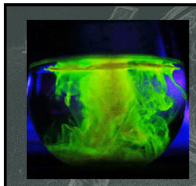
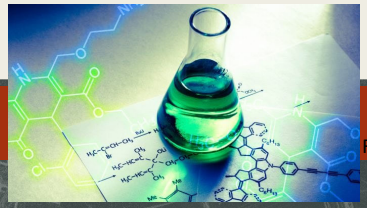


Mix and Flow of Matter

Topics ½



Science 8 – Mr. Greve
Finish before Thanksgiving Break

1

What is Science? Why are we doing this??

science [sahy-*uh*ns] SHOW IPA

SYNONYMS | EXAMPLES | WORD ORIGIN SEE MORE SYNONYMS FOR *science* ON THESAURUS.COM

noun 2 systematic knowledge of the physical or material world gained through observation and experimentation.

2

The Boiling Can Lab

Science 8 Introductory Lab

Safety First Please – Hot Plates and Boiling Water Will Burn

Please work with your seating plan group
Back row splits into TWO GROUPS

3

Mix and Flow of Matter Guiding Questions and Learning Outcomes

Focusing Questions

- What are fluids?
- What are they made of and how do we use them?
- What properties of fluids are important to their use?
- How can we use fluids safely?

Learning Outcomes

- Describe fluids used in technology and everyday materials
  - Explain WHMIS and other Safety Symbols. Know safety precautions
  - Identify examples of fluids including those to use, transport, or process other materials
  - Identify properties of fluids that are useful in their selection and use
- Investigate the make-up of fluids and interpret how materials behave in solution
  - Classify substances
  - Investigate solubility and concentration
  - Identify factors that affect solubility and rate of dissolving
  - Relate properties of mixtures to the particle model of matter

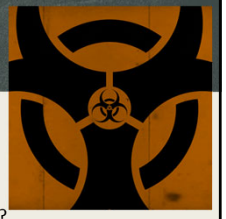
4

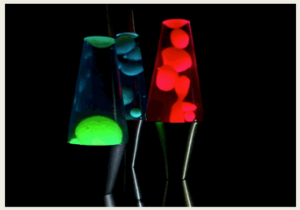
What Properties of Science does a Lava Lamp Depend on?

5

What about Safety?

- What are the Hazards when working with a lava lamp?
- What safety measures should you take?
- List some hazardous substances around your house
- How do you know these are hazardous? Are there any special markings?





6

Hazard Symbols

- How Many Hazard Symbols can you think of?
- Why is it important to know these symbols?
- Notes: Hazard Symbols: **Symbols to inform of hazardous substances. Typically found on household items.**

7

Hazard Symbols: Draw These

- Although there are many more Hazard Symbols, you will need to memorize these seven:


Flammable

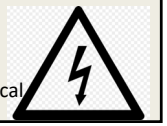
Toxic


Explosive


Irritant


Corrosive


Biological


Electrical

8

Hazard Levels: Shapes and Colours

- The Shape and / or colour gives the level of hazard:

Triangle or Yellow:
Caution
Least Hazardous

Square or Orange:
Warning

Octagon or Red:
Danger
Most Hazardous

9

Hazard Symbols: Quiz Time!

- Give the type and level of hazard for each:

Warning: Flammable Hazard

Caution: Biological Hazard

Danger: Corrosive Hazard

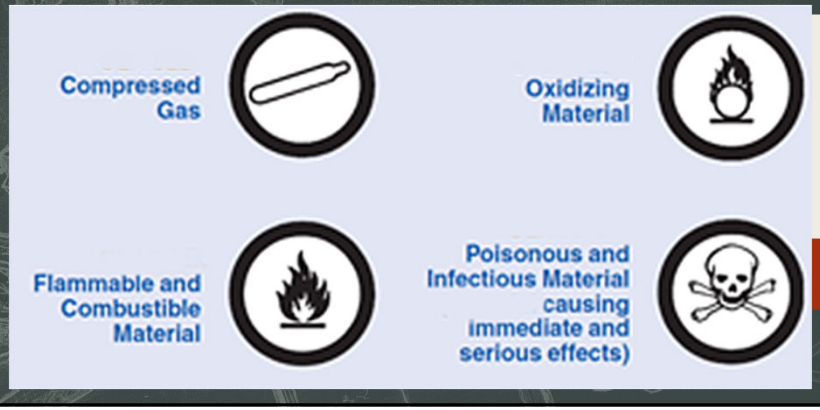
10

Workplace Hazardous Materials Information System (always round, used on commercial or lab chemicals)

WHMIS Symbols

11

Please Label the following on your WHMIS Handout



12

Please Label the following on your WHMIS Handout

Poisonous and Infectious Material causing other toxic effects)

Corrosive Material

Poisonous and Infectious Material (Biohazardous Infectious Material)

Dangerously Reactive Material

13

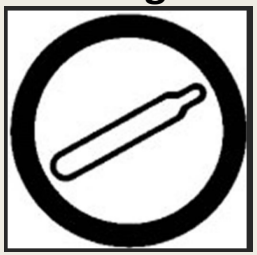
Ethanol

Propane Torch

Real Life Examples: Flammable, Explosive, Compressed Gas

14

Fire Extinguisher



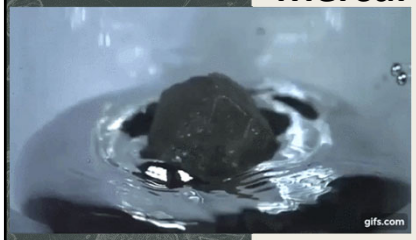
Real Life Examples: Compressed Gas

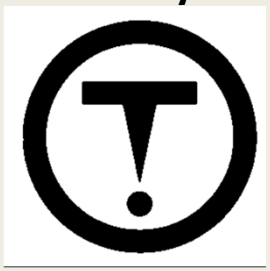
15

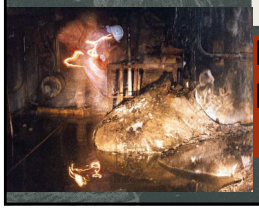
Real Life Examples: Toxic or *P and I Immediate*

