Careers in Chemistry: Dentistry

We learned that fluoride is an essential element to be taken to reduce teeth cavities. Too much fluoride can produce yellow spots on the teeth and too little will have no effect. After years of study it was determined that a quantity of 1 part per million (ppm) fluoride in the water supply is enough to significantly reduce cavities and not stain teeth yellow.

Measure the mass of the mineral *fluorite* (chemically, CaF_2). Use this sample to determine how much water must be added to yield a 1 ppm fluoride solution. Sounds difficult? Lets apply what we've learned this unit to solve this problem.

1 part per million = 1 atom of fluorine per 999,999 water molecules

What information do we know:

1 mol CaF_2 = 78.08 g CaF_2 = 6.02 x 10^{23} molecules of CaF_2

1 molecules of CaF_2 = 2 atoms of F

1 mol H_2O = 18 g H_2O Density of water is 1 g/mL

1000 mL = 1 L   and   3.78 L = 1 gallon

mass of sample of CaF_2 = 92.135 g