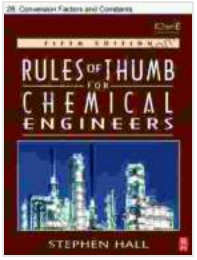
Chapter 26: Conversion Factors and Constants - A Comprehensive Guide

Conversion factors and constants are essential tools for scientists, engineers, and anyone else who works with physical quantities. They allow us to convert between different units of measurement and to make calculations involving physical constants. In this chapter, we will provide a comprehensive overview of conversion factors and constants, including detailed explanations of key concepts, real-world applications, and practice problems.

A **conversion factor** is a ratio of two equivalent units of measurement. For example, there are 2.54 centimeters in 1 inch. Therefore, 2.54 cm / 1 in is a conversion factor that can be used to convert from inches to centimeters or vice versa.

A **constant** is a physical quantity that has a fixed value. For example, the speed of light in a vacuum is a constant that has the value 299,792,458 meters per second.



Chapter 26, Conversion Factors and Constants by ReadList

★★★★★ 5 out of 5

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Screen Reader	: Supported
Enhanced typesetting	: Enabled
Word Wise	: Enabled
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Dimensional analysis is a technique that can be used to check the validity of equations and to convert between different units of measurement. Dimensional analysis involves comparing the units of measurement on both sides of an equation to make sure that they are equivalent.

Conversion factors and constants are used in a wide variety of real-world applications, including:

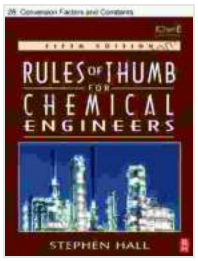
- **Engineering:** Conversion factors are used to convert between different units of measurement, such as feet and meters, pounds and kilograms, and gallons and liters.
- **Science:** Constants are used to make calculations involving physical quantities, such as the speed of light, the gravitational constant, and the Planck constant.
- **Medicine:** Conversion factors are used to convert between different units of measurement, such as milligrams and grams, milliliters and liters, and ounces and pounds.
- **Everyday life:** Conversion factors are used to convert between different units of measurement, such as miles and kilometers, Fahrenheit and Celsius, and inches and centimeters.

1. Convert 10 inches to centimeters.
2. Convert 2.5 kilograms to pounds.
3. Convert 100 miles per hour to kilometers per hour.

4. What is the speed of light in kilometers per hour?
5. What is the gravitational constant in meters cubed per kilogram squared per second squared?

1. 10 inches x (2.54 cm / 1 in) = 25.4 cm
2. 2.5 kilograms x (2.205 pounds / 1 kilogram) = 5.51 pounds
3. 100 miles per hour x (1.609 kilometers / 1 mile) x (1 hour / 3600 seconds) = 44.70 kilometers per hour
4. Speed of light in kilometers per hour = 299,792,458 meters per second x (1 kilometer / 1000 meters) x (3600 seconds / 1 hour) = 1,079,252,848 kilometers per hour
5. Gravitational constant in meters cubed per kilogram squared per second squared = 6.674 x 10^-11 meters cubed per kilogram squared per second squared

Conversion factors and constants are essential tools for anyone who works with physical quantities. By understanding the key concepts and real-world applications of conversion factors and constants, you can use them to solve a wide variety of problems.



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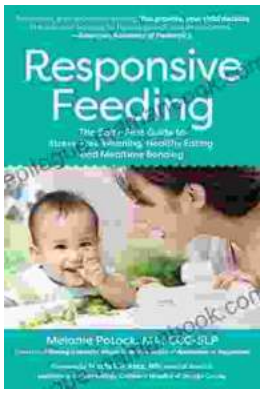

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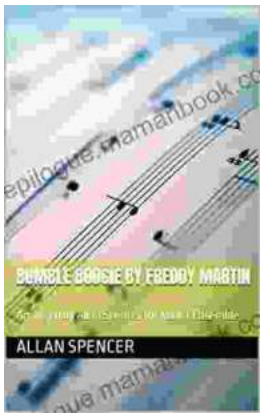

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