16

Mercury Chernobyl



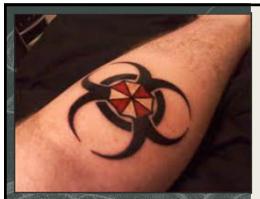




Real Life Examples:
Poisonous and Infectious Other

17

Bacteria Cultures



Real Life Examples:
Biohazardous

18

Mercury Chernobyl

Real Life Examples:
Corrosive

19

Magnesium Ribbon

Real Life Examples:
Dangerously Reactive

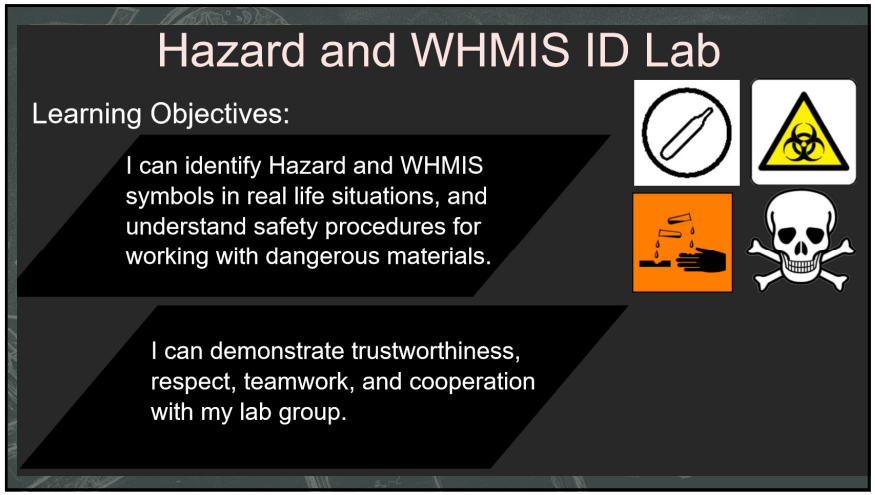
20


Real Life Examples: Electrical and Irritant

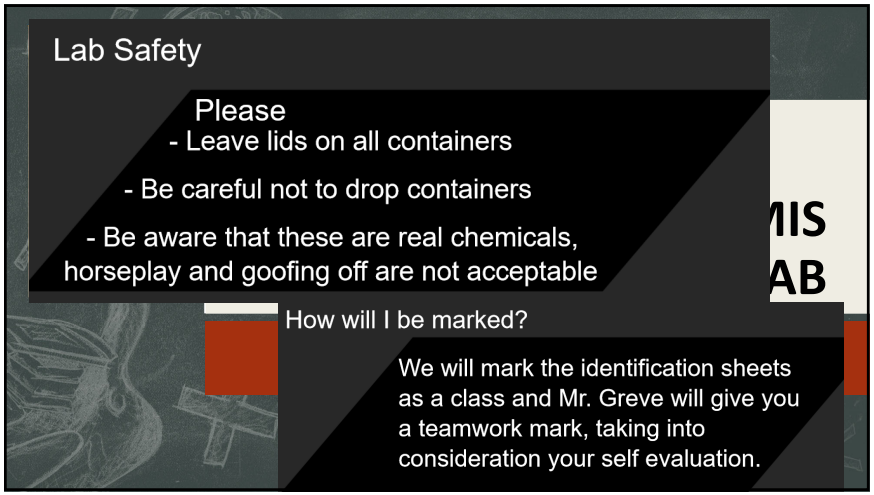
21


PLEASE LISTEN
TO SCIENCE
HAZARD AND WHMIS IDENTIFICATION LAB
Science in the real world

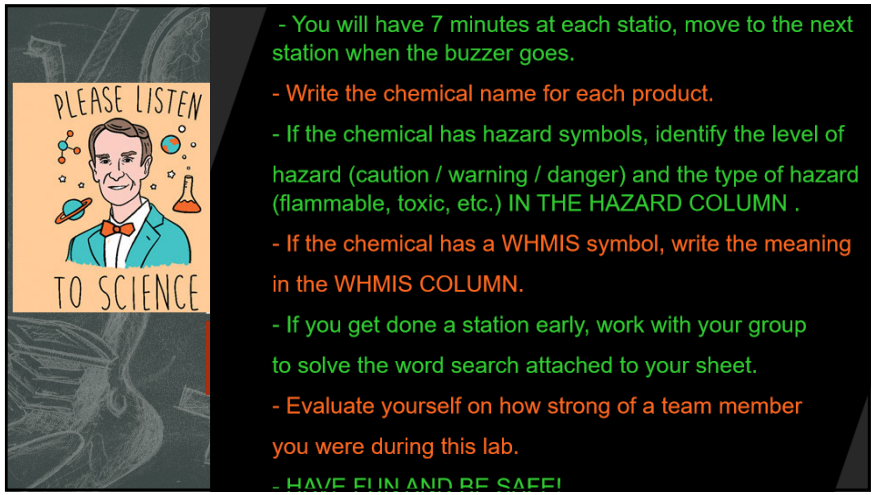
22


Hazard and WHMIS ID Lab
Learning Objectives:
I can identify Hazard and WHMIS symbols in real life situations, and understand safety procedures for working with dangerous materials.
I can demonstrate trustworthiness, respect, teamwork, and cooperation with my lab group.

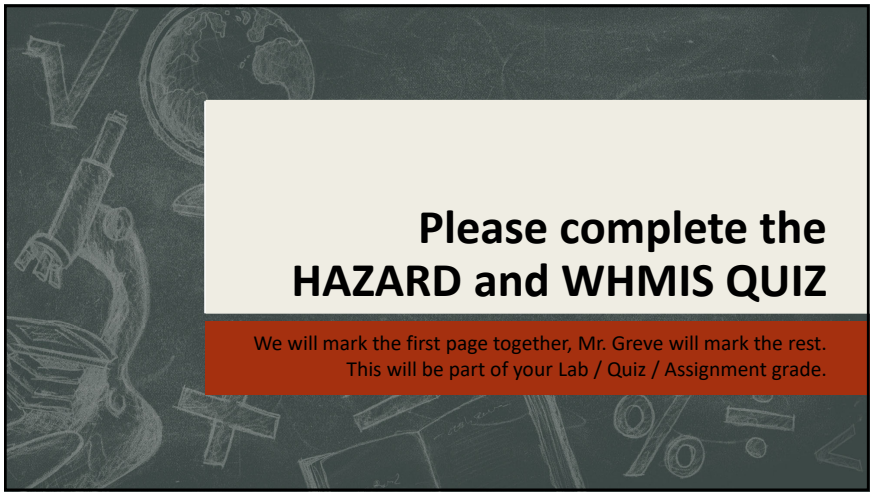
23


Lab Safety
Please
- Leave lids on all containers
- Be careful not to drop containers
- Be aware that these are real chemicals, horseplay and goofing off are not acceptable
How will I be marked?
We will mark the identification sheets as a class and Mr. Greve will give you a teamwork mark, taking into consideration your self evaluation.

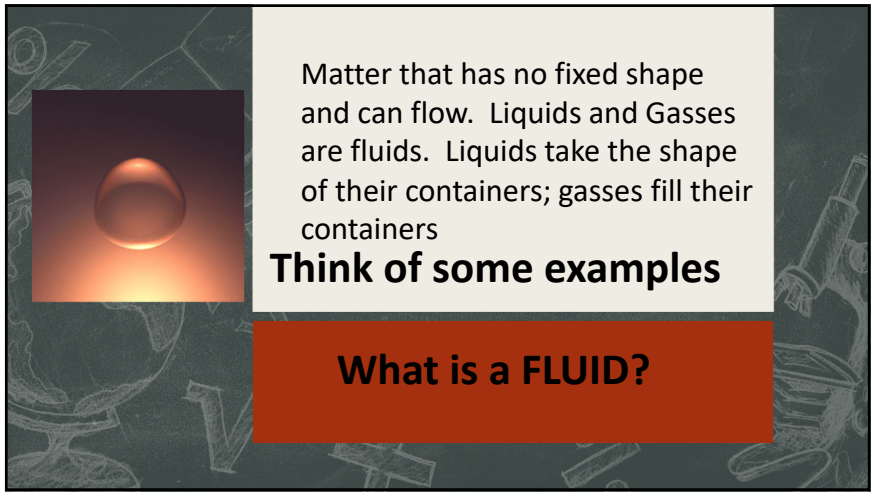
24


PLEASE LISTEN
TO SCIENCE
- You will have 7 minutes at each statio, move to the next station when the buzzer goes.
- Write the chemical name for each product.
- If the chemical has hazard symbols, identify the level of hazard (caution / warning / danger) and the type of hazard (flammable, toxic, etc.) IN THE HAZARD COLUMN .
- If the chemical has a WHMIS symbol, write the meaning in the WHMIS COLUMN.
- If you get done a station early, work with your group to solve the word search attached to your sheet.
- Evaluate yourself on how strong of a team member you were during this lab.
- HAVE FUN AND BE SAFE!

