

according to the first law of thermodynamics

According to the First Law of Thermodynamics: A Comprehensive Overview

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Abstract: This article provides a thorough exploration of the First Law of Thermodynamics, explaining its fundamental principles, various interpretations, and widespread applications across diverse scientific and engineering fields. According to the first law of thermodynamics, energy is neither created nor destroyed; it merely changes form. We will examine this principle through different lenses, analyzing its implications for closed, open, and isolated systems, and discussing its relationship with other thermodynamic laws.

1. Introduction: Understanding the First Law of Thermodynamics

According to the first law of thermodynamics, the total energy of an isolated system remains constant over time. This foundational principle, also known as the law of conservation of energy, asserts that energy cannot be created or destroyed, only transformed from one form to another. This seemingly simple statement has profound implications across numerous scientific disciplines, impacting our understanding of everything from the formation of stars to the operation of internal combustion engines. This article will delve into the nuances of this law, exploring its different interpretations and practical applications.

2. Defining the Components: Energy, Work, and Heat

Before delving deeper into the first law, it's crucial to define its key components. According to the first law

of thermodynamics, the internal energy (U) of a system is a state function, meaning its value depends solely on the current state of the system and not on the path taken to reach that state. Internal energy encompasses all forms of energy within the system, including kinetic energy (due to molecular motion), potential energy (due to intermolecular forces), and chemical energy (stored in chemical bonds).

Heat (Q) represents the transfer of energy between a system and its surroundings due to a temperature difference. Positive Q indicates heat transfer into the system, while negative Q signifies heat leaving the system. Work (W) represents energy transfer resulting from a force acting over a distance. Positive W indicates work done on the system, increasing its internal energy, while negative W indicates work done by the system, decreasing its internal energy.

3. Mathematical Expression of the First Law

The first law is mathematically expressed as:

$$\Delta U = Q - W$$

Where:

ΔU is the change in the internal energy of the system.

Q is the heat transferred to the system.

W is the work done by the system.

According to the first law of thermodynamics, this equation highlights the fundamental relationship between internal energy, heat, and work. A positive ΔU indicates an increase in the system's internal energy, while a negative ΔU indicates a decrease. The sign convention used for Q and W is crucial for accurately interpreting the energy changes within the system.

4. Applying the First Law to Different System Types

The application of the first law varies depending on the type of thermodynamic system:

Closed Systems: In a closed system, matter cannot exchange with the surroundings, but energy can.

According to the first law of thermodynamics applied to a closed system, the change in internal energy equals the net heat transfer minus the net work done by the system.

Open Systems: Open systems allow both matter and energy exchange with their surroundings. The first law applied here requires consideration of both enthalpy (a measure of the total heat content of a system) and the flow of matter, making the analysis more complex.

Isolated Systems: Isolated systems are completely sealed off from their surroundings, exchanging neither matter nor energy. According to the first law of thermodynamics for an isolated system, the internal

energy remains constant ($\Delta U = 0$).

5. Implications and Applications of the First Law

According to the first law of thermodynamics, the principle of energy conservation has far-reaching consequences:

Engineering: The design of efficient engines, power plants, and refrigeration systems relies heavily on understanding and applying the first law. Calculations of energy efficiency and losses are based directly on its principles.

Chemistry: Chemical reactions involve energy changes, and the first law helps predict the heat released or absorbed during these processes. Thermochemical calculations are essential in various chemical applications.

Physics: From understanding the behavior of gases to analyzing the processes in stars, the first law is integral to many areas of physics.

Environmental Science: The first law is crucial for analyzing energy flow in ecological systems and assessing the environmental impact of energy production and consumption.

6. Limitations and Extensions of the First Law

While the first law is fundamental, it has limitations:

It doesn't predict the direction of a process. It simply states that energy is conserved, not whether a particular process is spontaneous or not. This is addressed by the Second Law of Thermodynamics.

It doesn't provide information about the rate of energy transfer. The first law deals only with the overall energy balance, not the speed at which energy transformations occur.

7. The First Law and Other Laws of Thermodynamics

The first law is the foundation upon which the other laws of thermodynamics are built. The second law introduces the concept of entropy and dictates the direction of spontaneous processes. The third law deals with the behavior of systems at absolute zero temperature. Understanding the interplay between these laws provides a comprehensive understanding of thermodynamic systems.

8. Conclusion

According to the first law of thermodynamics, the principle of energy conservation is a cornerstone of our understanding of the physical universe. Its application extends across numerous scientific and engineering

fields, providing a framework for analyzing energy transformations in various systems. While it has limitations, its fundamental importance cannot be overstated. Further exploration of the other laws of thermodynamics enhances our ability to predict and manipulate energy transformations effectively.

FAQs

1. What is the difference between heat and work? Heat is energy transfer due to a temperature difference, while work is energy transfer due to a force acting over a distance.
1. Can energy be destroyed according to the first law? No, according to the first law of thermodynamics, energy cannot be destroyed, only transformed.
1. What is an isolated system? An isolated system does not exchange energy or matter with its surroundings.
1. How does the first law relate to chemical reactions? The first law helps determine the heat released or absorbed during chemical reactions (ΔH , enthalpy change).
1. What is internal energy? Internal energy is the total energy stored within a system, encompassing kinetic, potential, and chemical energy.
1. What is enthalpy? Enthalpy is a thermodynamic property representing the total heat content of a system at constant pressure.
1. How is the first law used in engineering? It is crucial for designing efficient engines, power plants, and refrigeration systems.

