Grade 8 SCIENCE Unit 3 FLUIDS Chapter 7 QUESTIONS

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1. A FLUID is a substance that can be made to FLOW.
   If a material, FLOWS, it is a FLUID.
   If you can STIR it, it is behaving like a FLUID.

2. Particle Theory of Matter:
   (i) All matter is made up of particles
   (ii) All particles in a PURE SUBSTANCE are the SAME.
   DIFFERENT SUBSTANCES are made of DIFFERENT PARTICLES.
   (iii) There is SPACE BETWEEN PARTICLES.
   (iv) The particles are ALWAYS MOVING.
   As the particles GAIN ENERGY, they are MOVING FASTER.
   (v) The particles in a substance are ATTRACTED TO ONE ANOTHER.
   The STRENGTH of the attractive forces depends on the type of particle.

3. **SAND GRAINS behave like a SOLID** when:
   (i)the sand grains move SLOWLY
   (ii) the sand grains are CLOSE TOGETHER
   (iii) the sand grains experience GREAT FORCEOF ATTRACTION
   EXAMPLE: sand grains in a SAND PILE

   SAND GRAINS behave like a FLUID when:
   (i) The SPEED of the sand grains INCREASES (like shaking the sand)
   (ii) the SPACE between the sand grains INCREASE (pouring sand grains through air)
   (iii) the ATTRACTIVE FORCES between the sand grains DECREASES (like when we dry out the sand so it's less sticky)

4. The particles in a LIQUID (like orange juice):
   (i) Have spaces between the particles
   (ii) Weak to medium attractive forces between particles allowing particles to roll past each other
   (iii) Since particles are always in motion, these tend to roll past each other until they settle to the LOWEST POSSIBLE POSITION, no matter what shape the container.

   REMEMBER: LIQUIDS take the shape of the container they are in.

5. ALL PARTICLES at room temperature have the SAME KINETIC ENERGY so they have SIMILAR AVERAGE SPEEDS.
   In a GAS,
   (i) Particles move freely because of WEAK ATRRACTIVE BONDS between particles.
   (ii) The kinetic energy allows particles to move in ANY DIRECTION, even against gravity.

   For liquids and solids,

   (i) Are held together by attractive forces between particles
   (ii) At the same temperature, these particles move at the same speed but CANNOT MOVE AS FAR as a gas

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1. A CHANGE IN STATE is the TRANSFORMATION from ONE STATE to ANOTHER, by ADDING/REMOVING ENERGY.

2. SUBLIMATION examples :
   (i) Ice cubes drying up in a freezer
   (ii) Snow dries up on a picnic table without melting
   (iii) Mothballs change into a vapour without melting

3. When water changes from a liquid to a solid, we say it freezes. It is the process of SOLIDIFICATION.

4. EVAPORATION is the CHANGE IN STATE from LIQUID TO GAS, due to the ADDITION of ENERGY.

   CONDENSATION is the CHANGE OF STATE from a GAS TO LIQUID, by REMOVING ENERGY.

5. It's important to know the melting point of substances, if you worked in a candle factory. If they didn't know melting point, the pot could get too cool and the wax solidify before the wax gets put into molds.

FIND OUT ACTIVITY 7-1B

1. When the cup was tipped:
   WATER:
   - flowed immediately
   - hit the plate and spread out

   GRANULAR SOLID:
   - did NOT flow immediately
   - stopped flowing and grains piled up

   BOTH:
   did flow

2. To be a **FLUID**, the SUBTANCE MUST FLOW.
   This is not a permanent property of a substance because the substance CAN change based on a circumstance.

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1. When **the liquid** is put into the tray, its particles are travelling at high speeds, there are significant distance between particles and the forces between particles are not very strong.
   When the water GETS COOLED, the particles move MORE SLOWLY and get CLOSER TOGETHER. The FORCES BETWEEN PARTICLES get STRONGER. At some point, these forces hold the particles in place. The liquid water has turned to ICE.

2. Tiny grains of salt are SOLID.
   SALT can be made to flow by increasing the spaces between particles, reduce the forces between particles, and increase the speed of the salt grains.
   When it stops pouring, it behaves like a solid again and PILES UP.