25


Please complete the HAZARD and WHMIS QUIZ
We will mark the first page together, Mr. Greve will mark the rest.
This will be part of your Lab / Quiz / Assignment grade.

26


Matter that has no fixed shape and can flow. Liquids and Gasses are fluids. Liquids take the shape of their containers; gasses fill their containers
Think of some examples
What is a FLUID?

27


Oilsands: Good or Bad?
The previous video showed the economic benefits of the Oilsands. The next two videos show the price paid environmentally. Remember, water can transport any type of solid, even dangerous ones. SLURRY

28

Cement is a Slurry

Cement slurry is a mixture of Portland **cement**, water, and additives

29

FLUIDS MAKE IT EASIER TO USE MATERIALS

Fluids can Become Solids

- Most solids melt into liquids when heated. This is how glass and steel are made.
- Glass is made by melting sand
- Steel is made from melting iron and carbon together at over 1600 degrees celcius

Fluids can Hold Other Materials

- What does Toothpaste have in it to polish your teeth?
- Powered "bauxite" is a solid used to polish.

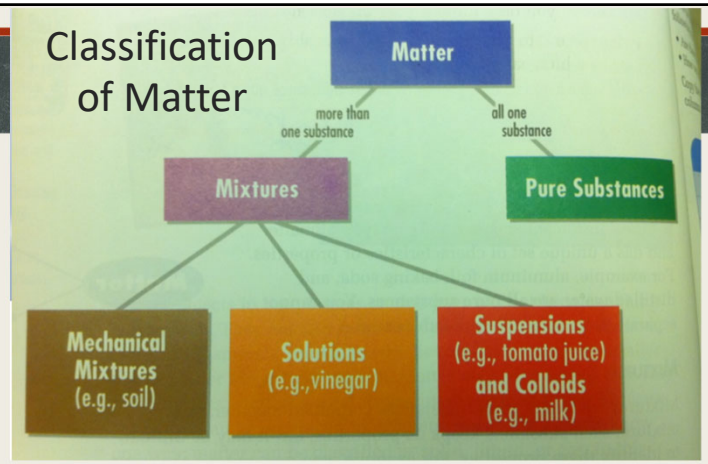
30

USEFUL PROPERTIES OF FLUIDS

- Viscosity
- Density
- Buoyancy
- Compressibility

31

Classification of Matter



32

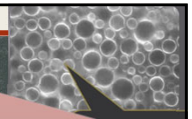
Matter: The substance or substances that make up any physical object

Pure Substance

- An object made of only one type of matter

33

Mixture: A Combination of two or more pure substances



Mechanical Mixture

- Heterogeneous
- Different parts are easy to see

Solution

- Homogeneous
- Different parts look like one substance

Suspension

- Cloudy mixture; one substance held in another
- Left undisturbed, the parts separate

Colloid

- Cloudy mixture; one substance held in another
- Tiny droplets too small to separate

34

Colloids

a substance which has droplets of one state within a surrounding made up of another state

Droplet \ Surrounding	Solid	Liquid	Gas
Solid		Sol	Solid Aerosol
Liquid	Gel	Emulsion	Liquid Aerosol
Gas	Solid Foam	Foam	

Colloid

- Cloudy mixture; one substance held in another
- Tiny droplets too small to separate

35

Classification of Matter

Pure Substances

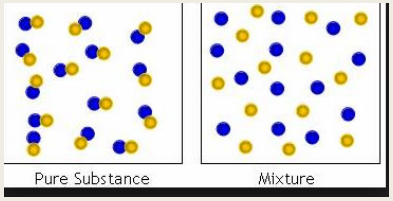
Element

Compound

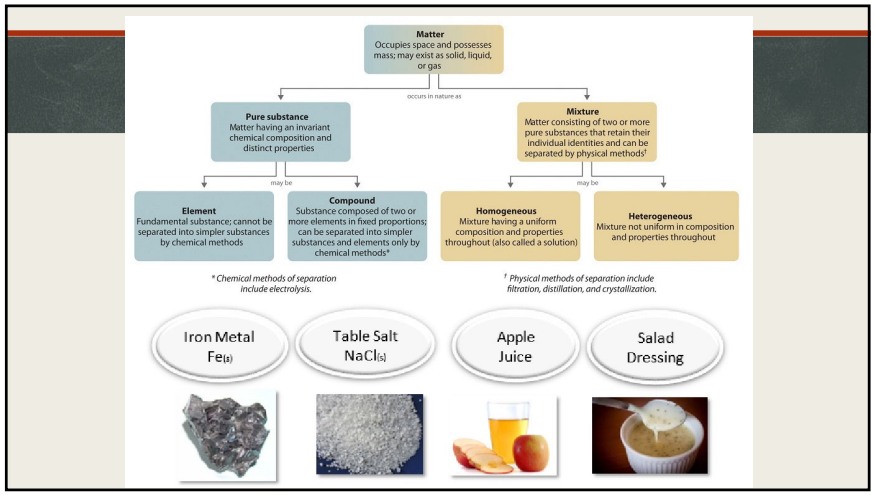
Mixtures

Homogeneous

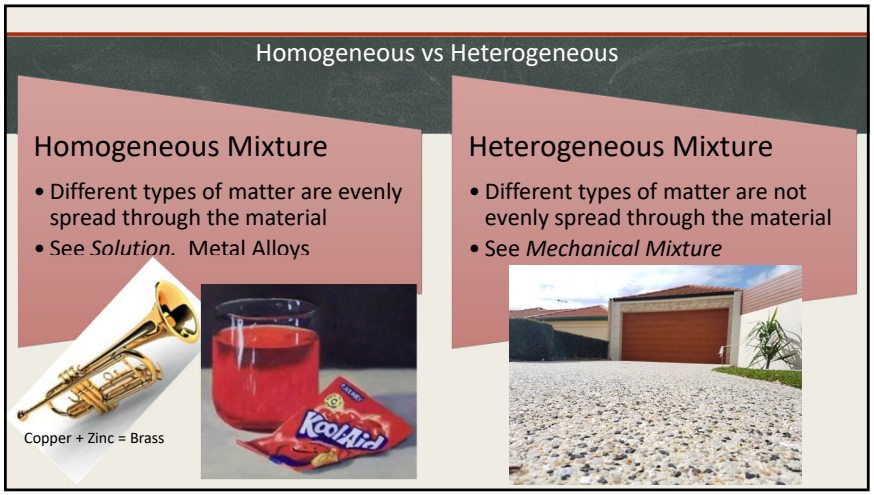
Heterogeneous



36


Matter
Occupies space and possesses mass; may exist as solid, liquid, or gas
occurs in nature as
Pure substance
Matter having an invariant chemical composition and distinct properties
Mixture
Matter consisting of two or more pure substances that retain their individual identities and can be separated by physical methods†
may be
may be
Element
Fundamental substance; cannot be separated into simpler substances by chemical methods
Compound
Substance composed of two or more elements in fixed proportions; can be separated into simpler substances and elements only by chemical methods*
Homogeneous
Mixture having a uniform composition and properties throughout (also called a solution)
Heterogeneous
Mixture not uniform in composition and properties throughout
* Chemical methods of separation include electrolysis.
† Physical methods of separation include filtration, distillation, and crystallization.
Iron Metal Fe(s)
Table Salt NaCl(s)
Apple Juice
Salad Dressing

