1 ☐ **UNIT A: MIX & FLOW OF MATTER**

TOPICS 1-3

2 ☐ **BIG QUESTION**

In your science journal make a mind map or graphic organizer of what you know about or words that come to mind about:

Mix & Flow of Matter

Questions to help:

1. What are fluids?
2. What are they made of and how do we use them?
3. What properties of fluids are important to their use?

3 ☐ **WHAT WILL WE LEARN?**

- WHMIS
- Pure substances, mixtures, and solutions
- Solutes & solvents
- Concentration
- Solubility & saturation points
- Particle model of matter
- Properties of fluids
- Viscosity & flow rate
- Mass, volume, and density
- Pressure
- Buoyancy

4 ☐ **SCIENCE JOURNAL**

5 ☐ **PROPERTIES OF FLUIDS**

Any substance that flows can be considered a fluid.

The properties of fluids can be explained by the *particle model of matter.*

This model states that all matter is made of tiny particles!

Atoms and molecules are believed to be the particles of which materials are made of.

6 ☐ **PARTICLE MODEL OF MATTER**

Key ideas:

1. All substances are made of tiny particles.
2. All particles in a pure substance are the same. Different pure substances are made of different particles.
3. The particles have spaces between them.
4. The particles are always in motion. (vibrating, rotating, moving) The speed of the particles increases/decreases with the temperature increases/decreases.
5. The particles in a substance are attracted to one another.

7 ☐ **STATES OF MATTER**

There are 3 states of matter:

1. solids
2. liquids
3. gases

8 ☐ **VIDEO:**

9 ☐ **STATES OF MATTER**

10 ☐ **FOLDABLE**

1. Cut square out.
2. Cut on dotted lines.
3. Fold on black line so beaker is on top.
4. Draw particles in each states beaker.
5. Write down properties for each state.
6. Write down examples for each.
7. Glue into your journal in the middle of the page.

11 ☐ **SOLIDS**

- Definite shape and volume (doesn't need container to make shape)
- Particles are tightly packed
- Particles can only vibrate
- Examples: sugar, desk, pencil, etc.

12 ☐ **LIQUIDS**

- Has a definite volume
- Has no definite shape (takes shape of the container)
- Particles will slide past each other (flow) and hang out together.
- Examples: water, kool-aid, etc.

13 ☐ **GASES**

- Has neither definite volume or shape (indefinite)
- Particles are very far apart from each other
- Examples: oxygen, CO_2, etc.
-

14 ☐ **BUT IS THERE A 4TH?**

Plasma!

- Considered a 4th state
- Most common form of matter in a fluid state
- Gas like mixture of positively and negatively charged particles
- Examples: Sun, lightning, etc.

15 ☐ **STATES OF MATTER**

16 ☐ **THINKING ABOUT FLOW…**

17 ☐ **VIDEO:**

18 ☐ **SCIENCE JOURNAL**

19 ☐ **CHANGES OF STATE**

A change of state occurs when a substance is *heated* and the particles of the substance *gain* energy.

If you were to *cool* the substance, the reverse changes of state would occur because the particles *lose* energy.

20 ☐ **MELTING**

Who can tell me what melting is??

Solid → liquid
Can also be called fusion.
Needs energy put in (heated).

21 ☐ **SOLIDIFICATION**

Who can tell me what *freezing* is?

Solidification or freezing is changing from a liquid to a solid.

Example: water freezing to form ice.

22 ☐ **CONDENSATION**

The change from gas to liquid state is called *condensation*.
Example: water vapor forming a liquid on a cool glass or grass (dew).

23 ☐ **VAPORIZATION**

Vaporization is the change from liquid to a gas.

Evaporation is a slower form of vaporization. Takes place only on the surface of the liquid.

Boiling is when a liquid changes to a gas BELOW it's surface as well as above.

Examples: water boiling, puddle evaporating, etc.

24 ☐ **SUBLIMATION**

Sublimation is a unique situation where a solid changes directly into a gas or the reverse (a gas changes directly into a solid) without changing into a liquid first.
Example: dry ice (frozen carbon dioxide) changes directly from a solid to a gas or frost forming.

25 ☐ **DEPOSITION**

Also known as desublimation, is a thermodynamic process, a phase transition in which gas transforms into solid. The reverse of deposition is sublimation.
One example of deposition is the process by which, in sub-freezing

air, water vapor changes directly to ice without first becoming a liquid

A gas --> a solid

26 ☐ **BOILING POINT**

The boiling point is when the molecular motion of some of the liquid molecules become so energetic as to break free of the surrounding particles and form a gas.

It is the point at which boiling occurs!

Example: 100 degrees Celsius is the boiling point of water.

27 ☐ **FREEZING POINT**

The freezing point is the point at which a substance freezes.

Example: 0 degrees Celsius for water.

If the substance was frozen and it is warming up, the point at which it changes state from a solid to a liquid is called the melting point.

28 ☐ **JOURNAL**

Go to the states of matter page (foldable).

Add in arrows for how states change.

Make sure your arrows are going to the right state!

29 ☐ **BILL NYE – PROPERTIES OF MATTER**

30 ☐ **CLASSIFICATION OF MATTER**

Cut and glue in the classification of matter handout.

31 ☐ **CLASSIFICATION OF MATTER**

Matter – anything that has mass and takes up space!

32 ☐ **CLASSIFICATION OF MATTER**

Matter

Pure Substances Mixtures

33 **PURE SUBSTANCES**

A pure substance:

- contains only one type of particle
- can exist in three states (solid, liquid, gas)
- examples:
  - Iron
  - Gold
  - Oxygen
  - Carbon

34 **MIXTURES**

Mixtures:

- Contain two or more pure substances
- Examples:
  - Vinegar
  - Air
  - Soil
  - Blood

35 **CLASSIFICATION OF MATTER**

Matter

Pure Substances Mixtures

Elements Compounds Homogeneous Heterogeneous

36 **ELEMENTS**

Elements are the simplest substances. They can not be broken down without using chemicals.

Examples: Hydrogen, oxygen, carbon, etc.

We have a whole periodic table full of them!

37 ☐ **COMPOUNDS**

Two or more elements combine to form a compound.
Examples: water (H_2O), carbon dioxide (CO_2), salt (NaCl)

38 ☐ **MIXTURES**

Homogeneous (solutions):
- Appear to be one substance
- Particles of different substances are intermingled
- Examples: vinegar, kool-aid, air

Heterogeneous (mechanical mixtures):
- Two or more parts can be seen
- Different kinds of particles stay together
- Examples: soil, blood, concrete

39 ☐ **MIXTURES**

40 ☐ **IN-BETWEEN MIXTURES**

Suspension: heterogeneous mixture in which the particles settle slowly after mixing. These particles can usually be trapped by fine filters. Example – salad dressing.

Colloid: heterogeneous mixture in which the particles do not settle. Example – jello.

Emulsion: a mixture in which droplets of fat are prevented from joining together by an emulsifying agent. Example – mayo.

41 ☐ **MIXTURES**

Mixtures that are obviously heterogeneous are usually called *mechanical mixtures*. The separate parts are called *phases*.

For example, think of soda water, two phases are visible. The bubbles make up one phase, and the liquid makes up the second phase.

42 ☐ **VOCABULARY**

Matter – anything that has mass & takes up space.
Pure substance – a material that only contains one kind of particle.
Compound – two or more elements.
Mixture – a combination of two or more pure substances.
Homogenous – the same structure, quality or kind.
Heterogeneous - made up of parts, or mixed.

43 ☐ **INVESTIGATION**

See handout.

Due: Tuesday, Oct. 17th!