

# **Introduction to Salinity**

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# Overview

- Measures of mixtures
  - Concentration
  - Mass fraction
- Exercises in mass fraction

## Measures of Salt Proportions

Chemists usually refer to *Concentration*

$$C = \frac{\text{mass of salt}}{\text{Volume of salt water}}$$

We will use *Mass fraction*

$$\text{Mass fraction} = \frac{\text{mass of salt}}{\text{total mass of mixture}}$$

## Mass Fraction and Weight Fraction

$$\text{Mass fraction} = \frac{\text{mass of salt}}{\text{total mass of mixture}} = \frac{m_{\text{NaCl}}}{m_{\text{NaCl}} + m_{\text{H}_2\text{O}}}$$

where  $m_{\text{NaCl}}$  is the mass of salt in the mixture, and  $m_{\text{H}_2\text{O}}$  is the mass of water in the mixture.

$$\text{Weight fraction} = \frac{\text{weight of salt}}{\text{total weight of mixture}} = \frac{(m_{\text{NaCl}}) g}{(m_{\text{NaCl}}) g + (m_{\text{H}_2\text{O}}) g}$$

Since the factors of  $g$  cancel,

$$\text{Mass fraction} = \text{Weight fraction}$$

These quantities are *numerically* equivalent. Both the *mass fraction* and *weight fraction* are *dimensionless* ratios.

## Weight Percent Salt

Often the mass fraction (or weight fraction) is expressed as *Weight percent* or *wt %* or *wt pct*

*Percent* is just a dimensionless fraction multiplied by 100.

Therefore

$$\text{wt \% salt mixture} = \text{mass fraction} \times 100$$

## Practice

1. What is the *weight percent* salinity of a mixture of 1 g of salt in 1 L of pure water?
2. How much salt (in grams) is in a gallon of 0.015 weight percent saltwater mixture?  
What is the mass fraction of salt in the mixture?