“IS THERE AN OCEAN IN THE HOUSE?”

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| Level | **Investigations** | | | |
| Topic | Salinity | | | |
| ‘*OITH bench-top’s* | Definitions, making, changing, measuring  GTV1.1  GTV1.2 | Tool, (setup)  manufacturing, testing, modification. | Tool, calibration and system error | Doing with the tool. Enquiry. Problem. Proposition |
| Support material | Overview | Concept, analogy and creativity | Graphing , statistical  GTV 1.3 | Review |

The sea is salty!! Find out more about this at **GTV2.2**, GTV **2.10**, **GTV 5.2** or

<https://oceanservice.noaa.gov/facts/whysalty.html>

How much saltiness is a measure called **salinity.**

**Salinity is the proportion of a water sample that is salt. Because it is a ratio it is unit less and often recorded as ppt (parts per thousand),**

**PSU (practical salinity units) are an electrical conductivity measure of salinity that is equivalent to ppt.**

**Often salinity is measured and reported in units of grams per Litre (gm/l), which is parts per thousand.**

We are going to make up a range of ‘ocean’ samples based on valid, real world, salinities.

‘*Bench top’* 1(**GTV 1.1**)

*Making an Ocean in the House*

Kit

* A kitchen, including the kitchen sink!
* 1 measuring jug, preferably to 1 litre
* 1 set kitchen scales, to 1 gm accuracy
* at least 1 2L ice cream container, empty!(or equivalent)
* salt (about 250 gms should be enough)
* cup
* teaspoon
* dessert spoon
* some clean and dry storage bottles
* labels, marker pen (or paper and pencil) or equivalent
* paper and pencil or pen

Procedure 1 (**GTV 1.1**)

* Weigh and record weight of a clean dry 2L ice cream container.
* Alternatively tare scales with container on and get weight of your 1 Litre measure.
* Using measuring jug measure as precisely as possible 1 Litre fresh water (to bottom of meniscus)
* Pour water into container and weigh and record weight of container + water
* Calculate weight of the water and record.
* Repeat this 2 more times for a total of 3.
* Use the worksheet to calculate your precision

One measure of precision with which you can measure 1 litre of water is (d) plus or minus (c). (How close the results are when repeated samples are taken)

* Find out what 1 Litre of fresh water should weigh (by definition).
* Compare to the average of your 3 weighing’s.
* What is the difference? (use the worksheet provided)

This difference is an indication of your accuracy. (How close the results of sampling is to the real value.). This is bias.

Note that **precision** and **accuracy** are ***not*** the same thing

In our Kitchen lab, do you think it would be more **accurate** to measure 1 Litre of water by volume or by weight?

Procedure 2 (**GTV1.1 and GTV1.2**)

* Weigh and record weight of a clean dry 2 L ice cream container
* Weigh as precisely as possible 1000 gm (1 Litre) water into a 2L ice cream container.\*
* Weigh and record weight of container plus water.
* Weigh 35 grams of salt in a cup\*
* Mix the salt into the water in your container (not while it is on the scales)
* Make sure all salt is dissolved
* Weigh and record weight of container+water+salt. (Note it may not necessarily equal 1000gm plus gms added, it may be less than you expect!)
* Compare weight of 1 litre water and 1 Litre water +salt
* Pour salty water back into measuring jug; still pretty much measures 1 litre?
* So-- same volume as fresh water but more weight?
* Store in bottle labelled “Ocean, sea 1-35 ppt”
* Repeat procedure for 5 gms salt, 10 gms salt, 20 gms salt, 55 gms salt and 100 gms salt.
* Bottle and label accordingly. (You can make up a name for each of your “seas”!)
* Calculate density (this is easy as gms/litre are equivalent to kgs/m3!).
* Graph salinity (ppt)(x axis) vs density (kg/m3)(y axis)

**GTV 1.3**

What is the relationship between **salinity** and **density**?

\* you might be able to short circuit this procedure if your scales have a Tare function you trust , but you will still need to know the weight of your 2 L ice cream container.