

Challenge Problems for Matter and Measurement -- Cooking Oil

1. You are a quality control chemist at Healthy World Labs, Inc. located in New Natchez, Mississippi. Last night, during a heavy rainstorm, the Mississippi overflowed its banks and flooded the storeroom containing barrels of various unsaturated cooking oils (corn oil, safflower oil, sunflower oil), and washed off the labels from these barrels. You send your technician to number the barrels, and gather some samples from each barrel as well as make some measurements. This is what they reported to you:

	Mass of oil	Volume of oil
Barrels 1 - 100	1.1 lb	20.0 fluid oz.
Barrels 101 - 200	1.2 lb	21.7 fluid oz.
Barrels 201 - 300	1.3 lb	23.5 fluid oz.

The density of safflower oil is: 0.8473 g/mL

The density of corn oil is: 0.8480 g/mL

Then density of sunflower oil is: 0.8457 g/mL

All densities are at room temperature, 25°C.

Are you able to identify the contents of the barrels with this information? Why or why not? If not, how should the measurements of mass and volume be made?

Subsequent measurements of the oil samples gave the following results:

	Mass of oil	Volume of oil
Barrels 1 - 100	21.1425 g	25.00 mL
Barrels 101 - 200	21.1825 g	25.00 mL
Barrels 201 - 300	21.2000 g	25.00 mL

All measurements were made at room temperature, 25 °C

Now, are you able to identify the contents of the barrels? If so, identify the type of oil in the barrels. If not, what else must be done to identify the oil?