A Mouth full of Moles

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This is an addendum to "The Biggest Mouth in Class" activity.

This can be used as an introduction to water density and/or to moles and/or Avogadro's number.

If the Biggest Mouth in Class activity is completed, the instructor can ask the class…."How many moles/molecules of water are in the student's mouth?"

1. Measure water to figure out its density:
   Mass out a specific volume of water.
   Density = Mass /Volume
   It turns out the density of water is 1gram/ml.

2. Figure out how many grams of water are in one mole.
   What is the formula for water?
   H_2O or 2 Hydrogens for every Oxygen
   What is the Atomic mass (amu) of Hydrogen?
   1 amu (atomic mass units)
   What is the Atomic mass of Oxygen?
   16 amu
   Total amu for H_2O
   H_2O = 2x1 + 16 or 18 amu
   In Moles…. that's 18 grams!

   Since the density of water is 1, the volume of water and the mass of water are the same.

3. Divide the volume of water in the nominee's mouth by 18.
Volume of water in mouth in mls/18 = Number of moles*

   Example: If someone can fit 200 gram (ml) of water into their mouth, how many moles of water is this:

$$200 \text{ grams of water} \times \frac{1 \text{ mole of } H_2O}{18 \text{grams}} = 11 \text{ moles}$$

4. To find how many molecules of water are in someone's mouth:
   A mole of anything has 6.02×10^{23} particles (this is Avogadro's number).

   From the Example above: If someone can fit 200 grams of water in their mouth, how many molecules of water is this:

$$200 \text{ grams of water} \times \frac{1 \text{ mole of } H_2O}{18 \text{grams}} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mole}} = 6.6 \times 10^{24} \text{ molecules of water}$$