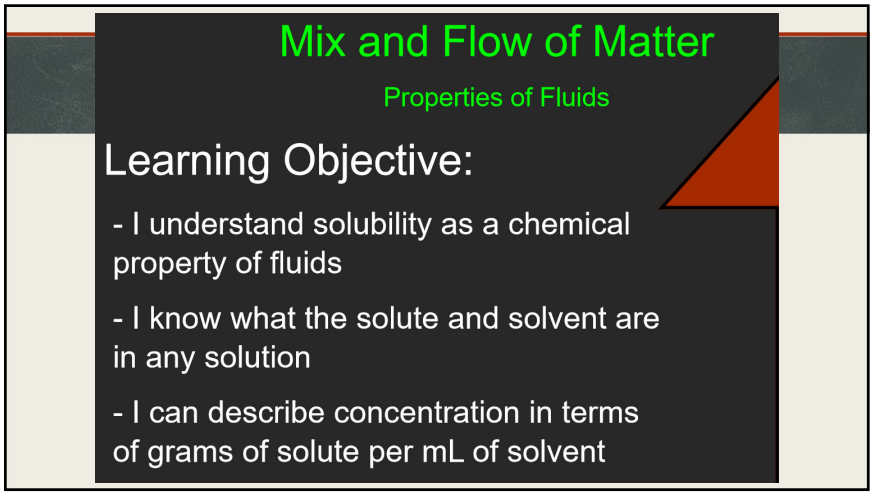
37


Homogeneous vs Heterogeneous
Homogeneous Mixture
• Different types of matter are evenly spread through the material
• See *Solution*. Metal Alloys
Copper + Zinc = Brass
Heterogeneous Mixture
• Different types of matter are not evenly spread through the material
• See *Mechanical Mixture*

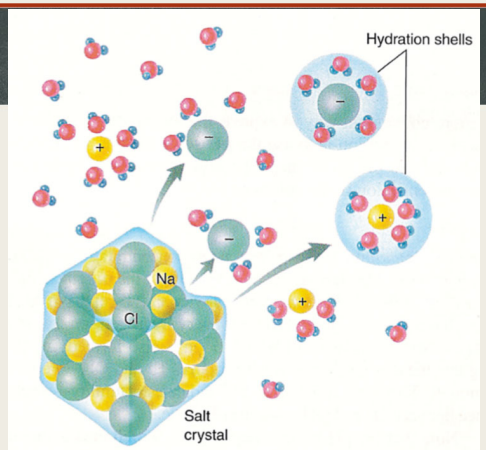
38


OH YEAH!!!
Play Classifying Matter Kahoot! Good Luck ☺
https://play.kahoot.it/v2/?quizId=21195c56-93c2-4f80-878c-252237a2204f

39


Mix and Flow of Matter
Properties of Fluids
Learning Objective:
- I understand solubility as a chemical property of fluids
- I know what the solute and solvent are in any solution
- I can describe concentration in terms of grams of solute per mL of solvent

40



41

Solute vs Solvent

- Solute: The substance that is dissolved
- Solvent: The substance that does the dissolving
- Solution: A completely dissolved mixture of solute and solvent

42

Unsaturated Solutions

More solute can be dissolved in the solvent.

Saturated Solutions

No more solute can be dissolved in the solvent.

Solubility / Saturation Point

The maximum amount of solute in grams that a solvent can hold before becoming saturated

43

What is Concentration?

44

Concentrated

- Large amount of solute dissolved
- Strong Mixture

Dilute

- Small amount of solute dissolved
- Weak Mixture

45

Concentration Practice Questions

Measuring [Concentration] in grams per milliliter

1. Calculate the concentration of 65g of orange crystals in 250 mL of water?

2. What is the [ ] in g/mL of 35g orange crystals in 200mL of water?

3. What is the [ ] in g/mL of 98g of salt dissolved in 330mL of water?

46

1. What is the difference between a diluted solution and a concentrated solution?
2. If a solution has a concentration of 75 g per 100 mL, what does this mean?
3. Calculate the concentrations in grams per 100 mL for the following solutions:
   a) 10 g of chocolate in 50 mL of water
   b) 3 g of sugar in 300 mL of water
   c) 5 g of maple syrup in 25 mL of water
4. What is the difference between a saturated solution and an unsaturated solution?
5. What is the solute in a fruit punch drink?

47

C/R p 28 answer key

/9 total

1. Diluted solutions have a small amount of solute dissolved in a solvent (weak juice). Concentrated solutions have a large amount of solute dissolved in a solvent (Strong juice). /2

2. If concentration is 75g per 100mL it means that there are 75 grams of solute dissolved in 100 mL of solvent. Eg) 75 grams juice crystal in 100mL of water /1

3. a) 10g of choc in 50mL water:

C = m/v

10g / 50mL = 0.20 g/mL

48

#4. In a SATURATED solution, no more solute can dissolve at a given temperature.

In an UNsaturated solution, there is still room for solute to dissolve

(2)

#5. The solute in a fruit punch drink is the fruit punch powered drink mix.

(1)

49

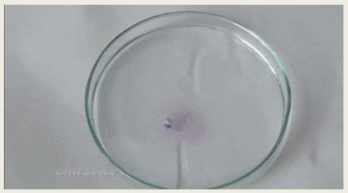
Making SLIME

- Dump glue into bowl
- Rinse Beaker in Beaker
- 200 ml HOT WATER
- One Spoon Borax into Beaker
- Food Colouring into beaker
- Four spoons of Borax Solution into glue
- Mix!
- Have fun, but be clean

50

Factors Affecting Solubility

- **Solubility Depends on three factors:**
  - Type of Solvent
  - Type of Solute
  - Temperature
- **Aqueous Solution:**
  - Water is the solvent in an aqueous solution. Water is also called the "universal solvent."



51

Solubility Changes with Temperature

- In a solid or a liquid when a solvent is warmer, its molecules have more space between them. This leaves more room for solute, therefore greater solubility. This is not true for a gas dissolved in a liquid.

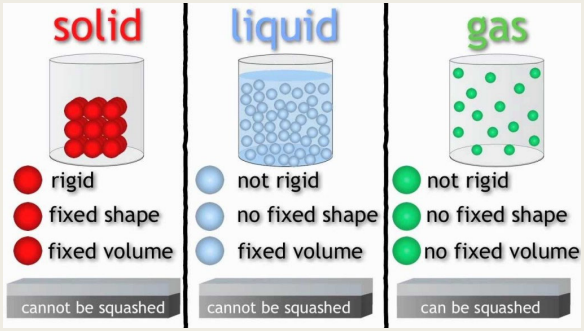
52

Compressibility

When a force pushes on an object it is said to be under compression

53

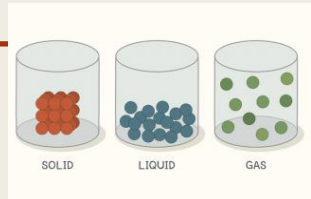
Which states of matter can be compressed? Why?



