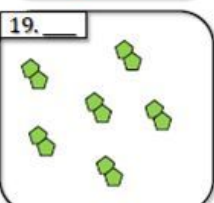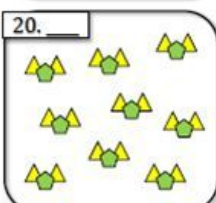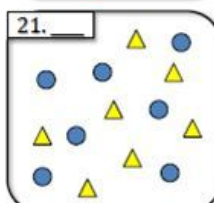
Each picture below is one of the following:

► ELEMENT (E)
► COMPOUND (C)
► *MIXTURE* of ELEMENTS (ME)

► *MIXTURE* of COMPOUNDS (MC)
► *MIXTURE* of ELEMENTS *and* COMPOUNDS (MEC)

Directions: Correctly label each picture for what it is representing.
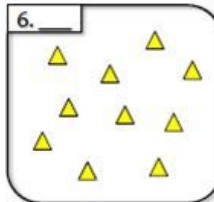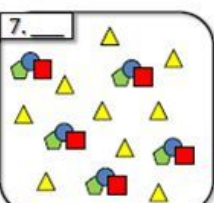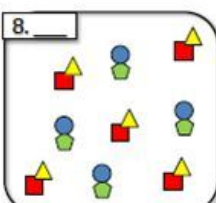Remember, each shape symbolizes an **element**. *If two different elements are connected*, then that object symbolizes a **compound**.

1. ____	2. ____	3. ____
4. ____	5. ____	6. ____
7. ____	8. ____	9. ____

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► ELEMENT (E)
► COMPOUND (C)
► *MIXTURE* of ELEMENTS (ME)

► *MIXTURE* of COMPOUNDS (MC)
► *MIXTURE* of ELEMENTS *and* COMPOUNDS (MEC)

10. ____	11. ____	12. ____
13. ____	14. ____	15. ____
16. ____	17. ____	18. ____
19. ____	20. ____	21. ____

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Use this table to classify the pictures, compounds and mixtures we have seen in the lab :

Matter			
Substance		Mixture	
Element	Compound	Heterogeneous	Homogeneous

2nd Session

After consulting this link : http://makezine.com/laboratory-18-colloids-and-suspensi/ prepare different solutions in beakers using coke, milk (or chocolate shake) and orange juice in water. Use the pipette and graduated cylinder to know the exact volume of the solute and the solvent.
Do the *Tyndall effect test* to the different solutions and design other experiments to find out other kinds of mixtures
Write all your observations, measures and results.

3rd Session

Solvents and solutions

Some important terms

Term	Meaning	Example
Solvent	the liquid in which a solute dissolves	the water in sea water
Solute	the substance that dissolves in a liquid to form a solution	the salt in sea water
Solution	is the mixture formed when a solute has dissolved in a solvent	sea water
Soluble	describes a substance that will dissolve	salt is soluble in water
Insoluble	describes a substance that will not dissolve	sand is insoluble in water

1. Concentration by Percent: It's the amount of solute dissolves in 100 g solvent.

    Percent by Mass = $\frac{mass\ of\ solute}{mass\ of\ solution}$ *100

    Percent by Volume = $\frac{volume\ of\ solute}{volume\ of\ solution}$ *100

2. Concentration by mass : It's the amount of solute (in grams) dissolves in 1 liter of dissolution.

Concentration in mass = $\frac{grams\ of\ solute}{liter\ of\ solution}$

Solve in pairs the following activities (1,2 ,4,8 and 10) using the appropriate formula. Write the formula and replace the values and calculate the result using the calculator. Pay attention to the units!

http://www.elortegui.org/ciencia/datos/3ESO%20CLIL/exercises/solved/Solved%20concentration%20exercises.pdf

In addition, solve the next activities in pairs :

1. Calculate the alcohol's volume in a 150 ml solution where the alcohol represents 60% of volume.
2. Calculate the percent by volume of a solution with 15 ml of alcohol and 130 ml of water.
3. An alcoholic drink has a concentration in percent by volume of 19%. Which amount of solute (alcohol) will you ingest if you drink 250 ml.?

4th Session

Play with this interactive simulator
https://phet.colorado.edu/en/simulation/legacy/soluble-salts

After reading the definition of solubility, please answer the following test :
.

Show the results to the teacher and ask questions you might have about the solubility and solutions.

