

# Math Diversion Problem 921

P. Reany

November 22, 2025

You can be creative in anything — in math, science, engineering,  
philosophy — as much as you can in music or in  
or in painting or in dance.  
— Ken Robinson

Source: Chemical Principles: Quest for Insight, 3rd Ed

Title: Problem 2. p. F44 E.27

Presenter: Atkins and Jones

## 1 Problem

The density of sodium borohydride ( $\text{NaBH}_4$ ) [hereafter referred to as the compound] is  $1.074 \text{ g} \cdot \text{cm}^{-3}$ . If 3.93 g of the compound contains  $2.50 \times 10^{23}$  H atoms, how many moles of H atoms are present in  $28.0 \text{ cm}^{-3}$  of the compound?

Given:  $\rho_{\text{compound}} = 1.074 \text{ g} \cdot \text{cm}^{-3}$

Given: 3.93 g compound on order of  $2.50 \times 10^{23}$  H atoms

Given:  $V_{\text{compound}} = 28.0 \text{ cm}^3$

## 2 Solution

$$\text{grams of compound} = \rho V = 30.072 \text{ g}. \quad (1)$$

$$\begin{aligned} \# \text{ H atoms in compound} &= 30.072 \text{ g} \times \frac{2.50 \times 10^{23} \text{ H atoms}}{3.93 \text{ g compound}} \\ &= 1.913 \times 10^{24} \text{ H atoms} \end{aligned} \quad (2)$$

Therefore,

$$\begin{aligned} \# \text{ moles H atoms in compound} &= \frac{1.913 \times 10^{24} \text{ H atoms}}{6.022 \times 10^{23} \text{ atoms mol}^{-1}} \\ &= 3.18 \text{ moles}. \end{aligned} \quad (3)$$