1. What are the limitations of the first law? It doesn't predict the direction of spontaneous processes or the rate of energy transfer.
1. How does the first law relate to the second law of thermodynamics? The second law addresses the direction of spontaneous processes, a limitation of the first law.

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According to the First Law of Thermodynamics: A Comprehensive Exploration

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Keywords: First law of thermodynamics, energy conservation, internal energy, enthalpy, heat transfer, work, thermodynamic systems, open systems, closed systems, isolated systems, applications of thermodynamics, thermodynamic processes, according to the first law of thermodynamics:, energy balance, system boundary.

Abstract: This article provides a comprehensive exploration of the first law of thermodynamics, its

implications, and its widespread applications across various scientific and engineering disciplines. We will delve into the fundamental principles, mathematical formulations, and diverse methodologies employed in analyzing energy transformations according to the first law of thermodynamics. The discussion includes different system types and their associated considerations, along with practical examples illustrating the law's significance.

1. Introduction: The Foundation of Energy Conservation

According to the first law of thermodynamics, energy cannot be created or destroyed, only transformed from one form to another. This fundamental principle underpins our understanding of energy interactions in physical systems. It states that the total energy of an isolated system remains constant over time. This seemingly simple statement has profound implications, influencing everything from designing efficient power plants to understanding the processes occurring within living cells.

1. Mathematical Formulation: Quantifying Energy Changes

The first law is mathematically expressed as: $\Delta U = Q - W$, where:

ΔU represents the change in the internal energy of the system. Internal energy encompasses all forms of energy within the system, including kinetic and potential energy at the molecular level.

Q represents the heat transferred to or from the system. A positive Q indicates heat added to the system, while a negative Q represents heat leaving the system.

W represents the work done by the system. A positive W indicates work done by the system on its surroundings, and a negative W indicates work done on the system by its surroundings.

According to the first law of thermodynamics, this equation emphasizes the balance between internal energy changes, heat transfer, and work done.

1. Types of Thermodynamic Systems and their Implications

The application of the first law depends critically on the type of thermodynamic system being considered:

Closed Systems: These systems allow heat transfer but not mass transfer across their boundaries. According to the first law of thermodynamics applied to a closed system, the change in internal energy is solely

determined by the net heat transfer and work interaction.

Open Systems: Open systems permit both heat and mass transfer across their boundaries. Analyzing open systems often requires the use of enthalpy (H), which combines internal energy and the product of pressure and volume ($H = U + PV$). According to the first law of thermodynamics for open systems, the energy balance considers enthalpy changes, heat transfer, work, and mass flow.

Isolated Systems: These systems are completely sealed off from their surroundings, preventing both mass and energy exchange. According to the first law of thermodynamics, the internal energy of an isolated system remains constant.

1. Thermodynamic Processes and their Analysis

Various thermodynamic processes are governed by the first law, each characterized by specific conditions:

Isothermal Processes: Occur at constant temperature. According to the first law of thermodynamics, the change in internal energy might be zero if there's no change in temperature and the heat transfer compensates for any work.

Adiabatic Processes: Involve no heat transfer ($Q=0$). According to the first law of thermodynamics, any change in internal energy is solely due to work done.

Isobaric Processes: Occur at constant pressure. In this case, enthalpy changes are particularly relevant. According to the first law of thermodynamics, the heat transfer will often be directly related to the enthalpy change.

Isochoric Processes: Occur at constant volume. In this situation, no work is done ($W=0$) unless there is a change in pressure or volume. According to the first law of thermodynamics, any internal energy change is only due to heat transfer.

1. Applications of the First Law of Thermodynamics:

The first law's versatility is reflected in its extensive applications across multiple fields:

Power Generation: Analyzing the efficiency of power plants (e.g., steam turbines, internal combustion engines) relies heavily on the first law. Understanding energy conversions from heat to mechanical work

is crucial. According to the first law of thermodynamics, the output power can never exceed the input energy.

Refrigeration and Air Conditioning: Designing efficient refrigeration systems involves managing heat transfer and work according to the first law of thermodynamics to achieve cooling effects.

Chemical Engineering: Analyzing chemical reactions and process design demands understanding energy changes based on the first law. According to the first law of thermodynamics, the heat released or absorbed in a reaction can be calculated.

Biological Systems: The first law applies to metabolic processes and energy transfer within organisms. According to the first law of thermodynamics, the total energy within a living system remains constant (though it transforms between chemical, kinetic, and potential energy).

Environmental Science: Understanding energy flow in ecosystems requires application of the first law to analyze energy transfer between trophic levels. According to the first law of thermodynamics, energy is never lost but transformed.

1. Advanced Methodologies:

More advanced approaches for applying the first law include:

Control Volume Analysis: Extending the first law to analyze open systems with mass flow rates.

Thermodynamic Cycles: Analyzing sequences of processes to determine overall efficiency (e.g., Carnot cycle, Rankine cycle).

Computational Fluid Dynamics (CFD): Simulating complex fluid flows and energy transfer using numerical methods.

1. Limitations and Considerations

While the first law provides a fundamental framework, it doesn't address the direction of energy transformations. The second law of thermodynamics is essential to determine spontaneity and the limitations on energy conversion efficiency.