Now, you are prepared to begin an experiment to observe the changes of solubility versus the temperature. You can use different salts you can find in the lab and write in your notebook the salt name and its amount in grams. Use the watchglass and the scale to measure the salt.
1. Solve the salt into water stirring with the glass stick at room temperature
2. Add more salt and heat until the salt is dissolved. Note down the temperature and the amount of salt you used.
3. Repeat the procedure 4 times.
4. Draw a graph to show how the solubility changes versus temperature

5th Session

Separation of mixtures

Heterogeneous mixtures (mechanical separation techniques)

Sieving
Sieving allows mixtures of solids of different sizes to be separated. The mixture is passed through a sieve—a tool with a mesh of a given size.

Filtration
In this technique, suspended solid fragments are extracted from a liquid. This only occurs when the solid is larger in diameter than the pores of the filter paper.

Sedimentation and decantation
This technique, based on the difference of densities, allows the components of a suspension to be separated. It involves allowing the mixture to stand until the solid and liquid components separate into two clearly differentiated layers.

Centrifuging and decantation
Centrifuging is method of separating the components of a suspension or a liquid colloid according to their density, by spinning at a high velocity.

Decantation
A separating funnel allows the liquid components of heterogeneous mixtures with different densities to be separated.

Magnetic separation
When applied to a heterogeneous mixture of solids, this method allows the components with magnetic properties (i.e., those which are attracted by a magnet) to be separated from the rest of the components.

Flotation
This method allows mixtures of similarly sizes solids to be separated by density. For the method to work, the density of one of the two components must be lower than the density of water (and therefore float), while the remaining components must sink in water.

Leaching
This method allows the separation of mixtures of solid components of similarly sized particles. One of the components must be soluble in liquid.

Homogeneous mixtures (physical methods of separation)
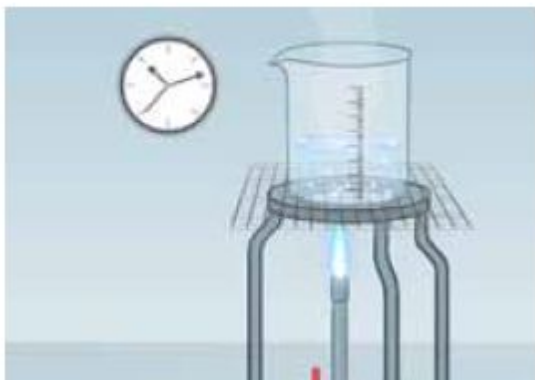
Vaporization
This method is used to separate solutions of solids in a liquid solvent. After heating the mixture, the liquid is vaporized. The solid deposited at the bottom of the container is then recovered.
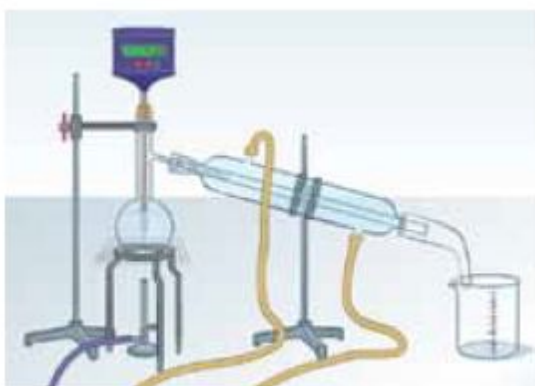
Distillation
This method allows solutions of liquids with different boiling points to be separated. The mixture is heated until the liquid with a lower boiling point evaporates. The gas is collected and cooled, and it is condensed in another container.

Chromatography
This technique allows the components to be separated according to the speed at which they travel through an absorbent surface, such as a piece of paper.

You can consult the textbook to found the different methods of separation the substances in a mixture and do a table with every method with you physic property.

Use the different physics properties to separate the different compounds of a mixture with salt , iron, iodine solid, and sand.

Salt + iron + iodine solid + sand
            | magnet
Salt + iodine solid + sand
            | sublimation
      Salt + sand
            | water
      Salt + sand + water
            |decantation
      Salt +water
            | evaporating (crystallized)
            Salt

Lab Report Template

Title: * a brief, concise, yet descriptive title
Statement of the Problem (objectives):
      * What question(s) are you trying to answer?
      * Include any preliminary observations or background information about the subject
Hypothesis (+ brief theoretical introduction):
      * Write a possible solution for the problem.
      * Make sure this possible solution is a complete sentence.
      * Make sure the statement is testable, an if-then statement is recommended to illustrate what criteria will support your hypothesis (and what data would no support the hypothesis).
Materials:
      * Make a list of ALL items used in the lab. Alternatively, materials can be included as part of the procedure.
Lab safety rules:
      *Make a list of main safety lab that you need to work in lab.
Procedure:
      * Write a paragraph (complete sentences) which explains what you did in the lab as a short summary.
      * Add details (step-by-step) of your procedure in such a way that anyone else could repeat the experiment.
      * Add pictures of your procedure, remember compressed the pictures before upload to the document onto the school's *moodle* platform.
Results (Data):
      * This section should include any data tables, observations, or additional notes you make during the lab.
      * You may attach a separate sheet(s) if necessary.

