

Unit Review: Fluids

KEY

CLASSIFY: FLUID or NOT A FLUID? (8 02)

Classify: Write the letter "F" for FLUID on the blank if the following is a fluid.
Write the letters "NF" for non-fluid if the substance is not a fluid.

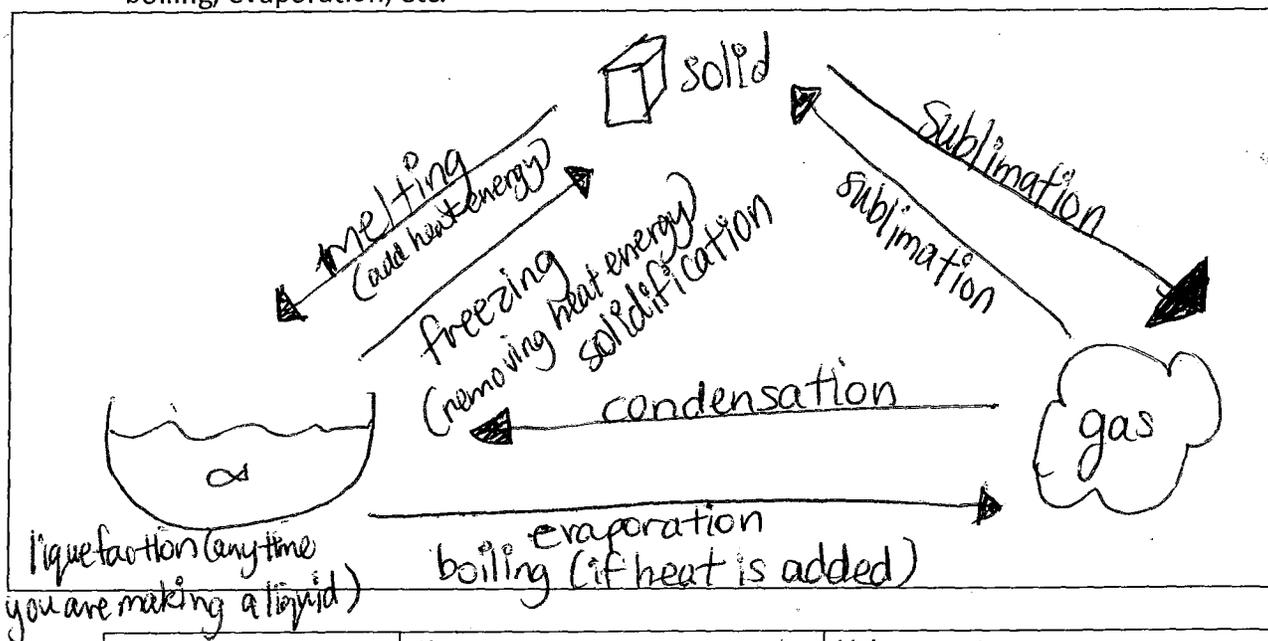
- a) Air in a balloon F b) molasses F
 c) Sugar NF d) honey F
 e) Snow NF f) melted snow F

What are the 3 criteria you need to observe to check whether a substance is a fluid or not?

- A fluid must flow
- A fluid must spread out evenly when you pour it

Change of State

- 1) Draw the change of state diagram. Include melting, freezing, sublimation (twice) condensation, boiling, evaporation, etc.



	Shape	Volume
Solid	definite	definite
Liquid 50 mL  still 50 mL 	indefinite (takes the shape of the container)	definite
Gas	indefinite	indefinite We call gases compressible because we can

- 2) In the chart above, indicate which has a definite shape/indefinite shape and which has a definite volume/indefinite volume.

Viscosity & Flow Rate

Fill in the blanks with the best word.

- 3) A substance with a higher viscosity will have a lower flow rate.
- 4) A substance with a lower viscosity will have a faster flow rate.
- 5) A substance with a lower viscosity will have a higher flow rate.
- 6) A substance with a higher viscosity will have a slower flow rate.
- 7) A thicker substance has a higher viscosity.
- 8) A thinner substance has a lower viscosity.
- 9) A thicker substance has a higher viscosity.
- 10) A thinner substance has a lower viscosity.
- 11) Name a substance with a high viscosity molasses
- 12) Name a substance with a high flow rate. water

Inquiry/Design with Flow Rate

- 1) Four different substances were poured down a ramp, and their flow rate calculated. Their flow rates are recorded in the following table.

Use the following chart to answer questions a, b and c:

- a) Order the substances from the fastest to the slowest flow rate:

2, 1, 4, 3

- b) Order the substances from the highest to the lowest viscosity:

3, 4, 1, 2

- c) Fluid #3 says that it flowed 0.0 metres in 1 second. What does that mean?

Substance	Flow Rate (cm/s)
1	1.0
2	1.4
3	0.0
4	0.5

USE PROPER VOCABULARY!!

It has a high viscosity.

It's viscosity may be so high that it does not flow (ie it is not a fluid) It may be a solid, check viscosity at different temperatures to find out whether it is a fluid or not! at higher temperatures!

Viscosity of Products (8 04)

1) Calculate the flow rate in cm/s of these 2 different brands of syrup:

a) Brand SUPERSYRUP (500 mL bottle) (\$4.00) flowed 15 cm in 10 seconds

$$\frac{15\text{cm}}{10\text{s}} = \frac{3}{2} \text{ or } 1.5\text{cm/s}$$

b) Brand TREESAP (250 mL bottle) (\$2.00) flowed 30 cm in 15 seconds.

$$\frac{30\text{cm}}{15\text{s}} = \frac{2}{1} \text{ or } 2\text{cm/s}$$

c) Which brand had the higher viscosity? supersyrup.

d) Which brand had the higher flow rate? treesap.

e) Which brand in question ~~12~~ is the best "deal"? Justify (back up) your answer

Both are the same in price, however the viscosity of ~~the~~ is higher and thus you are getting more concentrated Pressure, Hydraulics & Pneumatics product.