Conclusion:

According to the first law of thermodynamics, energy is conserved in all processes. This seemingly simple principle forms the bedrock of our understanding of energy interactions in the universe. Its applications are remarkably broad, spanning from the design of power plants to the analysis of biological processes. By mastering the principles and methodologies associated with the first law, we gain essential tools for analyzing and optimizing energy systems across diverse fields.

FAQs:

1. What is the difference between internal energy and enthalpy? Internal energy (U) represents the total energy within a system, while enthalpy (H) incorporates the pressure-volume work term ($H = U + PV$) and is particularly useful for open systems.
1. How does the first law apply to adiabatic processes? In adiabatic processes ($Q=0$), any change in internal energy is solely due to work done on or by the system ($\Delta U = -W$).
1. Can the first law be violated? No, the first law is a fundamental principle of physics and has never been observed to be violated.
1. What is the significance of the system boundary in applying the first law? The system boundary defines what is included in the system and what constitutes its surroundings, crucial for correctly accounting for heat and work interactions.
1. How is the first law used in the design of power plants? The first law is used to analyze the efficiency of energy conversion from heat to mechanical work in power plants, maximizing the power output for a given heat input.
1. What is the role of the first law in chemical reactions? The first law helps determine the heat

released or absorbed (enthalpy change) during chemical reactions.

1. How does the first law apply to biological systems? The first law governs energy transformations in metabolic processes, ensuring that the total energy within a biological system remains constant.

1. What are some limitations of the first law? The first law does not predict the direction of a process; the second law is needed for that.

1. How does the first law relate to the concept of entropy? The first law deals with the conservation of energy, while the second law introduces the concept of entropy, which governs the directionality of energy transformations.

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according to the first law of thermodynamics: A Rational Approach To The Bible Aemilius, 2019-11-10 Between mankind and God, there is a secret missing link that humanity has forgotten. This book is the first in a series of books that seeks to explain in great detail the meaning behind the world's most renowned religions as well as the true nature of reality. As children, religion is not provided to us as a system of choice but rather enforced upon us by our parents and peers. It gives us a certain identity and ties us to a certain group of people who hold the same sacred cause while dooming everyone else as profane. We then spend our entire lives defending this religion as it literally dictates our identity, as false as it may be. The child rarely understands his religion as he lacks the proper tools to dissect and analyze it verse by verse. This is the book you wish you had in your childhood as your personal unbiased mentor who sheds light on millennia's endarkened scriptures. The purpose of this book is to help the child as well as the adult to navigate his way

through the bible.

according to the first law of thermodynamics: Mechanical Engineering Solved Papers (2023-24 SSC JE) YCT Expert Team , 2023-24 SSC JE Mechanical Engineering Solved Papers

according to the first law of thermodynamics: *Oswaal JEE Advanced 47 Years' Chapter-wise and Topic-wise Solved Papers, Chemistry (For Exam 2025)* Oswaal Editorial Board, 2024-10-12
Benefits of the product: 100% Updated with Fully Solved 2024 Papers (1 & 2) Extensive Practice with 950+ Questions of Previous Years & 1 Practice Paper each of Paper 1 & 2 Crisp Revision with Revision Notes, Smart Mind Maps, Mnemonics and Appendix Valuable Exam Insights with Expert Tips, Tricks and Shortcuts to Crack JEE (Advanced) Concept Clarity with Extensive Explanations of previous years' papers 100% Exam Readiness with Chapter-wise Analysis (2017-2024)

according to the first law of thermodynamics: 2024-25 SSC JE Mechanical Engineering Solved YCT Expert Team , 2024-25 SSC JE Mechanical Engineering Solved

according to the first law of thermodynamics: *Materials in Machinery, Chemical Production and Civil Engineering* Alan Kin Tak Lau, Omar S. Dahham, Waluyo Adi Siswanto, 2023-02-20 Special topic volume with invited peer-reviewed papers only

according to the first law of thermodynamics: *2024-25 RRB JE Mechanical & Allied Engineering Study Material* YCT Expert Team , 2024-25 RRB JE Mechanical & Allied Engineering Study Material 288 595 E. This book contains study material of electrical engineering with the solutions.

according to the first law of thermodynamics: *DEREK JETER NARAYAN CHANGDER, 2024-05-16 THE DEREK JETER MCQ (MULTIPLE CHOICE QUESTIONS) SERVES AS A VALUABLE RESOURCE FOR INDIVIDUALS AIMING TO DEEPEN THEIR UNDERSTANDING OF VARIOUS COMPETITIVE EXAMS, CLASS TESTS, QUIZ COMPETITIONS, AND SIMILAR ASSESSMENTS. WITH ITS EXTENSIVE COLLECTION OF MCQS, THIS BOOK EMPOWERS YOU TO ASSESS YOUR GRASP OF THE SUBJECT MATTER AND YOUR PROFICIENCY LEVEL. BY ENGAGING WITH THESE MULTIPLE-CHOICE QUESTIONS, YOU CAN IMPROVE YOUR KNOWLEDGE OF THE SUBJECT, IDENTIFY AREAS FOR IMPROVEMENT, AND LAY A SOLID FOUNDATION. DIVE INTO THE DEREK JETER MCQ TO EXPAND YOUR DEREK JETER KNOWLEDGE AND EXCEL IN QUIZ COMPETITIONS, ACADEMIC STUDIES, OR PROFESSIONAL ENDEAVORS. THE ANSWERS TO THE QUESTIONS ARE PROVIDED AT THE END OF EACH PAGE, MAKING IT EASY FOR PARTICIPANTS TO VERIFY THEIR ANSWERS AND PREPARE EFFECTIVELY.*