54

The Particle Model of Matter

1. All matter is made up of tiny particles too small to see.
2. The particles are always moving and vibrating.
3. The particles may be attracted to each other or bonded together.
4. The Particles have spaces between them.



QUESTION: WHAT PARTS OF THE PMOM CHANGE DURING CHANGES OF STATE?

55

Egg in the Bottle Lab

Materials:

- **2 400mL Beakers**
- **Hot Plate**
- **Beaker Tongs**
- **Measuring Cup**
- **2 Medium Eggs**
- **Paper Towel**

Procedure

1. Turn Hot Plate to high
2. Place 300mL hot water in each beaker
3. Put eggs into boiling water, boil for 10 minutes
4. Remove boiled egg using tongs and measuring cup
5. Place egg on paper towel to cool. DO NOT PEEL
6. Turn off hot plate and clean up.

56

Topic ½ Test Review

Solutions Review: https://greve.schoolsites.ca/download/208448

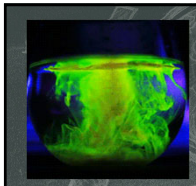
Concentration Review: https://greve.schoolsites.ca/download/208450

WHMIS / HAZARD Review: https://greve.schoolsites.ca/download/206616

Classifying Matter Review: https://create.kahoot.it/share/classifying-matter-science-8-mix-and-flow-of-matter/21195c56-93c2-4f80-878c-252237a2204f

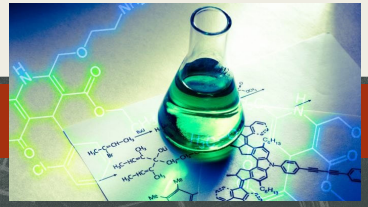
STUDY HARD, GOOD LUCK!

57



Mix and Flow of Matter

Topics ¾



Science 8 – Mr. Greve

1

Mix and Flow of Matter Guiding Questions and Learning Outcomes

Focusing Questions

- What are fluids?
- What are they made of and how do we use them?
- What properties of fluids are important to their use?
- How can we use fluids safely?

Learning Outcomes: Topic ¾

- Investigate and relate the following properties of gases and liquids to the **particle model of matter:**
  - Viscosity
  - Density
  - Buoyancy
  - Compressibility
- Apply technologies based on solubility, viscosity.
- Describe and interpret technologies for moving fluids from one place to another
- Construct a device that uses fluids to apply a force or to transfer motion

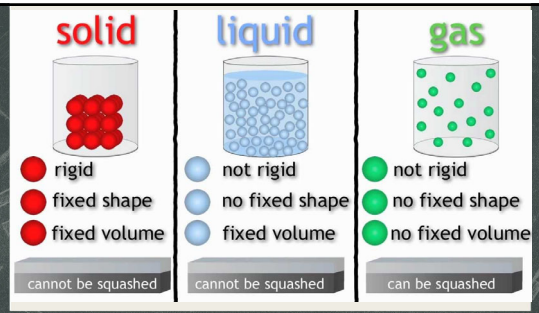
2

P

M

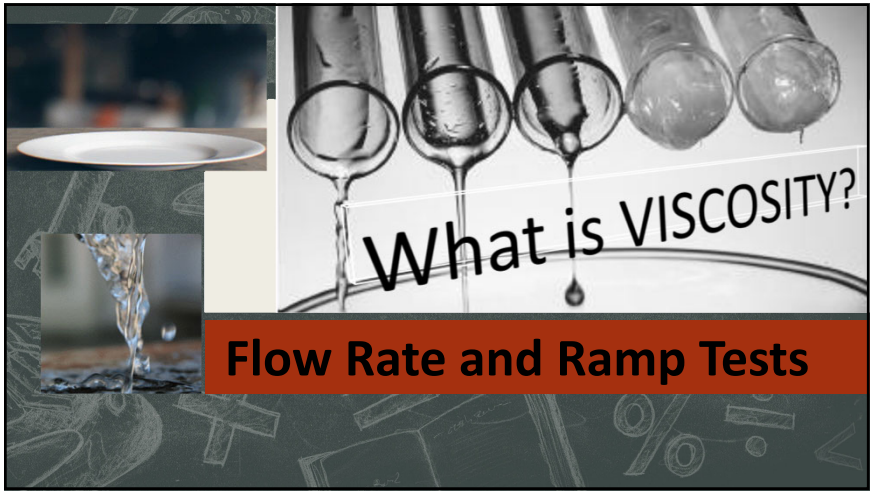
O

M



HUMAN PARTICLES ACTIVITY:
Demonstrate how Solids, Liquids, and Gasses move? Go to atrium and try it!

3



Flow Rate and Ramp Tests

4

What is VISCOSITY?

- A liquid's internal resistance or friction between particles that keeps it from flowing – Resistance to flow. (COPY INTO NOTES)

High Viscosity = Slow Flow Rate

5

What is VISCOSITY?

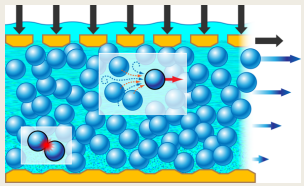
- Which parts of the PMOM does viscosity apply to?

Explain "Friction" between particles

6

"PARTICLES ARE ATTRACTED TOGETHER"

- This produces friction between the molecules as they move. The greater the friction the more resistance to flow and, therefore, higher viscosity)



7

How does temperature affect viscosity?

Explain with PMOM

8

"PARTICLES ARE ATTRACTED TOGETHER"

MOTOR OIL AFTER 10 SECONDS OF POURING

Highest Temp?

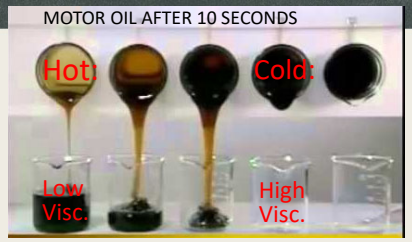
Lowest Temp?

Highest Viscosity?

Lowest Viscosity?

9

Understanding Viscosity and Temperature



High Temp = Large Space Between Particles = Low Friction = Low Viscosity

Low Temp = Small Space Between Particles = High Friction = High Viscosity

10

Understanding Viscosity and Temperature

Hot:

Low Visc.

Cold:

High Visc.

11

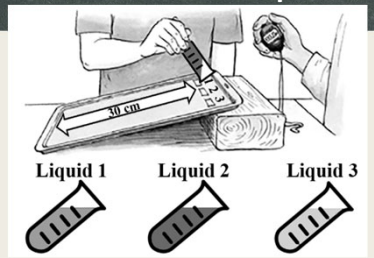
Viscosity with the Ramp Method

A ramp is used to measure the flow rate of a fluid (how long it takes to flow a given distance), often in centimeters per second.