1) Define pressure in words as the force applied over a certain surface area.

Define pressure using Math language (a formula) $P = \frac{F}{A}$

2) Why are snowshoes able to help a human stay on top of a snowbank?

Snowshoes provide a larger surface area to spread the human forces out more so than a shoe, for Example.

3) Water under pressure is an example of a (pneumatic/hydraulic)

4) Give 3 examples of a pneumatic tire pump, jackhammer (air jackhammer)

Give 3 examples of a hydraulic showerhead, syringe, garden nozzle, jackhammer, car jack

5) What 2 criteria are needed to be a pneumatic or hydraulic?
Enclosed, continuous
(no breaks in the pipe)

Density of Regular & Irregular Solids

- 1) What is the density of water? (Include units) 1 g/cm³ or 1 g/mL
- 2) Classify each item as a regular or irregular solid by writing R if it is a regular solid and IR if it is an irregular solid.
- | | |
|----------------------|-----------------------------------|
| necklace <u>IR</u> | rectangular memory stick <u>R</u> |
| a box <u>R</u> | a can of soup <u>R</u> |
| a stop sign <u>R</u> | a cloth <u>IR</u> |
- 3) Describe in the chart below how finding the volume and mass of a regular object different than finding the mass of an irregular object (if at all). Include instruments (tools) used as well as procedure.

	Regular Solids	Irregular Solids
Volume	ruler Measure length, width, height, radius, etc. <u>Multiply using the formula!</u>	overflow can <u>OR</u> graduated cylinder <u>Use water displacement method</u>
Mass	triple beam balance Place regular solid on balance. Move counters until balanced.	triple beam balance Place regular solid on balance. Move counters until balanced.

- 4) Calculate the density: Narjis gave necklace given to you has a mass of 1600 grams and you calculate the volume to be 200cm³. Show the formula you use to find its density. Include the units.

$$D = \frac{1600g}{200cm^3} \quad D = 8g/cm^3$$

$$D = \frac{m}{V}$$



- a) How would you measure the mass of the necklace? on a triple beam balance
- b) How would you measure the volume of the necklace? Fill a graduated cylinder to 50ml. Drop the bracelet in.
- c) What is the density of the necklace? D = 8g/cm³
- c) What do you suspect the necklace is made of? iron!

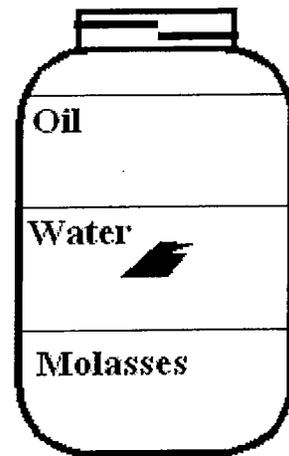
Substance	Density (g/cm ³)
Gold	19.3
Lead	11.3
Silver	10.5
Nickel	8.9
Iron	7.9
Aluminum	2.7

Buoyancy (8 06)

- 1) A density tower was made using water, oil, and molasses. An object was placed in the density tower. The object sank through the oil and only partially through the water. It hovered in the water. Tell me everything you can about the density of this object compared to the density of the fluids around it

The object has a density lower than molasses but higher than oil.

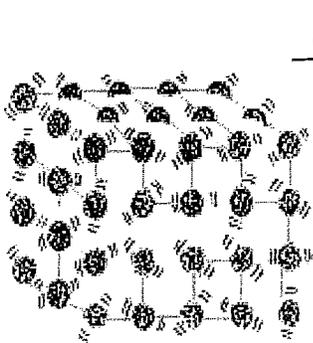
The object is floating in water, we would say that it was neutrally buoyant. Its density must be 1 g/cm^3 .



8 05 Factors Affecting Flow/Density

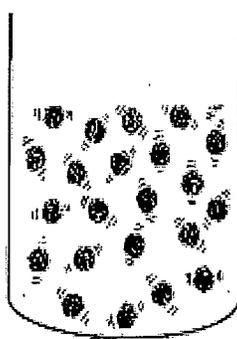
8 06 Density & Particle Theory

- 1) Describe the differences between the speed, spacing and the density of particles in each state below.
2) Describe TWO factors that might have caused the density to change



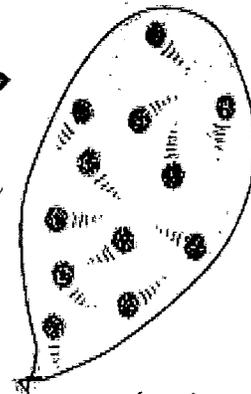
lowest speed
closest spacing

add heat energy
remove heat energy



Density can be changed by adding or removing heat energy. We can also change pressure to change density, as when we compress a gas

add heat energy
remove heat energy



highest speed
furthest spacing

... methane propane tank.

VOCABULARY (8 01)

Complete a 3-point approach for each of the following vocabulary words:

Force

Force

Units gram
milliliter
newton

Tools (instruments, apparatus, materials)

triple beam balance
graduated cylinder
overflow can

Pressure - force
- area

Density mass
gravity
weight
volume
regular solid
irregular solid

Hydraulic

Average Density

Pneumatic

Fluids viscosity
flow rate
flow
rate
buoyancy
positive buoyancy
negative buoyancy
neutrally buoyant