

Basic Transport Phenomena in Biomedical Engineering 4th Edition Fournier Solutions Manual

Chapter 1 Solutions

Problem 1.1. Use the conversion factors

$$\frac{8.314\text{J}}{\text{mol K}} \times \frac{0.23901\text{cal}}{\text{J}} = 1.987 \frac{\text{cal}}{\text{mol K}}$$

Problem 1.2. Use Equation 1.2 to convert the temperature to degrees Celsius

$$t^{\circ}\text{C} = \frac{5}{9}(t^{\circ}\text{F} - 32) = \frac{5}{9}(98.6 - 32) = 37^{\circ}\text{C}$$

Now, use Equation 1.3 to convert the temperature from degrees Celsius to Kelvin

$$T^{\circ}\text{K} = t^{\circ}\text{C} + 273.15 = 37 + 273.15 = 310.15^{\circ}\text{K}$$

Problem 1.3. Use the conversion factors

$$2 \times 10^4 \mu\text{dynes} \times \frac{\text{dynes}}{10^6 \mu\text{dynes}} \times \frac{\text{N}}{10^5 \text{dynes}} \times \frac{\text{kN}}{10^3 \text{N}} = 2 \times 10^{-10} \text{kN}$$

Problem 1.4. Use the conversion factors

$$\frac{27 \mu\text{m}}{\text{hr}} \times \frac{10^{-6} \text{m}}{\mu\text{m}} \times \frac{0.0006214 \text{miles}}{\text{m}} \times \frac{\text{hr}}{60 \text{min}} \times \frac{\text{min}}{60 \text{sec}} = 4.66 \times 10^{-12} \frac{\text{miles}}{\text{sec}}$$

Problem 1.5. Use the conversion factors

$$48 \text{MW} \times \frac{10^6 \text{W}}{\text{MW}} \times \frac{\text{kg m}^2}{\text{sec}^2 \text{W}} \times \frac{10^3 \text{g}}{\text{kg}} \times \frac{100 \text{cg}}{\text{g}} \times \frac{3600^3 \text{sec}^3}{\text{hr}^3} \times \frac{100^2 \text{cm}^2}{\text{m}^2} = 2.24 \times 10^{27} \frac{\text{cgcm}^2}{\text{hr}^3}$$

$$48 \text{MW} \times \frac{10^6 \text{W}}{\text{MW}} \times \frac{\text{J}}{\text{sec W}} \times \frac{\text{kJ}}{10^3 \text{J}} \times \frac{60 \text{sec}}{1 \text{min}} = 2.88 \times 10^6 \frac{\text{kJ}}{\text{min}}$$

Problem 1.6. Use the conversion factors to get both values into units of mm per second and then compare the two values for the higher value.

Basic Transport Phenomena In Biomedical Engineering

Basic Transport Phenomena In Biomedical Engineering

Ashim K. Datta



Basic Transport Phenomena In Biomedical Engineering Basic Transport Phenomena In Biomedical Engineering:

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Transport Phenomena Larry A. Glasgow, 2010-12-01 Enables readers to apply transport phenomena principles to solve advanced problems in all areas of engineering and science This book helps readers elevate their understanding of and their ability to apply transport phenomena by introducing a broad range of advanced topics as well as analytical and numerical solution techniques Readers gain the ability to solve complex problems generally not addressed in undergraduate level courses including nonlinear multidimensional transport and transient molecular and convective transport scenarios Avoiding rote memorization the author emphasizes a dual approach to learning in which physical understanding and problem solving capability are developed simultaneously Moreover the author builds both readers interest and knowledge by Demonstrating that transport phenomena are pervasive affecting every aspect of life Offering historical perspectives to enhance readers understanding of current theory and methods Providing numerous examples drawn from a broad range of fields in the physical and life sciences and engineering Contextualizing problems in scenarios so that their rationale and significance are clear This text generally avoids the use of commercial software for problem solutions helping readers cultivate a deeper understanding of how solutions are developed References throughout the text promote further study and encourage the student to contemplate additional topics in transport phenomena Transport Phenomena is written for advanced undergraduates and graduate students in chemical and mechanical engineering Upon mastering the principles and techniques presented in this text all readers will be better able to critically evaluate a broad range of physical phenomena processes and systems across many disciplines

Heat and Mass Transfer Ashim K. Datta, 2017-01-23 This substantially revised text represents a broader based biological engineering title It includes medicine and other applications that are desired in curricula supported by the American Society of Agricultural and Biological Engineers as well as many bioengineering departments in both U S and worldwide departments This new edition will focus on a significant number of biological applications problem solving techniques and solved examples Specifically there will be 160 interesting application problems over an extended biological base biomedical bioenvironmental etc that were originally developed by the author throughout his 13 years of teaching this course at Cornell

Transport and Surface Phenomena Kamil Wichterle, Marek

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