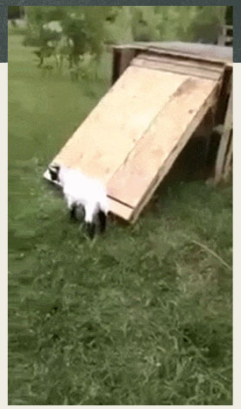
Example: The honey from the viscosity video took 20 seconds to flow 30 centimeters. Calculate flow rate

12

Ramp Test Method



Ramp Test Demo with Torch



Your Assignment:
Check and Reflect Page 41 #s 1-5

13

Check and Reflect

1. Write a short paragraph to describe viscosity. Include at least two examples of fluids, and use the words *flow*, *fluid*, *particles*, and *viscosity* in your description.
2. Describe two substances that are useful because of their viscosity.
3. In a fair test, you have to keep all the variables the same except one. That way, you can see the effect of the one variable. If you had to do a ramp test for viscosity:
   a) What would you change during the tests?
   b) What things would you keep the same for each test?
4. You are given three samples of the same shampoo at three different temperatures: 35°C, 50°C, and 75°C. Which sample would have the highest viscosity? Which sample would have the lowest?
5. You are making cookies that call for 3 tablespoons of molasses. But you are having trouble measuring out the thick, syrupy liquid. What could you do to make it easier to pour and measure this fluid?

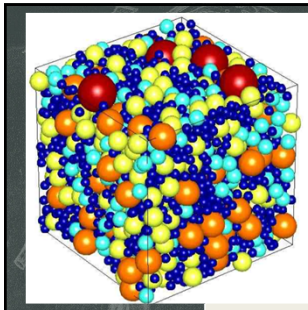
Your Assignment:
Check and Reflect Page 41 #s 1-5

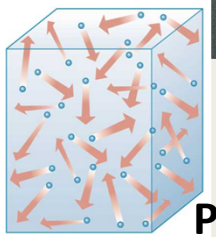
14

Density is the amount of matter in a given volume, measured in grams per milliliter, kilograms per liter, or grams per cubic centimeter

Density of Fluids

15



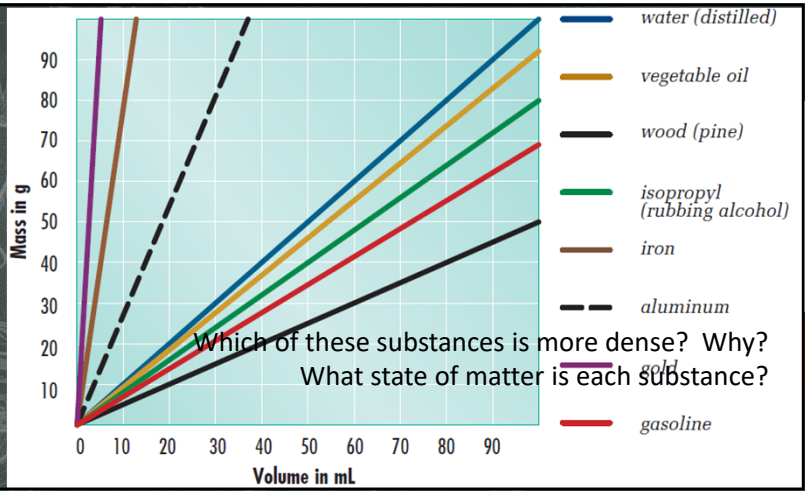


Oil Demo
Pop Can Demo

Which of these substances is more dense? Why?
What state of matter is each substance?

16

Understanding Density



Which of these substances is more dense? Why?
What state of matter is each substance?

17

$$\text{Density } (d) = \frac{\text{Mass } (m)}{\text{Volume } (V)}$$

Units for Liquids: g/mL or kg/L

Units for Solids: g/cm^3

Calculating Density

18

Density Practice

$$\text{Density } (d) = \frac{\text{Mass } (m)}{\text{Volume } (V)}$$

1. Draw the density formula in a triangle
2. What is the density of 8g of sugar in 125mL of water?
3. Calculate the density of 53kg of Copper (II) Sulphate in 1550L of water
4. Calculate the density of a pool ball with a mass of 170grams, occupying 98 cubic centimeters
5. A bar of gold is 17.78cm long, 9.21cm wide, and 4.45cm tall. Calculate its volume by using V = l x w x h to the nearest one hundredth of a cubic centimeter.
6. If the bar of gold listed above has a density of 19.3 g/cc, what is the mass of the gold?
7. The density of gasoline is 0.75kg/L. What is the volume of 200kg of gasoline?

19

Check and Reflect

1. The table below shows mass and volume data for baby oil. What happens to the mass of the baby oil as the volume changes?

Mass (g)	Volume (mL)
0.8	1.0
1.6	2.0
2.4	3.0
3.2	4.0

GRAPH THIS DATA PLEASE

2. a) What is the density of the baby oil?
   b) What happens to the density as the mass and volume change?
3. Suppose you were to graph the baby oil data on a graph with mass on the vertical axis and volume on the horizontal axis. Would the slope of the line for the baby oil be shallower or steeper than one for water? (The density of water is 1.0 g/mL.)
4. What is the density of each of the following substances?
   a) 2.0-mL of mercury has a mass of 27.1 g
   b) 0.5-mL of silver has a mass of 5.25 g
   c) 2.5-mL of lead has a mass of 28.5 g
5. If you had 100 mL of each substance in question 4, which one would have the greatest mass?

C/R Page 46 #1-5

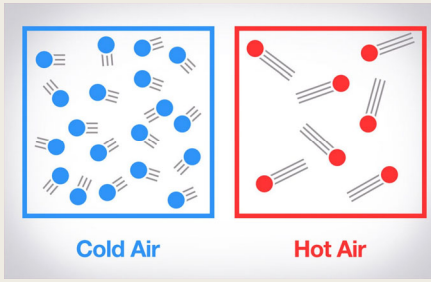
20

The Particle Model of Matter & Density Changes

Think of two ways you could add more particles into the same amount of space.

More particles = greater density

21



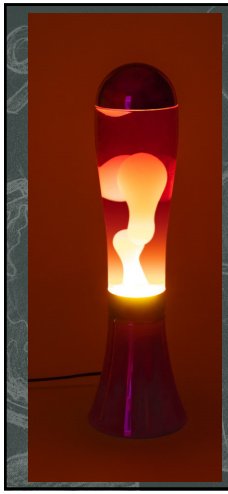
Different Temperature, different density: Decreasing the temperature makes particles move closer together, increasing density

22

Changing Density by changing concentration

By adding solid particles (ex. Salt water), we are increasing the density: More solids in the same volume = greater density

23



Write a paragraph explaining how a lava lamp works.

WILL IT FLOAT?

Include why the "wax" floats to the top, sinks to the bottom, and is suspended in the middle at different times. Be sure to use the terms "temperature," and "Density" in each of your explanations.

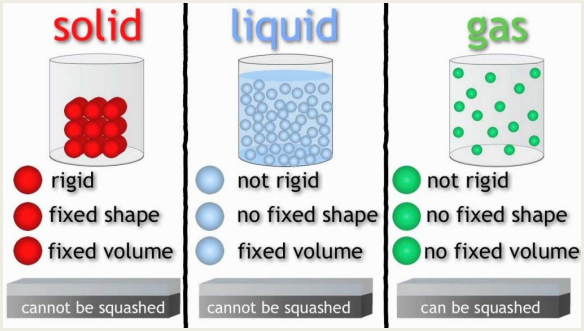
24

Compressibility

When a force pushes on an object it is said to be under compression.

25

Which states of matter can be compressed? Why?



