

Make a Hydrometer

Grandpa Pencil learns how to make
an inexpensive

Hydrometer

How simple is this?

Snip off a section of one of those fat drinking straws to about 6 cm or so (around 2 1/2 inches) and put a blob of plasticine on one end making sure that the end is fully sealed.



With a waterproof marker (a china marker) mark the length of the straw into 5 mm sections.

You may need to experiment a little with length of the straw and the weight of your plasticine blob.

You have just made your own hydrometer.

Hydrometer

An instrument for determining specific gravity of liquids that is made up of a graduated stem with a hollow bulb and a weight at the bottom.

The specific gravity is indicated by the depth to which the stem is immersed, or how high or low the hydrometer floats.

If Great Uncle brews his own beer you will notice that he uses an hydrometer to check for the alcohol level in his concoction

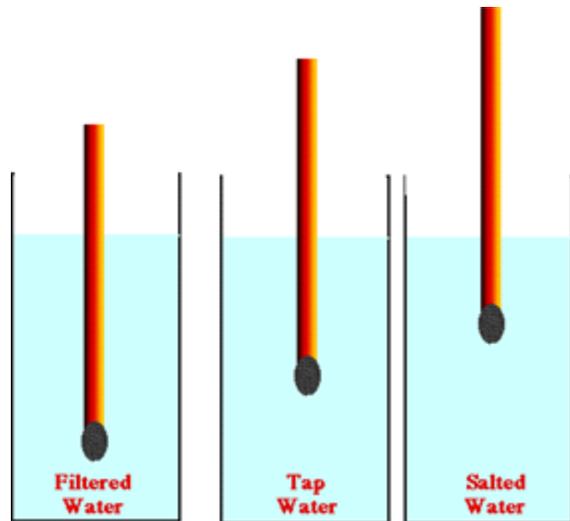
As alcohol has a lower specific gravity than the water he started out with, the hydrometer will float lower as the alcohol level increases.

Some interesting experiments with your hydrometer

One thing that the designer of a ship must consider is 'how high will it float'. Make an hydrometer with a full length straw and notice what it does. Mine always flop over and an incorrectly designed ship will do the same thing.

To overcome this effect in the ships trading between England and colonial Australia added much the the architecture of Australia because beautiful ornate cast iron decorations were used to stabilize the vessel on her journey down-under. This is called ballast.

Try your hydrometer in different types of liquid, as below, and note which mark the water comes up to.



A very wet puzzle

- Filtered water (cold and warm)
- Tap water (cold and warm)
- Rain water (cold and warm)
- The swimming pool
- Tap water with salt dissolved in it (cold and warm)
- Tap water with metholated spirits dissolved in it.

You should be able to tell which of your waters (filtered, tap and rainwater) contain the most minerals.

Try your hydrometer on a variety of other fluids including petrol, oil etc.

A ship floating in the harbour at low tide has a ladder over the side with 25 of its 30 rungs visible.
How many rungs will be visible at High Tide given that Low Tide is 1m and High tide is 2 m?
Why?

Answer: Half fill a container and note the level shown on your hydrometer then fill the container and see the difference. Did you get the right answer?

Lab Solutions (if needed):

Fresh water 0 ppt = 0% = 0 g salt in 100 g H₂O

Brackish water 15-20 ppt = 1.5-2.0% solution = 1.5-2.0 g salt in 100 g water

Salt water (ocean) = 35 ppt= 3.5% solution = 3.5 g salt in 100 g water

<http://www.grandpencil.net/science/hydrom.htm>