according to the first law of thermodynamics: HSSC TGT Science Exam Book 2023 (English Edition) | Haryana Staff Selection Commission : Trained Graduate Teacher | 15 Practice Tests (1500 Solved MCQs) EduGorilla Prep Experts, • Best Selling Book in English Edition for HSSC TGT Science Exam with objective-type questions as per the latest syllabus. • HSSC TGT Science Exam Preparation Kit comes with 15 Practice Tests with the best quality content. • Increase your chances of selection by 16X. • HSSC TGT Science Exam Prep Kit comes with well-structured and 100% detailed solutions for all the questions. • Clear exam with good grades using thoroughly Researched Content by experts.

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according to the first law of thermodynamics: **Bihar Sakshamta Pariksha : Physics 2024 | Higher Secondary School Class 11-12 - Niyojit Special Teacher | 10 Practice Tests** EduGorilla Community Pvt. Ltd., • Best Selling Book in English Edition for Bihar Sakshamta Pariksha : Physics 2024 (Higher Secondary School Class 11-12) comes with objective-type questions

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according to the first law of thermodynamics: Engineering Drawing & Basic Science YCT Expert Team , 2023-24 RRB ALP/Technician Stage-II Engineering Drawing & Basic Science

according to the first law of thermodynamics: 33 Years Chapterwise Solutions NEET Physics 2021 Arihant Experts, 2020-11-24 1. 33 Years' Chapterwise Solution NEET Physics" is a collect of all questions of AIPMT & NEET 2. The book covers the entire syllabus of class 11th and 12th in 23 chapters 3. Detailed and authentic solutions are provided for each question for conceptual understanding 4. Important Formulae is given at the end of the book 5. Previous Years' Solved papers are given for practice. Students who are preparing for NEET Exam are often advised to first revise the syllabus of Class 11th and 12th completely before focusing on NEET itself. Here's presenting "33 Years' Chapterwise Solution NEET Physics" a Chapterwise collection of all questions asked in AIPMT & NEET. This book is designed to cover the complete syllabus of both class 11th & 12th under 23 Chapters. Detailed, authentic and explanatory solutions are provided for every question that has been drafted in such a manner that students will surely able to catch the context and understand the concept. Important Formulae are provided at the end for quick revision. Previous years' Solved Papers are given to understand the prescribed pattern and types of questions. With this helpful set of Chapterwise solved papers, students will be ensured to get success in NEET 2020. TABLE OF CONTENT Physical World & Measurement, Motion in One Dimension, Motion in Two and Three Dimension, Laws of Motion, Work, Energy and Power, Rotational Motion, Properties of Matter, Gravitation, Heat and Thermodynamics, Oscillations, Waves, Electrostatics, Current Electricity, Thermal and Chemical Effects of Current, Magnetic Effects of Current, Magnetism, Electromagnetic Induction, Alternating Current and Electromagnetic waves, Optics and Optical Instruments, Electrons and Photons, Atomic Physics, Nuclear Physics, Solids and Semiconductors Devices, Important Formulae, NEET SOLVED Paper 2018, NEET (National) Paper 2019, NEET (Odisha) Paper 2019, NEET Solved Paper 2020.

according to the first law of thermodynamics: 32 Years' Chapterwise Solutions CBSE AIPMT & NEET Physics 2020 Arihant Experts, 2019-07-10 In such high level exams like NEET there are lakhs of aspirants who are enrolling every year to just limited number of seats, so having conceptual knowledge with thorough practice is the only key to success in such examinations. There is a neck to neck competition in every entrance examinations so, the main concern for the students who are preparing is to know the types of questions, important questions, Question paper pattern and styling of the answers that are expected to come in the examination. Keeping this in mind, the current edition of "32 years' chapter wise solution (1988-2019) NEET & AIPMT Physics (one of the major subjects) has been provided with correct solutions, detailed explanatory discussions of the answers and each and every concept accompanied by the important formulae for 23 main chapters. This chapter wise guide of physics give the complete idea of exactly what kind of questions are being asked in the papers of NEET SOLVED PAPER 2018, NEET (NATIONAL) PAPER - 2019, NEET (ODISHA) PAPER - 2019. Thorough practice done from this will guarantee students in getting success in this examination. TABLE OF CONTENT Physical World & Measurement, Motion in One

Dimension, Motion in Two and Three Dimension, Laws of Motion, Work, Energy and Power, Rotational Motion, Properties of Matter, Gravitation, Heat and Thermodynamics, Oscillations, Waves, Electrostatics, Current Electricity, Thermal and Chemical Effects of Current, Magnetic Effects of Current, Magnetism, Electromagnetic Induction, Alternating Current and Electromagnetic waves, Optics and Optical Instruments, Electrons and Photons, Atomic Physics, Nuclear Physics, Solids and Semiconductors Devices, Important Formulae, NEET SOLVED Paper 2018, NEET (National) Paper 2019, NEET (Odisha) Paper 2019.