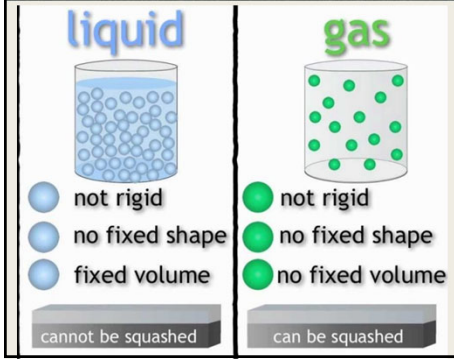
26

Differences in compressibility between gases and liquids: https://phet.colorado.edu/sims/html/gas-properties/latest/gas-properties_en.html

As you can see from these animations, ***gas molecules have space between them, liquid molecules are already touching. Therefore gases can be compressed while liquids cannot.***

27

Incompressibility



Liquids are said to be incompressible (don't compress) Their molecules are already touching and cannot be pushed any closer together.

28

Incompressibility

When "compressing" a solid, the molecules don't get closer together, they are simply put in a different position.

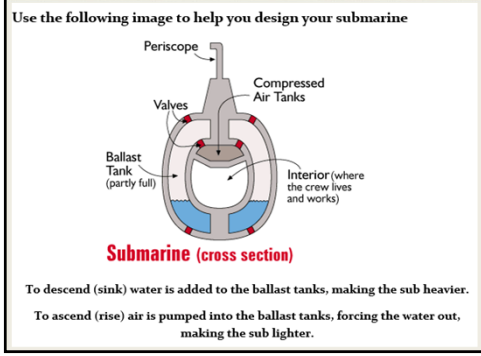
29

SCUBBA DIVING LUNGS

https://www.youtube.com/watch?v=qKRTfAENmz4

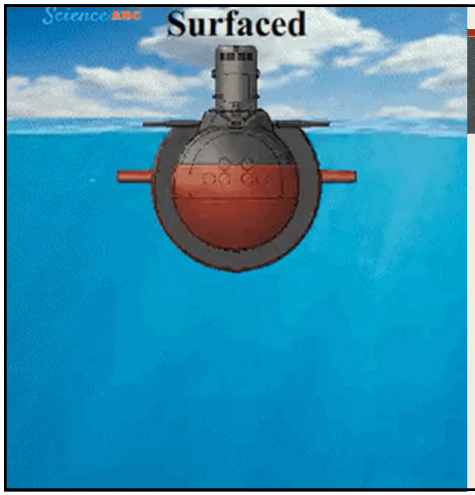
30

Cartesian Diver Lab



Goal: Build a working model of a submarine.

31



Cartesian Diver Lab

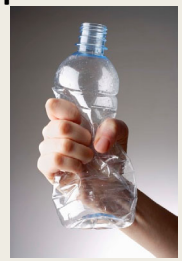
"Ballast Tanks"

32

Cartesian Diver Lab

Problem: How could you create a condition of neutral buoyance with your submarine? Write a hypothesis

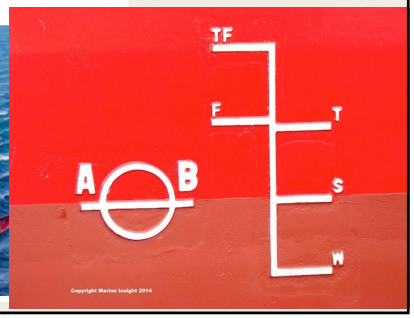
Materials:



33

Plimsoll Line

A series of lines on the side of cargo ships, denoting maximum weight carrying capacity. Different types of water (hot, cold, fresh, salt) will have different densities, and therefore different lines. Even though the maximum safe weight does not change.

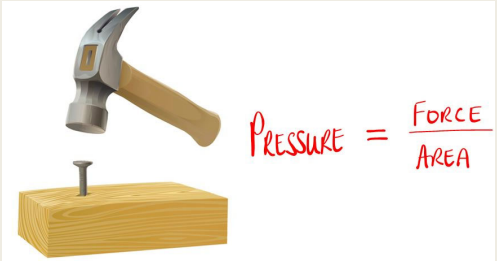


34

https://www.youtube.com/watch?v=a01QQZyl-_I

Pressure

Pressure is the amount of force applied to a given area. It is measured in pascals (Pa). A pascal equals the force of 1 N (newton) over an area of 1 m^2



35

https://www.youtube.com/watch?v=a01QQZyl-_I

Pressure Equation

You have a force of 10 N on an area of 2 m^2. What would the pressure be?

$$\text{Pressure } (p) = \frac{\text{Force } (F)}{\text{Area } (A)} = \frac{10 \text{ N}}{2 \text{ m}^2} = \frac{5 \text{ N}}{\text{m}^2} = 5 \text{ Pa}$$

36

Pressure and Depth Demo

How does water depth affect pressure? Why?

Bucket Demo

37

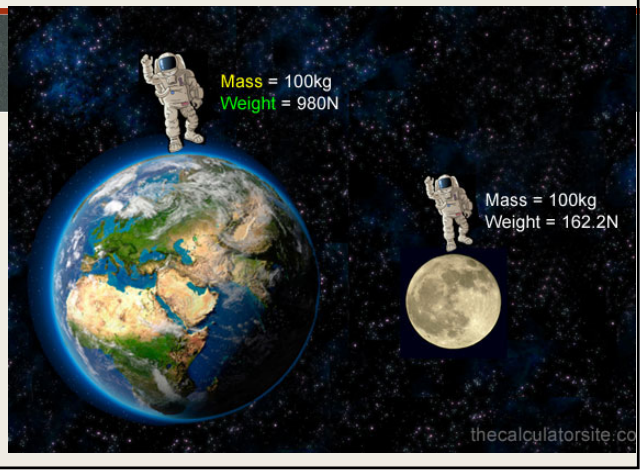
WHY?

The key is *weight*.

Mass is set amount of matter

Weight is mass multiplied by the acceleration of gravity.

The weight of water is immense



38

Pressure and Depth

The greater the depth, the greater the pressure:

- Pressure under water is calculated by multiplying density by depth by earth's gravitational acceleration. Therefore the greater the depth, the greater the pressure.

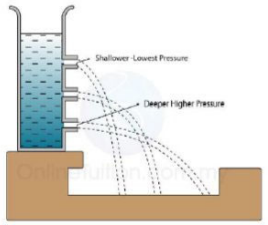
$P - P_0 = \rho gh$

ρ – density

g – gravitational acceleration

h – depth

$P = P_0 + \rho gh$

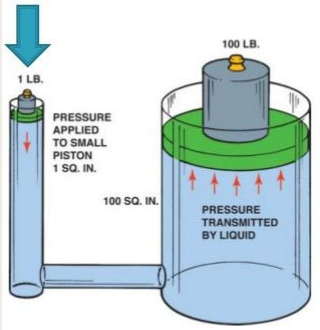


Acceleration of gravity = 9.8 m/s² or 35 km/hr for each second that elapses

39

Pascal's Law

An enclosed fluid transmits pressure equally and undiminished in all directions. Hydraulic and Pneumatic Devices are examples.



40

Pascal's Law

Leaks are bad!

Pressure is let out and not directed where it needs go go

41

Hydraulic Devices

A system or device that uses an enclosed LIQUID under pressure to move a load or complete work.

42

Pneumatic Devices

A system or device that uses an enclosed GAS under pressure to move a load or complete work.