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1. VISCOSITY is a fluid's "RESISTANCE TO FLOW." We experience viscosity as the thickness or thinness of a fluid.
2. INTERNAL FRICTION would be the friction between ONE PART of a fluid to ANOTHER PART in the SAME FLUID.
   The GREATER the internal friction, the MORE RELUCTNAT the particles are to slide past one another. This is HIGH VISCOSITY.

3. The performance of many products is affected by VISCOSITY. Imagine toothpaste as thin as milk. EACH PRODUCT must have carefully controlled viscosity in order to perform well.

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1. FLOW RATE is the measure of the time it takes for a fluid to flow from one point to another. The SHORTER the time, the GREATER the flow rate is.

2. The GREATER the VISCOSITY, the LOWER the FLOW RATE. Example, white glue has high viscosity but it flows very slowly.

3. LOW VISCOUS FLUIDS: many alcohols, gasoline, water, butane in a butane lighter

   HIGH VOSCOUS FLUIDS: vegetable oil, motor oil, molasses, syrup, paint, glue

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1. KINETIC ENERGY is the ENERGY a particle has due to its MOTION.
The greater the motion, the greater the kinetic energy.
TEMPERATURE is the average kinetic energy of a collection of particles.

2. To increase kinetic energy, heat a substance. To decrease kinetic energy, cool a substance.

3. **Factors which affect viscosity:**

(i) Temperature
(ii) State
(iii) Concentration of components
(iv) Attractive forces between particles
(v) Size of the particles

4. INCREASING the TEMPERATURE of a GAS, increases the random motion of its particles This results in more collisions with the walls of the container and other particles.

5. The greater the concentration of flour in a cake batter, the thicker and higher the viscosity.

Page 291 7-3B Flowing Fluid Floods City

1. A) The date was January 15, 1919.

   B) The weather was unusually warm.

   C) the First clue was something was about to happen was a low rumbling sound, followed by an explosive "CRACK"

   D) The molasses poured out of the tank at a speed of 60 km/hour.

   E) The United States Industrial Alcohol Company accused of being responsible for the accident.

2. Fermentation might speed up by the warm temperature OR the gases in the tank expanded in the warm temperature.

3. The combination of higher temperature and the additional kinetic energy of the fall provided enough kinetic energy to allow the molasses to flow as fast as 60 km/hr.

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1. The cornstarch is the thickener. It increases the viscosity in the gravy.
2. During hot summer months, pavement is LESS VISCOUS. It is easier to pack and settles more completely as the traffic rolls over it.
3. To decrease the viscosity of molasses you could warm it up OR add water to the molasses.
4. TAR is much more viscous when it is cool. During the winter, the tar is a glassy solid.
5. Summer oil is more viscous than winter oil. Modern oils have additives that actually get thicker as the temperature INCREASES, keeping the oil about the same viscosity for both winter and summer.
6. To decrease the viscosity of syrup from the fridge, warm up the bottle in a bowl of hot water.

8.LARGER PARTICLES **do not flow past each other as easily** as SMALLER PARTICLES.

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9. Liquids kept in a refrigerator flow more SLOWLY than those kept in a cupboard. At the colder temperatures in the fridge, the liquid's particles moves slower, particles are closer together and the attractive forces between particles are stronger than the same liquid in a cupboard.

14. Each product has its own special viscosity to work as it needs to work.

A) MECHANIC: many fluids like motor oil, brake fluid, transmission fluid

B) CANDY MAKER: each candy, caramel and chocolate all flow in their own way. Change in temperature affects each one's viscosity

C) BAKER: thin batters, thick dough/ Bakers must know how to mix, shape and cook.

15. A) The microwave gave more kinetic energy to the air and water particles trapped in the bubbles in the marshmallow. As the particles move faster, they push the bubbles outwards causing expansion.

B) Cooling the marshmallow slows the air and water in the bubbles. At slower speeds, they could not push the bubbles outward, so the bubbles collapse under atmospheric pressure.

16 A) Substance 3 is the highest viscosity and Substance 2 is the least viscous.

B) Substance 3 is most likely to be a SOLID at room temperature.

C) Substance 2 has low viscosity, like water or alcohol. Its particles already move quickly around and past each other. Warming this substance a few degrees would NOT have a big effect on VISCOSITY.