

Fact Sheet: Reporting Water Dissociable Nitrates

This advisory is of interest to Massachusetts facilities that use and neutralize nitric acid on site. Such facilities are subject to reporting requirements for the production of water dissociable nitrate compounds resulting from nitric acid neutralization. Nitrates generated biologically or by other means are not covered here.

While nitric acid itself is a reportable chemical under the Emergency Planning Community Right-to-know Act (EPCRA) Section 313 (also known as the Toxics Release Inventory) and the Massachusetts Toxics Use Reduction Act (TURA), facilities should also be aware that the neutralization byproduct of nitric acid generates water dissociable nitrate compounds that are reportable above specific threshold levels* under EPCRA and TURA.

* The threshold for reporting coincidentally manufactured water dissociable nitrate compounds under EPCRA and TURA is 25,000 lb per year.

For complete information, facilities should consult the U.S. EPA guidance on reporting water dissociable nitrate compounds. https://ofmpub.epa.gov/apex/guideme_ext/?p=104:81::no::p81_id:nitrate

Below is a brief summary of the calculation facilities may use to determine whether their neutralization of nitric acid generates levels of water dissociable nitrate compounds in excess of the EPCRA/TURA thresholds.

In addition, OTA has provided a calculation tool to help facilities estimate the amount of water dissociable nitrate compounds generated from nitric acid neutralization.

Example threshold calculation:

For this example, nitric acid (HNO_3) is neutralized with sodium hydroxide (NaOH), producing nitrate compounds in the form of sodium nitrate (NaNO_3). This calculation defines the amount of nitric acid (in pounds) a facility must neutralize to exceed the EPCRA/TURA reporting thresholds.

Neutralization reaction: $\text{HNO}_3 + \text{NaOH} \rightarrow \text{NaNO}_3 + \text{H}_2\text{O}$

First, determine the molecular weight of HNO_3 and NaNO_3 .

$$\text{MW HNO}_3 = 1 \times 63 \text{ kg/kmol}$$

$$\text{MW NaNO}_3 = 1 \times 85 \text{ kg/kmol}$$

Second, because the quantity of NaNO_3 generated (in kilomoles) is equivalent to the quantity of HNO_3 neutralized (in kilomoles), simply divide the molecular weight of HNO_3 by the molecular weight of NaNO_3 . This gives a ratio of HNO_3 neutralized versus NaNO_3 generated, in terms of their molecular weights.

$$(63 \text{ kg/kmol HNO}_3) / (85 \text{ kg/kmol NaNO}_3) = 0.74$$

Third, multiply this ratio by the threshold reporting level for NaNO_3 .

The threshold is 25,000 lb per year.

$$(0.74)(25,000 \text{ lb}) = 18,529 \text{ lb}$$

In this example, a facility neutralizing 18,529 lb or more per year of HNO_3 with NaOH must report under EPCRA and TURA. See the respective rules reporting requirement guidelines for further information.

Form R and Form S Reporting Differences

In general, the amount of water dissociable nitrate compounds (in pounds) generated by the on-site neutralization of nitric acid are not considered “byproduct” under Form S (TURA) and should be reported as “coincidentally manufactured.” For Form R (EPCRA), the total amount of nitrate compounds generated is used to determine whether reporting thresholds have been exceeded – however, only the total weight of the nitrate ion (NO_3) is reported as a “release.”

Example

A facility determines that on-site neutralization of nitric acid generates 27,500 lb. of NaNO_3 each year, which exceeds the relevant thresholds. On their Form S (TURA), the facility reports the 27,500 lb as “coincidentally manufactured,” since it is not generated directly from a production process and pounds of Byproduct.

On their Form R (EPCRA), the facility first finds the percentage of the nitrate compound (NaNO_3) generated that is NO_3 . This is calculated using a ratio of the molecular weight for NO_3 to the molecular weight for NaNO_3 .

$$\begin{aligned} \text{MW of Na} &= 22.99 \text{ kg/kmol} & \text{MW of N} &= 14.01 \text{ kg/kmol} \\ \text{MW of O}_3 &= 16.00 \text{ kg/kmol} \times 3 = 48.00 \text{ kg/kmol} \\ (\text{MW of NO}_3) / (\text{MW of NaNO}_3) &= 62.01 / 85.00 = 0.73 = 73\% \end{aligned}$$

This determines that 73% of the nitrate compound is NO_3 . Multiply the total amount of NaNO_3 generated by 73%.

$$27,5000 \times 0.73 = 20,075 \text{ lb of NO}_3.$$

In this case, the facility would report 20,075 lb. as the amount of NO_3 released on its Form R.

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