Skills Compétences Canada

SKILLS FOR SUCCESS · 9+1 · COMPÉTENCES POUR RÉUSSIR

THROUGH THICK AND THIN

TRADE LINK: CAR PAINTING

RATIONALE:

Viscosity is the measure of how thick and "sticky" a liquid is. You should have the opportunity to explore the properties of viscosity through discovery. You will explore the viscosity of a number of different everyday products and determine the intermolecular interactions within a fluid.

You will relate this activity to car painting, that is one of the contest areas found at the Skills Canada National Competition. If you understand viscosity, you will have a greater chance of understanding one of the important elements that people in the car painting industry must understand and apply in their day-to-day careers.

METHOD:

In this activity, you will "test" the viscosity of a number of different products and "rank" the viscosity of each to determine the effect that viscosity would have on items, such as painting a car. You will be responsible for testing viscosity in both hot and cold temperatures. You will begin by pouring liquid from one cup to another and charting how long it takes the liquid to transfer. Then, drop a marble into each of the cups to view the effect viscosity has. Lastly, you will test viscosity and pipe flow by drinking edible products through a straw. You will then be able to determine why viscosity is a factor in painting a car.

MATERIALS:

- Dixie Cups
- Graduated cylinders
- Stopwatch (or use stopwatch function on smartphone or ipod)
- Marbles
- Corn starch
- Water
- Liquid glue
- Nail polish
- Yogurt
- Honey
- Smoothie
- Tarp (something to contain the mess)

GETTING STARTED:

Viscosity is evident by how things are poured and how long those things take to pour. If two cups were sitting on a tabletop, both spilled, which one would you need to clean first? In this activity you will be exploring and charting the viscosity of a number of products. The goal is to determine which one flows fastest and slowest. At the end of the activity, you will know more about density and how the density of fluids impacts different careers, specifically car painting.

THE ACTIVITY:

Decide what method is more appropriate.

There are a couple of ways to measure viscosity of liquids. One way is by measuring the amount of time it takes marble or steel balls to fall given distances through the liquids. The other way is to calculate the density of the fluid in question. You should determine what method is best to use.

TO FIND THE DENSITY OF A FLUID:

1. Choose a fluid to measure the viscosity.
2. Calculate the density of the fluid.
   - Weigh the empty graduated cylinder.
   - Fill the cylinder with fluid, and record the volume.
   - Weigh the full graduated cylinder. Subtract the weight of the empty graduated cylinder to determine the weight of the fluid.
   - The density of the fluid is the weight over the volume.

$$Pf = \frac{weight\ of\ fluid\ [kg]}{volume\ of\ fluid\ [cm^3]}$$

Note: 1 cm^3=1 ml.

Here are the details to carry out this activity:

1. Watch Mythbusters clip on viscosity – **https://www.youtube.com/watch?v=V4TEqb-728k**
2. Observe viscosity and which liquids flow slowest and fastest.
3. Set-up area and pour liquids into Dixie cups and set them up for inspection.
4. Pour liquids from one Dixie cup to another and time how long it takes to transfer all of the liquid from one to the other.
5. Make sure Dixie cups are at the same level and drop a marble from a foot in the air into each of the fluids. Determine how much splatter was created on the side of the cup, did any spill over? Record the number of "drops" on the side or outside the cup.
6. Use the edible items and time how long it takes you to drink the variety of items through a straw.