

Lesson 9:
Fluoridation Math Worksheet

Name:

Student ID:

Please answer the following questions. Put your calculations into the allotted spaces. Partial credit may be awarded. You MUST enter the unit with the number to get full credit.

Remember the AFIs for each compound: NaF = 45.2%; H₂SiF₆ = 79.2%, Na₂SiF₂ = 60.7%.

Application/Analysis

1. **A water plant produces 2852 gpm and the city wants to add 1.8 mg/L of fluoride. What would the fluoride feed rate be if sodium silicofluoride was used?**

First, convert gpm to MGD:

$$\text{Set it up like: } \frac{2852 \text{ gal}}{\text{min}} \times \frac{1440 \text{ min}}{1 \text{ day}} \times \frac{1 \text{ MG}}{1,000,000 \text{ gal}} = ? \text{ MGD}$$

$$2852 \text{ gpm} = \underline{\hspace{2cm}} \text{ MGD}$$

Now, determine the feed rate, lb/day:

$$\text{Set it up like: Fluoride feed rate, lb/day} = \frac{\text{Dosage, mg/L} \times \text{Capacity, MGD} \times 8.34 \text{ lb/gal}}{\text{AFI} \times \text{Chemical purity}}$$

$$\text{Fluoride feed rate, lb/day} = \underline{\hspace{4cm}}$$

The last step is to convert the feed rate to gpm:

$$\text{Set it up like: } \frac{? \text{ lb}}{\text{day}} \times \frac{1 \text{ day}}{1440 \text{ min}} \times \frac{454 \text{ g}}{1 \text{ lb}} = ? \text{ gpm}$$

_____ lb/day = _____ gpm

2. **Now, let's work the same problem, but this time calculate the feed rate if hydrofluorosilicic acid was used for fluoridation. (You already know the capacity of the plant in MGD from above).**

Set it up like: Fluoride feed rate, lb/day = $\frac{\text{Dosage, mg/L} \times \text{Capacity, MGD} \times 8.34 \text{ lb/gal}}{\text{AFI} \times \text{Chemical purity}}$

Fluoride feed rate, lb/day = _____

The last step is to convert the feed rate to gpm:

Set it up like: $\frac{? \text{ lb}}{\text{day}} \times \frac{1 \text{ day}}{1440 \text{ min}} \times \frac{454 \text{ g}}{1 \text{ lb}} = ? \text{ gpm}$

_____ lb/day = _____ gpm

3. **And again, same problem, but use sodium fluoride for fluoridation.**

Set it up like: Fluoride feed rate, lb/day = $\frac{\text{Dosage, mg/L} \times \text{Capacity, MGD} \times 8.34 \text{ lb/gal}}{\text{AFI} \times \text{Chemical purity}}$

Fluoride feed rate, lb/day = _____

The last step is to convert the feed rate to gpm:

$$\text{Set it up like: } \frac{? \text{ lb}}{\text{day}} \times \frac{1 \text{ day}}{1440 \text{ min}} \times \frac{454 \text{ g}}{1 \text{ lb}} = ? \text{ gpm}$$

$$\underline{\hspace{2cm}} \text{ lb/day} = \underline{\hspace{2cm}} \text{ gpm}$$

Assumptions

4. Which fluoride chemical uses the lowest feed rate amount to treat 2852 gpm?