according to the first law of thermodynamics: Thermodynamics In Nuclear Power Plant Systems Bahman Zohuri, Patrick McDaniel, 2015-04-20 This book covers the fundamentals of thermodynamics required to understand electrical power generation systems, honing in on the application of these principles to nuclear reactor power systems. It includes all the necessary information regarding the fundamental laws to gain a complete understanding and apply them specifically to the challenges of operating nuclear plants. Beginning with definitions of thermodynamic variables such as temperature, pressure and specific volume, the book then explains the laws in detail, focusing on pivotal concepts such as enthalpy and entropy, irreversibility, availability, and Maxwell relations. Specific applications of the fundamentals to Brayton and Rankine cycles for power generation are considered in-depth, in support of the book's core goal- providing an examination of how the thermodynamic principles are applied to the design, operation and safety analysis of current and projected reactor systems. Detailed appendices cover metric and English system units and conversions, detailed steam and gas tables, heat transfer properties, and nuclear reactor system descriptions.

according to the first law of thermodynamics: Self Study Guide for PVT 2022 Arihant Experts, 2021-09-02 1. All India Pre Veterinary Test Entrance Examination is prepared for the entrance of the VET 2. The Guide is divided into 4 main sections 3. Complete Study Material as per prescribed syllabus & Pattern by AIPVT 4. Previous Years' Solved Papers for practice 5. Division of chapters strictly based on the latest syllabus 6. Step by step guidance is provided for better understanding of the concepts To succeed in the AIPVT Examination, grab your copies of "Self Study Guide PVT All India Pre-Veterinary Test" a revised edition that has been prepared exactly on the lines of pattern, Level and syllabi of the exam. Its approach has been kept simple and lucid, presented in a Step-by-Step manner for complete grasp of the content. This guide divides the whole syllabus into 4 major categories and every chapter is provided with ample exercises for practice. Lastly, Previous Years' Papers are incorporated to make students familiar with exact examination pattern and trends. Enough practice done through this book, students will score high with good ranking! TOC AIPVT Solved Paper (2021 -2018), Physics, Chemistry, Botany, Appendix

according to the first law of thermodynamics: 40 Days Crash Course for NEET Physics Arihant Experts, 2021-11-25 1. "NEET in 40 Day" is Best-Selling series for medical entrance preparations 2. This book deals with Physics subject 3. The whole syllabus is divided into day wise learning modules 4. Each day is assigned with 2 exercise; The Foundation Questions & Progressive Questions 5. Unit Tests and Full Length Mock Test papers for practice 6. NEET solved Papers are provided to understand the paper pattern 7. Free online Papers are given for practice 40 Days Physics for NEET serves as a Revision - cum crash course manual that is designed to provide focused and speedy revision. It has been conceived keeping in mind the latest trend of questions according to the level of different types of students. The whole syllabus of physics has been divided into day wise learning module. Each day is assigned with two exercises - Foundation Question exercises - having topically arranged question exercise, and Progressive Question Exercise consists of higher difficult level question. Along with daily exercises, this book provides 8 Unit Test and 3 Full length Mock Tests for the complete practice. At the end of the book, NEET Solved Papers 2021 have been given for thorough practice. TOC Preparing NEET 2022 Physics in 40 Days! Day 1: Physical World and Measurement, Day 2: Kinematics, Day 3: Scalar and Vector, Day 4: Laws of motion, Day 5: Circular Motion, Day 6: Work, Energy and Power, Day 7: System of Particle and Rigid Body, Day 8: Rotational Motion, Day 9: Gravitation, Day 10: Unit Test 1, Day 11: Properties of Matter, Day 12:

Transfer of Heat, Day 13: Behaviour of Perfect Gas and Kinetic Theory, Day 14: Thermodynamics, Day 15: Unit Test 2, Day 16: Oscillations, Day 17: Waves, Day 18: Unit Test 3, Day 19: Electrostatics, Day 20: Current Electricity, Day 21: Unit Test 4, Day 22: Magnetism Effects of Current, Day 23: Magnetism, Day 24: Electromagnetic Induction, Day 25: Alternating Current, Day 26: Electromagnetic Waves, Day 27: Unit Test 5, Day 28: Ray Optics, Day 29: Wave Optics, Day 30: Unit Test 6, Day 31: Matter Waves, Day 32: Photoelectric Effect, Day 33: Atoms and Nuclei, Day 34: Radioactivity, Day 35: Unit Test 7, Day 36: Electronic Devices, Day 37: Unit Test 8, Day 38: Mock Test 1, Day 39: Mock Test 2, Day 40: Mock Test 3, NEET Solved Papers 2019 (National & Odisha), NEET Solved Papers 2020, NEET Solved Paper 2021.

according to the first law of thermodynamics: Competition Science Vision, 2003-02 Competition Science Vision (monthly magazine) is published by Pratiyogita Darpan Group in India and is one of the best Science monthly magazines available for medical entrance examination students in India. Well-qualified professionals of Physics, Chemistry, Zoology and Botany make contributions to this magazine and craft it with focus on providing complete and to-the-point study material for aspiring candidates. The magazine covers General Knowledge, Science and Technology news, Interviews of toppers of examinations, study material of Physics, Chemistry, Zoology and Botany with model papers, reasoning test questions, facts, quiz contest, general awareness and mental ability test in every monthly issue.

