



**WASTEWATER TECHNOLOGY
T R A I N E R S**

Transforming today's operators into tomorrow's water quality professionals

**Problem of the Day
2015.Jul.19**

Problem of the Day

An industrial discharger dumped 35,000 gallons of product into the sewer. The BOD concentration of the product is 256,000 mg/L. How many pounds of BOD were discharged?

Introduction

This is a straightforward pounds calculation. Don't let the high BOD concentration throw you off.

Solution

The list of "givens" is short:

1. BOD concentration = 256,000 mg BOD/L
2. Volume of waste discharged = 35,000 gal
3. Density of waste discharged = 8.34 lb/gal (assumed)

The question asks for pounds of BOD so the units lb BOD are put between heavy vertical lines, as always, followed by an equals sign and the blank solution bridge.

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| | | |
|--------|---|--|
| lb BOD | = | |
|--------|---|--|

Again, this is a straightforward pounds calculation. WWTT likes to start out the solution bridge for pounds and pounds-per-day calculations with the concentration of the constituent of interest, in this case BOD.

| | | | |
|--------|---|----------------|--|
| lb BOD | = | 256,000 mg BOD | |
| | | L | |

The next entry cancels mg and L.

| | | | | |
|--------|---|----------------|------|--|
| lb BOD | = | 256,000 mg BOD | L | |
| | | L | M·mg | |

The M in the conversion factor just entered reminds us that an Mgal is needed. Since we don't have an Mgal in the information given, we enter the conversion factor Mgal/10⁶ gal. Note gal also cancel.

| | | | | | |
|--------|---|----------------|------|---------------------|--|
| lb BOD | = | 256,000 mg BOD | L | Mgal | |
| | | L | M·mg | 10 ⁶ gal | |

The only unit currently on the solution bridge is BOD. The density of water is entered to get lb BOD needed in the answer.

| | | | | | | |
|--------|---|----------------|------|---------------------|---------|--|
| lb BOD | = | 256,000 mg BOD | L | Mgal | 8.34 lb | |
| | | L | M·mg | 10 ⁶ gal | gal | |

The volume of waste discharged is entered to cancel gal.

| | | | | | | | |
|--------|---|----------------|------|---------------------|---------|------------|--|
| lb BOD | = | 256,000 mg BOD | L | Mgal | 8.34 lb | 35,000 gal | |
| | | L | M·mg | 10 ⁶ gal | gal | | |

Since all the units have now canceled except those needed in the answer, we know the solution bridge is complete. The arithmetic gives the answer.

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| | | | | | | |
|---------------|---|----------------|-----|---------------------|---------|------------|
| lb BOD | = | 256,000 mg BOD | L | Mgal | 8.34 lb | 35,000 gal |
| | | L | Mmg | 10 ⁶ gal | gal | |

$$256,000 \times 8.34 \times 35,000 \div 1,000,000 = \underline{\underline{74,726 \text{ lb BOD}}}$$

Discussion

Obviously, that's quite a bit of BOD in a small volume! Depending on the size of the treatment plant, this might be a big problem: this amount of BOD in a slug to a small plant would be devastating.

Happy calculating! Let us know, by leaving a comment, if you want us to do a specific problem, if you see a mistake, or if you have a question on any of the Problems of the Day you are looking at.