43

Check and Reflect

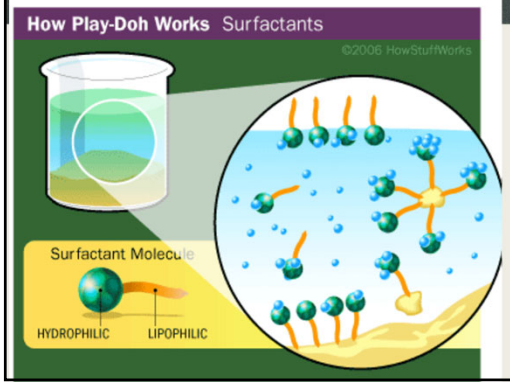
1. Describe how pressure is transferred in a fluid.
2. If 10 N of force is applied to an area of 1 m^2, what is the pressure?
3. What is the difference between a hydraulic and a pneumatic system?
4. A hydraulic lift has 1000 N applied to an input piston that has an area of 30 cm^2.
   a) What is the pressure exerted on the liquid by the input piston?
   b) If the force were doubled, what would be the pressure?
   c) If the area were reduced to 15 cm^2, what would be the pressure?

C/R Page 60 #1-4

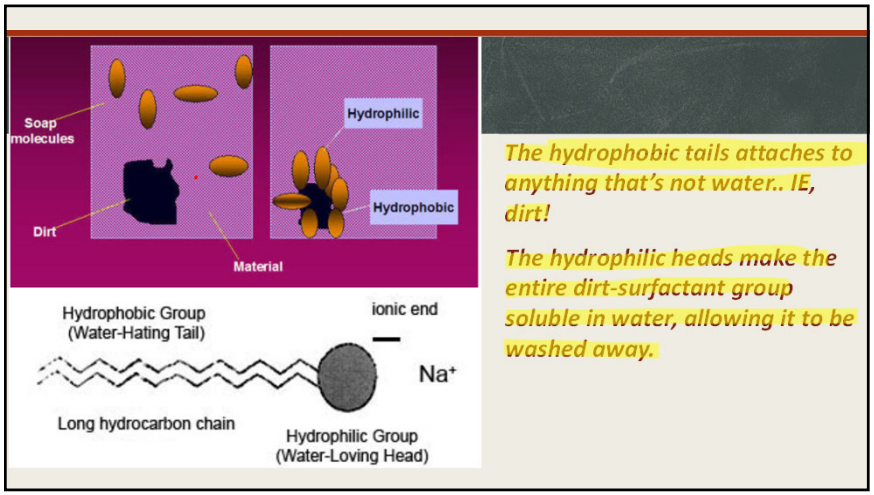
44

Surfactants

Detergents can remove dirt from fabric. Detergents contain a cleaning agent known as a surfactant. Surfactants attach themselves to dirt and oil and separate them from the fabric



45



The hydrophobic tails attaches to anything that's not water.. IE, dirt!

The hydrophilic heads make the entire dirt-surfactant group soluble in water, allowing it to be washed away.

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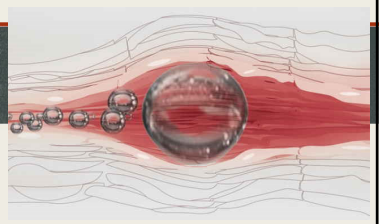
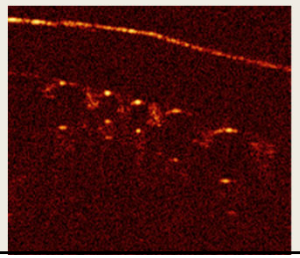
What Causes The Bends?

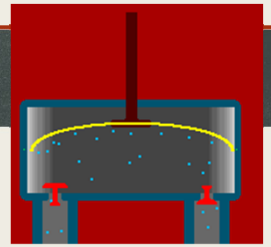




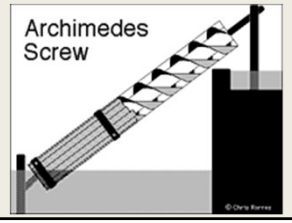
Gasses have a greater solubility in liquids under pressure, so prolonged time spend deep under water allows more nitrogen to dissolve into the plasma of our blood. If a diver surfaces too quickly, the extra dissolved nitrogen is forced out of solution, forming dangerous, sometimes deadly, bubbles in the blood.

47

Two Types of Water Pump



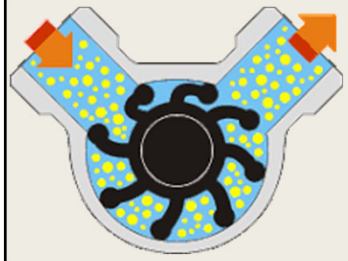
Diaphragm pumps use a set of valves and a flexible membrane to transfer fluid.

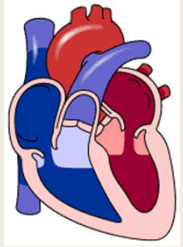


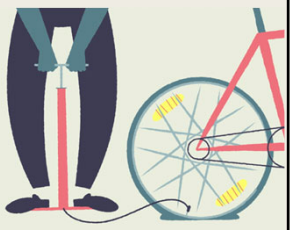
Screw pumps operate like a grain auger to lift water from one place to another

48

Other Types of Pumps







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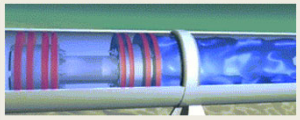
https://www.youtube.com/watch?v=iJnO8exGgng

Applications of Pressure: Pipeline Pig



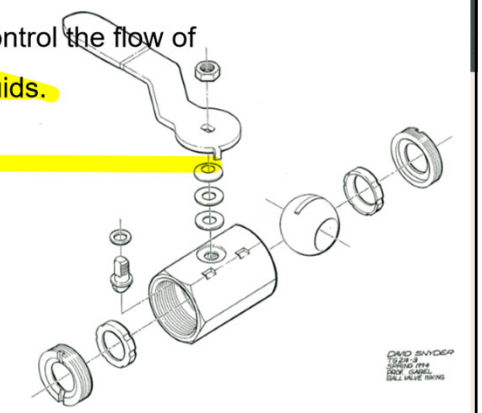
Pipeline Pigs are pushed through the oil or gas pressure within the pipeline. They clean the inside of the pipeline with rubber scraping disks. Pigs can also be equipped with sensors to determine weak spots in the pipeline.

50

Valves

You use valves every day at home and at school. Think of some examples.

Valves are used to control the flow of fluids.



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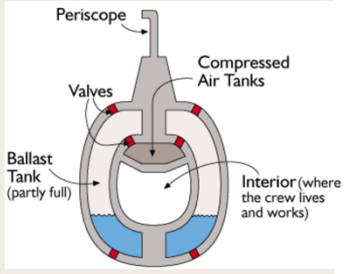
Submarines



Diving (submerging). Ballast tanks in sub are filled with water - this water pushes the air out of the ballast tanks. The sub becomes more dense than water and sinks.

Neutral Buoyancy: Ballast tanks contain both air and water. Sub neither dives nor surfaces.

Surfacing: Ballast tanks are filled with air, causing the sub to be less dense than the water, and float to the surface.

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Topic 3/4 Test Review

- In Class Review: https://greve.schoolsites.ca/download/214198
- Answers to vocabulary review: https://greve.schoolsites.ca/download/214280
- Kahoot Review: https://create.kahoot.it/share/duplicate-of-unit-a-review/fa6d473d-c076-43c9-a86e-8a3c9e5194ec

STUDY HARD, GOOD LUCK!

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