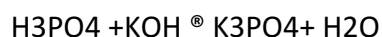


Answer on the question #61227, Chemistry / Other

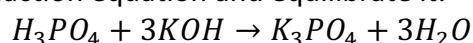
Question:

A train is carrying three cars of concentrated phosphoric acid (assume that it is 85% by weight) to deliver it in a manufacturing plant. The train got into an accident and all of the acid were spilled due to derailment. If 150,000 lbs of potassium hydroxide was used to neutralize the acid, what is the amount (in kg) of concentrated phosphoric acid that was spilled due to derailment?



Solution:

First, we should write the reaction equation and equilibrate it:



As far as we did it, we see that one mole of phosphoric acid reacts with three moles of potassium hydroxide. Using this relation of the moles, we find easily the mass of pure phosphoric acid released:

$$\begin{aligned} 3 \cdot n(\text{H}_3\text{PO}_4) &= n(\text{KOH}) \\ 3 \cdot \frac{m(\text{H}_3\text{PO}_4)}{M(\text{H}_3\text{PO}_4)} &= \frac{m(\text{KOH})}{M(\text{KOH})} \\ m(\text{H}_3\text{PO}_4) &= \frac{m(\text{KOH})}{3 \cdot M(\text{KOH})} \cdot M(\text{H}_3\text{PO}_4) = \frac{150000(\text{lb})}{3 \cdot 56.1056 \left(\frac{\text{g}}{\text{mol}}\right)} \cdot 98 \left(\frac{\text{g}}{\text{mol}}\right) = 87,335(\text{lb}) \end{aligned}$$

This is the mass of pure phosphoric acid. Let's calculate the mass of concentrated phosphoric acid that contains 87,335(lb) of pure H_3PO_4 :

$$m(\text{conc. H}_3\text{PO}_4) = \frac{87,335(\text{lb})}{85\%} \cdot 100\% = 102,747(\text{lb})$$

Answer: 102,747 (lb)