according to the first law of thermodynamics: Thermodynamics and Energy Systems Analysis Lucien Borel, Daniel Favrat, Dinh Lan Nguyen, Magdi Batato, 2012-02-02 This book illustrates the basic concepts of phenomenological thermodynamics and how to move from theory to practice by considering problems in the fields of thermodynamics and energy-systems analysis. Many subjects are handled from an energetics or exergistics angle: calorimeters, evaporators, condensers, flow meters, sub or supersonic nozzles, ejectors, compressors, pumps, turbines, combustion processes, heaters, smoke stacks, cooling towers, motors, turbo-reactors, heat pumps, air conditioning, thermo-electrical generators, energy storage, and more.

according to the first law of thermodynamics: 2024-25 NTA NEET Chemistry Solved Papers YCT Expert Team, 2024-25 NTA NEET Chemistry Solved Papers

according to the first law of thermodynamics: Objective NCERT Xtract Physics for NEET/ JEE Main, Class 11/ 12, AIIMS, BITSAT, JIPMER, JEE Advanced 4th Edition Disha Experts, 2019-06-10 The 4th Edition of the book Objective NCERT Xtract - Physics for NEET/ JEE Main, Class 11 & 12, AIIMS, BITSAT consists of Quality Selected MCQs as per current NCERT syllabus covering the entire syllabus of 11th and 12th standard. The most highlighting feature of the book is the inclusion of a lot of new questions created exactly on the pattern of NCERT. • This book-cum-Question Bank spans through 30 chapters. • The book provides a detailed 2 page Concept Map for Quick Revision of the chapter. • This is followed by 3 types of objective exercises 1. Topic-wise Concept Based MCQs 2. NCERT Exemplar & Past JEE Main, BITSAT, NEET & AIIMS Questions 3. 15-20 Challenging Questions in Try If You Can Exercise • Detailed explanations have been provided for all typical MCQs that need conceptual clarity. • The book also includes 5 Mock Tests for Self Assessment. This book assures complete syllabus coverage by means of questions for more or less all significant concepts of Physics. In nutshell this book will act as the BEST PRACTICE & REVISION MATERIAL for all PMT/ PET entrance exams.

Additional Resources

ACCORDING | English meaning - Cambridge Dictionary

ACCORDING definition: 1. present participle of accord 2. to treat someone specially, usually by showing respect: . Learn more.

ACCORDING Synonyms: 81 Similar and Opposite Words - Merriam-Webster

Synonyms for ACCORDING: corresponding, coinciding, conforming, agreeing, fitting, consisting, checking, answering; Antonyms of ACCORDING: differing (from), disagreeing (with), ...

According - definition of according by The Free Dictionary

Define according. according synonyms, according pronunciation, according translation, English dictionary definition of according. v. ac·cord·ed , ac·cord·ing , ac·cords v. tr. 1. To give or ...

ACCORDING Definition & Meaning - Dictionary.com

According definition: agreeing.. See examples of ACCORDING used in a sentence.

What does according mean? - Definitions.net

According is typically used as a preposition to show a relationship or connection between two clauses, phrases, or ideas. It indicates a condition, reason, or consequence for something ...

According Definition & Meaning - YourDictionary

Agreeing; in agreement or harmony; harmonious. This according voice of national wisdom. Present participle of accord. Mind and soul according well. - Alfred Tennyson. Consistently as; ...

according to or according? - TextRanch

Oct 29, 2024 · Both 'according to' and 'according' are correct, but they are used in different contexts. 'According to' is used to introduce a source or reference, while 'according' is used as ...

ACCORDING definition and meaning | Collins English Dictionary

5 meanings: 1. in proportion; in relation 2. on the report (of); as stated (by) 3. in conformity (with); in accordance (with).... Click for more definitions.

According - Definition, Meaning & Synonyms - Vocabulary.com

The term according to can be used to attribute something reported — according to the news, the airports are closed (even though according to your friend, they're still open). It also refers to ...

According vs. Accordingly — What's the Difference?

Apr 5, 2024 · Understanding the distinction between "according" and "accordingly" is crucial for clear and precise communication. "According" helps attribute ideas or facts to their sources, ...

Worksheet #5 The system and surroundings - My Chemistry ...*

The First Law of Thermodynamics The first law of thermodynamics deals with the total amount of energy in the universe. ... According to the first law of thermodynamics, energy can be ...

Chapter 18 – Temperature, Heat and the First Law of ...

First Law of Thermodynamics The first law of thermodynamics relates the change in internal energy to the heat absorbed and the work done by a substance. It is essentially a statement of ...

Ch 19. The First Law of Thermodynamics - UC Davis

the First Law of Thermodynamics Internal energy U : kinetic energies of all constituent particles + potential energies of particle-particle interactions Recall energy change is $Q-W$ Thus $\Delta U = Q-W$...

Biological Thermodynamics - Cambridge University Press

Chapter 2 The First Law of Thermodynamics 25 A. Introduction 25 B. Internal energy 29 C. Work 31 D. The First Law in operation 35 E. Enthalpy 38 F. Standard state 41 G. Some examples from ...

UNIT 8 THE SECOND LAW OF THERMODYNAMICS

about the feasibility and direction of flow of energy. According to the first law of thermodynamics, all processes in which energy is conserved are possible. For example, if a cup of hot tea is left on ...

