Answer on Question #51728 – Chemistry – General Chemistry

Question:

A flow of 150 GPM is to be treated with 2.4 percent (0.2 pounds per gallon) solution of sodium Fluoride (NaF). The water to be treated contains 0.5 mg/L of fluoride ion and the desired fluoride ion concentration is 1.4 mg/L. What is the sodium feed rate in gallons per day? Assume the sodium fluoride purity of 43.4 percent.

Answer:

Required amount of Sodium Fluoride (100%) for 1 L:
1.4-0.5=0.9 mg/L=$9 \cdot 10^{-7}$ kg/l
1 kg/l=8.35 lb/gal
$9 \cdot 10^{-7}$ kg/l= $6.26 \cdot 10^{-5}$ lb/gal

Amount of NaF in the solution:
(0.2 lb/gal) x 0.434=0.0868 lb/gal

Amount of NaF required to treat the actual water flow:

- actual flowrate = 150 gal/min
- NaF required: $6.26 \cdot 10^{-5}$ lb/gal x 150 gal/min = 0.00939 lb/min

Required flow of NaF solution: (0.0868 lb/min) / (0.00939 lb/gal) = 9.24 gal/min = **13 311 gal/day**