* All tables, graphs and charts should be labeled appropriately.
Conclusions:
* Accept or reject your hypothesis.
* EXPLAIN why you accepted or rejected your hypothesis using data from the lab.
* Include a summary of the data - averages, highest, lowest..etc to help the reader understand your results. Try not to copy your data here, you should summarize and reference KEY information.
* List one thing you learned and describe how it applies to a real-life situation.
*Discuss possible errors that could have occurred in the collection of the data (experimental errors)

Lab Report Rubric

	Excellent(4pts)	Good (3pts)	Adequate (2pts)	Needs work (1pts)	Not attempted (0pts)
Introduction	1. Includes the question to be answered by the lab 2. states hypothesis that is based on research and/or sound reasoning 3. title is relevant.	One of the "excellent" conditions is not met, two conditions met	Two of the "excellent" conditions is not met , one is met	Introduction present, no exemplary conditions met	
Methods	Description or step-by-step process is included, could be repeated by another scientist	Description included, some steps are vague or unclear	The description gives generalities, enough for reader to understand how the experiment was conducted	Would be difficult to repeat, reader must guess at how the data was gathered or experiment conducted	
Data and analysis	Results and data are clearly recorded, organized so it is easy for the reader to see trends. All appropriate labels are included	Results are clear and labeled, trends are not obvious or there are minor errors in organization	Results are unclear, missing labels, trends are not obvious, disorganized, there is enough data to show the experiment was conducted	Results are disorganized or poorly recorded, do not make sense ; not enough data was taken to justify results	
Conclusions	1. Summarizes data used to draw conclusions 2. Conclusions follow data (not	3 of 4 of the "excellent" conditions is met	2 of the 4 excellent conditions met	1 of the 4 excellent conditions met	

	wild guesses or leaps of logic), 3. Discusses applications or real world connections 4. Hypothesis is rejected or accepted based on the data.				
Format and lab protocols	Lab report submitted as directed, and on time. Directions were followed, stations were cleaned. All safety protocols followed.	Most of the excellent conditions were met; possible minor errors in format or procedures	Some of the excellent conditions met, directions were not explicitly followed, lab stations may have been left unclean or group not practicing good safety (such as not wearing goggles)	Student did not follow directions, practiced unsafe procedures, goofed around in the lab, left a mess or equipment lost	
	Total (out of 20)				

Homework (record videos)

Record three videos with the experiments that you are doing at home. Explain all the steps (procedure) and all the material that you need to carry them them out.

Home video Rubric

	Excellent(4pts)	Good (3pts)	Adequate (2pts)	Needs work (1pts)	Not attempted (0pts)
Vocabulary	Uses a wide variety of vocabulary and expressions	Uses a variety of vocabulary and expressions but makes some mistakes in word choice	Uses limited vocabulary and expressions	Use only basic vocabulary and expressions	
Content	The content of the presentation fully corresponds to the task and it	The content of the presentation quite corresponds to the task and it is clearly	Either the content of the presentation is a bit poor or it is quite chaotic	The content of the presentation is off topic and /or is very chaotic	

	is clearly organized	organized			
Fluency	Speaks smoothly , with little hesitation that does not interfere in communication	Speaks with some hesitation, but it does not interfere in communication	Speaks with some hesitation, with some influence in communication	Hesitates too often, which interferes in communication	
Presentation Skills	The student does not read at all and makes eye contact to the camera	The student does not read too much and makes adequate eye contact to the camera	The student mostly reads and makes little eye contact to the camera	The student reads the whole time and makes no eye contact to the camera	
Time	The recording as a whole is of appropriate length as indicated by the teacher	The recording as a whole is a bit long or short in length as indicated by the teacher	The recording as a whole is considerably too long in length as indicated by the teacher	The recording as a whole is considerably to short in length as indicated by the teacher	

6th Session

The last session is to review and finish the homework and watch some of the videos.

Review activities

1. Classifying Substances According To Their Homogeneity
Classify the following substances as homogeneous or heterogeneous.

a. Water

b. Fruit shake

c. Steel

d. Salt

e. Granite

f. Wood

g. Oil

h. Black pepper

i. Salty water

j. Copper

k. Cement

l. Water and oil

10. Identifying Components
Classify the following heterogeneous mixtures according to the state of matter of their components.