UNIT – I –Engineering Thermodynamics– SMEA1302

It violates the First law of Thermodynamics and hence it is impossible. ... According the law of conservation of mass, the mass flow rate entering must equal to the mass flow rate leaving. ie. m ...

The First Law of Thermodynamics - University of Babylon

First Law of Thermodynamics • 1st Law of Thermodynamics is a statement about conservation of energy and it categorizes the method of energy transfer into two basic forms: work (W) and heat ...

Creationism and the Second Law of Thermodynamics

the SLT is a law of divergence; its complement is a law of convergence.” [13] In other words, the SLT has a complementary law that works in reverse when the universe is assumed to be infinite. ...

Microsoft PowerPoint - 10.2 Second Law of ...

Second Law of Thermodynamics 10.2 ... The reversal of an irreversible process is improbable (even though it may be possible according to the First Law of Thermodynamics) Entropy Heat Entropy ...

The First Law of Thermodynamics for Open Systems: ...

Therefore, for an open, simple system, the differential form of the First Law of Thermodynamics can be written as follows: $dU = \delta Q - \delta W$ Generalizing to multiple entering (in) and leaving ...

Thermodynamics Notes - University of Utah

First law of thermodynamics This is the law of conservation of energy for a thermo-dynamic system. Second law of thermodynamics This law specifies the direction in which heat (molecular kinetic ...

Page 1 Subject code: ME3391 of 15 - PIE Tech

According to first law of thermodynamics heat and work are mutually convertible during any cycle of a closed system. But this law does not specify the possible conditions under which the heat is ...

Chapter 1 Classical Thermodynamics: The First Law

1.4 First law for cycles 1.5 Reversible processes 1.6 Work 1.7 The zeroth law and temperature 1.1 Classical Thermodynamics: 1st law ... The first law of thermodynamics is a statement of energy ...

Chapter 20: (REVIEW) Heat Engines - hep.vanderbilt.edu

The First Law of Thermodynamics states the equivalence of all forms of energy, and the equivalence of heat and work as different forms of energy which must be conserved. In principle, according ...

LECTURE SEVEN// SECOND LAW OF THERMODYNAMIC

Statements of Second Law of Thermodynamics 3. Important Terms 4. Equivalent of the two statements 5. Carnot Cycle (Carnot Heat Engine) 6. Reverse Carnot Cycle (Carnot Refrigeration) ...

Ch 19. The First Law of Thermodynamics - UC Davis

the First Law of Thermodynamics Internal energy U : kinetic energies of all constituent particles + potential energies of particle-particle interactions Recall energy change is $Q-W$ Thus $\Delta U = Q-W$...

The First Law of Thermodynamics - Springer

2 The First Law of Thermodynamics 2.1 The Principle of Conservation of Energy In mechanics, the principle of the conservation of energy is applied to two types of energy which occur in the ...

Engineering Thermodynamics 2 Marks Question and Answers ...

Define Zeroth law and first law of thermodynamics. (Nov/ Dec 2017) (April/May 2017) Zeroth law of thermodynamics states that when two systems are separately in thermal equilibrium with a third ...

Law of Thermodynamics-1 - Langat Singh College

The First Law of Thermodynamics: The first law is concerned with the conversion of energy within a "system," where a system is defined as a body (e.g., a cell or an ... According to the first law, ...

First Law of Thermodynamics

Transient Processes: First Law of Thermodynamics First Law of Thermodynamics: Transient Analysis $dE_{CV} = \delta Q - \delta W_{cv} + \sum \dot{m}_i h_i + \sum \dot{m}_i \frac{V_i^2}{2} + \sum \dot{m}_i gz_i - \sum \dot{m}_e h_e - \sum \dot{m}_e \frac{V_e^2}{2} - \sum \dot{m}_e gz_e$ $R \int_0^t dE_{CV}$

first law of thermodynamics - Michigan State University

The second law suggests that all processes tend towards greater total multiplicity and entropy and at constant temperature and pressure: $dS_{tot} = dS_{sys} + dS_{bath} \geq 0$ $TdS_{tot} = TdS_{sys} + TdS_{bath} \geq 0$...

Chapter 20 – First Law of Thermodynamics - University of ...

First Law of Thermodynamics The first law of thermodynamics relates the change in internal energy to the heat absorbed and the work done on a substance. It is essentially a statement of ...

8.044 Lecture Notes Chapter 3: Thermodynamics, rst pass

Chapter 3: Thermodynamics, rst pass Lecturer: McGreevy Reading: CJ Adkins, Equilibrium Thermodynamics, Chapters 1, 2, 3.1-3.7. Skip Adkins x3.5.4. R Baierlein, Thermal Physics, ...

NCERT Solutions for Class 11 Chemistry - Vedantu

-Thermodynamics NCERT Exercise 1. Choose the correct answer. A thermodynamic state function is a quantity a. used to determine heat changes b. whose value is independent of path c. used to ...

Thermodynamics: The First Law - University of Michigan

The First Law of Thermodynamics: Internal Energy is Conserved $\Delta U = 0$ For an Isolated System $\Delta U = q + w$ For a Closed System • The change in internal energy (ΔU) of a closed system is equal to ...

Chapter 19 The First Law of Thermodynamics

$Q = \Delta U + W$ (1st law of thermodynamics) (2) where ΔU is the change in internal energy, and W is the work done by the system. Another way of looking at the 1st law of thermodynamics is to rewrite ...

Thermodynamics - 2023 A2 Physics 9702 1.

The first law of thermodynamics may be expressed as Use the first law of thermodynamics to explain why the temperature of the helium gas increases. [2] (b) A fixed amount of helium gas is ...

PART 1 THE SECOND LAW OF THERMODYNAMICS - MIT ...

The first of these represents the conversion of work into heat. The second, which is much more useful, concerns the conversion of heat into work. The question we will pose is how efficient can ...

The Form of Magnetic Work in a Fundamental Thermodynamic ...

these." And according to Kittel,² "A great deal of unnecessary confusion exists as to how to write the First Law of Thermodynamics for a magnetic system." For a paramagnetic crystal in a uniform ...

First Law of Thermodynamics: Closed Systems

First Law of Thermodynamics: Closed Systems Problem 3-73 A 0.3-m³ tank contains oxygen initially at 100 kPa and 27°C. A paddle ... According to the ideal gas equation, $PV = mRT$ From the ...

Self-Study

law that establishes temperature as a valid concept should have the lowest number. Hence, it is called zeroth law. First Law of Thermodynamics The first law of thermodynamics is a statement ...

{The First Law of Thermodynamics for Closed Systems}

radiation. However, when solving problems in thermodynamics involving heat transfer to a system, the heat transfer is usually given or is calculated by applying the first law, or the conservation of ...

Assignment no 3 - HCC Learning Web

each process as (a) possible, (b) impossible according to the first law of thermodynamics, (c) impossible according to the second law of thermodynamics, or (d) impossible according to both ...

Introduction to Chemical Thermodynamics - University of ...

Introduction to Chemical Thermodynamics D. E. Manolopoulos First Year (13 Lectures) Michaelmas Term A. EQUILIBRIUM AND SPONTANEOUS CHANGE According to the first law of ...

Thermodynamics Heat & Work The First Law of ...

Applying the 1st Law & P-V diagrams questions The figure shows four paths on a p-V diagram along which a gas can be taken from state i to state f. Rank the paths, greatest to least, according to ...

Thermodynamics third law - Binghamton University

Sep 17, 2017 · who is known for his work in thermodynamics; his formulation of the Nernst heat theorem helped pave the way for the third law of thermodynamics, for which he won the 1920 ...

Lecture 5: Thermodynamics - Scholars at Harvard

2Heat Say we have two systems with different temperatures T_1 and T_2 , energies E_1 and E_2 and numbers of particles N_1 and N_2 . The number of microstates of each is $\Omega_1(N_1; E_1)$ and $\Omega_2(N_2; E_2)$ and their ...

Sadi Carnot, 'Founder of the Second Law of Thermodynamics'

First Law of Thermodynamics. The *Réflexions*, which had made so small a stir on its original publication in 1824, was republished in 1878 in a new edition [2], which also contained a letter ...

UNIT – I -Chemical Engineering Thermodynamics-I– SCHA1202

Basic Concepts and First Law of Thermodynamics Thermodynamics is: • the science of heat and work and related properties • the basic science that deals with energy ... According to Hooke's ...

According To The First Law Of Thermodynamics Energy ...

According To The First Law Of Thermodynamics Energy ... web smarter balanced vocabulary flashcards learn test match flashcards learn test match created by mrmankofsky first 17 tier 2 ...

An Introduction to ENGINEERING THERMODYNAMICS

The first law of thermodynamics is a version of the law of conservation of energy, adapted for thermodynamic processes, distinguishing two kinds of transfer of energy, as heat and as ...

Chapter 22

First Law of Thermodynamics – Review The first law is a statement of Conservation of Energy. The first law states that a change in internal energy in a system can occur as a result of energy ...

THERMODYNAMICS AND BIOLOGICAL SYSTEMS - EOLSS

energy that is available under reversible condition is known as 'exergy.' The first law of thermodynamics shows the interactions between internal energy, heat and work, and states that ...

FIRST LAW OF THERMODYNAMICS: CONSERVATION OF ...

First Law of Thermodynamics (VW, S & B: 2.6) A. There exists for every system a property called energy . E = internal energy (arising from molecular motion - primarily a function of temperature) ...

Chapter 2 Classical Thermodynamics: The Second Law

2.2 The second law of thermodynamics There are 2 different (seemingly) statements, both generalized from everyday experience: (1) Kelvin-Planck statement: It is impossible to construct ...

ENGINEERING THERMODYNAMICS (ME3391) - RVSTCC

Thermal equilibrium- Zeroth law – Concept of temperature and Temperature Scales. First law – application to closed and open systems – steady and unsteady flow processes. UNIT II SECOND ...

The first law of thermodynamics states that energy can be transferred or ... •According to the first law of thermodynamics, the total amount of energy in the universe is constant. •Energy can be ...

First Law of Thermodynamics - MSubbu

First Law of Thermodynamics ... According to this convention heat and work are both taken as positive when their direction is into the system of interest. • In my opinion the second convention ...

Thermodynamics, the First Law: the concepts

If we consider the moving atom, according to the equipartition theorem, the average energy of each term in the expression for kinetic energy is $(1/2)kT$. Therefore, the mean ... First Law of ...

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