❑ Only solids ❑ Only liquids ❑ Liquids + gases ❑ Liquids + solids

a. Iced tea

b. Champagne

c. Vinaigrette

d. Bubbles and water

e. A trash heap

f. Breakfast

g. Crunchy chocolate

h. Sand

i. Oil

j. Duckweed

k. Rock

18. In the Kitchen

The kitchen is an incredibly productive lab: endless procedures and experiments are carried out on a daily basis. Classify the following procedures according to whether the method employed is sieving or filtration.

a. ❏ Sieving
❏ Filtration

b. ❏ Sieving
❏ Filtration

c. ❏ Sieving
❏ Filtration

d. ❏ Sieving
❏ Filtration

e. ❏ Sieving
❏ Filtration

f. ❏ Sieving
❏ Filtration

g. ❏ Sieving
❏ Filtration

h. ❏ Sieving
❏ Filtration

19. Mechanical Methods of Separation

❏ Sieving ❏ Leaching ❏ Magnetic separat.
❏ Filtration ❏ Decantation ❏ Flotation

a. What technique or techniques would you use to separate the components of a suspension of water and soil?

b. Which of these separation techniques are based on the difference in size of the fragments of the components of the mixture?

c. Which of these separationtechniques are based on the differences in density of the components of the mixture?

d. Which of these separation techniques are based on the different solubilities of the components of a solid mixture?

20. A Step-by-Step Approach to the Separation of Components

A mixture contains salt, iron filings, and sand. Place the following steps in the correct order to describe how to separate these three components.

• Decant the mixture into a filtering device.

• Add water to the mixture and stir well.

• Let the water in the solution evaporate to obtain the salt.

• Separate the iron filings from the sand and salt using a magnet.

• Allow the sand to deposit at the bottom.

21. Types of Mixtures and Separation Techniques

Complete the following statements:

• Decantation allows for the separation of [*miscible / immiscible*] components, as is the case with [*water and oil / water and salt / alcohol and sugar*].

• Filtration allows for the separation of [*solids / liquids / gaseous*] components from the liquid component in a [*homogeneous / heterogeneous*] mixture.

• Magnetic separation is very useful for separating [*iron from sulphur / salt from sugar / iodine from salt*].

• Water is necessary to separate flour from salt, as is the application of the [*flotation / leaching*] method.

1. Solvent

a. Which of the components of a cup of coffee is the solvent when a teaspoon of sugar has been added?

❑ Acids ❑ Caffeine ❑ Sugar
❑ Other components ❑ Water

b. Which of the components of a carbonated drink is the solvent?

❑ Acids ❑ Caffeine ❑ Sugar
❑ Other components ❑ Water

c. Which property characterizes the solvent in a given solution?

❑ It is the soluble component.
❑ It is the main component.
❑ It is the liquid component.

d. Which property is typical of the solute in a given solution?

❑ It is the insoluble component.
❑ It is the solid component.
❑ It is the component that is present in a smaller amount.

6. Soluble or Insoluble?

Classify each of the following mixtures according to whether the substance mixed with water is soluble or insoluble:

| Water and soil | Water and carbon dioxide | Water and sugar | Water and vinegar | Water and olive oil | Water and salt |

9. Ranking Solutions

a. These beakers contain aqueous solutions of copper sulfate. They all appear to be different, because they each have a different concentration. Rank the solutions from most dilute to most concentrated.

b. Look at these corpuscular representations of different solutions of copper sulfate. Which image most accurately represents a dilute solution?
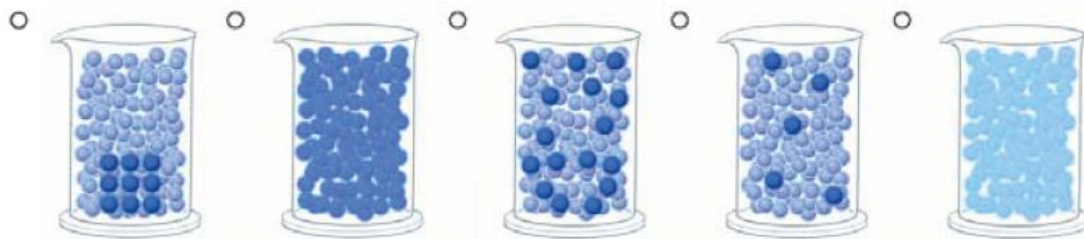
c. Which of these images most accurately represents a concentrated solution?