

Thermochem and Collision theory Study Guide

What is enthalpy? (define it and indicate its symbol)

heat content of a reaction or process. H

What is thermochemistry?

Study of heat (E) changes of a reaction

What is an exothermic reaction?

a reaction that gives off heat

Explain why an exothermic reaction have a negative enthalpy change?

b/c reactants lose heat to become products. (The overall ΔH is negative)

What is an endothermic reaction?

a reaction that absorbs heat

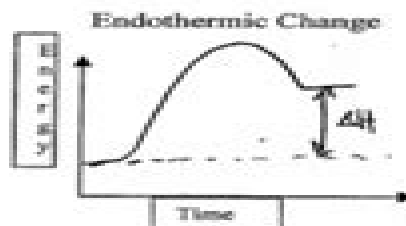
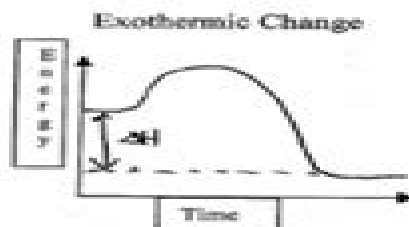
Explain why an endothermic reaction have a positive enthalpy change?

b/c reactants absorb heat to become products (The overall ΔH is +)

Complete the following chart:

Type of Reaction	Sign of ΔH_{rxn}	Which has more energy: reactants or products?	What temperature change would you see?
Exothermic	-	Reactants	Temp would $\uparrow$
Endothermic	+	Products	Temp. would $\downarrow$

Make enthalpy diagrams for the two chemical reactions from above, showing clearly the amount of energy released or gained.



Does the energy go from the surrounding to the chemicals or from the chemicals to the surroundings in an exothermic reaction? from chemicals to surroundings

Does the energy go from the surrounding to the chemicals or from the chemicals to the surroundings in an endothermic reaction? from surroundings to chemicals

Classify each of the following as an exothermic or endothermic process.

Melting ice cubes endothermic

Burning a candle exothermic

Evaporation of water endothermic

Baking Bread endothermic

Splitting a gas molecule apart endothermic (breaking bond!)

Formation of snow in clouds exothermic (freezing!)

What type of reactions are the following based on the enthalpy?

$C + H_2O \rightarrow CO + H_2$ $\Delta H_{rxn} = +113 \text{ kJ}$ endothermic

$2H_2O_2 \rightarrow 2H_2O + O_2$ $\Delta H = -190 \text{ kJ}$ exothermic

$6CO_2 + 6H_2O + 2803 \text{ kJ} \rightarrow C_6H_{12}O_6 + 6O_2$ endothermic

$3NO_2 + H_2O \rightarrow 2HNO_3 + NO + 138 \text{ kJ}$ exothermic

$P_4 + 5O_2 \rightarrow 3013 \text{ kJ} + P_4O_{10}$ exothermic

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Thermodynamics Stephen R. Turns,Laura L. Pauley,2020-02-27 Fully revised to match the more traditional sequence of course materials this full color second edition presents the basic principles and methods of thermodynamics using a clear and engaging style and a wealth of end of chapter problems It includes five new chapters on topics such as mixtures psychrometry chemical equilibrium and combustion and discussion of the Second Law of Thermodynamics has been expanded and divided into two chapters allowing instructors to introduce the topic using either the cycle analysis in Chapter 6 or the definition of entropy in Chapter 7 Online ancillaries including new LMS testbanks a password protected solutions manual prepared PowerPoint lecture slides instructional videos and figures in electronic format are available at www.cambridge.org/thermo

Thermodynamics Earl Logan,1999 Examining practical hands on applications in large scale industrial settings this work

covers the principles of the science of thermodynamics It presents applications for power plants refrigeration and air conditioning systems and turbomachinery Solutions manual available

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Jean-Pierre Nadeau,Xavier Fischer,2011-04-23 This book provides an accurate overview of the recent research or industrial application in interactive design The different arguments taken from the international conference Virtual Concept 2005 will provide the reader with some advanced solutions concerning new methods and tools by discussing modelling techniques design solution space exploration and interactive process organization

The Future of Heritage Science and Technologies

Rocco Furferi,Kate Seymour,Anna Pelagotti,2025-05-03 This book features selected contributions from Florence Heri Tech 2024 showcasing cutting edge technologies for the analysis conservation and restoration of cultural heritage It explores advancements in materials science including nanotechnology and plasma based restoration as well as innovative diagnostic methods The book provides insights into biotechnology tailored materials and novel physical techniques offering a comprehensive overview of emerging trends in heritage preservation

Modeling the Material Behavior under Metal Cutting Conditions Marvin Hardt,2022-03-16 The scientific goal of the present work was to model the workpiece material behavior of steels in the metal cutting process depending on the occurring thermo mechanical loads The results of this work shall make a significant contribution to the predictive process design of the cutting process by means of Finite Element FE simulations for the virtual representation of the reality in the sense of the digital twin To achieve the objective extensive empirical examinations were conducted in a first step which included conventional material scientific and orthogonal cutting tests This enabled the establishment of a database of the workpiece response with increasing thermo mechanical loads During the orthogonal cutting examinations integral and locally resolved process results were measured which were used as calibration and validation variables in the modeling of the workpiece material behavior By extending an established friction test bench with a workpiece pre heating system the friction conditions between tool and workpiece could be investigated under conditions equivalent to the cutting process Based on the experimental results a friction model was derived in which the observed effects of thermal softening and the localized adhesion induced increase in the apparent friction coefficient were superposed A phenomenological material model was developed to describe the workpiece material behavior in the cutting process The formulation of the material mode was developed based on empirical examinations as well as results from the state of the art The material model was implemented in an FE chip formation simulation using a subroutine A hybrid optimization algorithm was developed to inversely determine the material model parameters By means of the optimization algorithm the material model parameters could be systematically determined inversely taking the experimentally determined process observables into account An automated procedure linked to a user interface lowered the entry hurdle for industrial companies and unexperienced users of FE simulations and reduced the computational effort for the inverse parameter determination to about 10 days of computational execution time The quality of the developed models

and the determined model parameters were further verified by a final deduction step using the industrial example of face turning

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 - The Rise of Digital Reading Thermo Study Guide Key
 - Advantages of eBooks Over Traditional Books
2. Identifying Thermo Study Guide Key
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Thermo Study Guide Key
 - User-Friendly Interface
4. Exploring eBook Recommendations from Thermo Study Guide Key
 - Personalized Recommendations
 - Thermo Study Guide Key User Reviews and Ratings
 - Thermo Study Guide Key and Bestseller Lists
5. Accessing Thermo Study Guide Key Free and Paid eBooks
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 - Highlighting and Note-Taking Thermo Study Guide Key
 - Interactive Elements Thermo Study Guide Key
8. Staying Engaged with Thermo Study Guide Key
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Thermo Study Guide Key
9. Balancing eBooks and Physical Books Thermo Study Guide Key
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Thermo Study Guide Key
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Thermo Study Guide Key
 - Setting Reading Goals Thermo Study Guide Key
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Thermo Study Guide Key
 - Fact-Checking eBook Content of Thermo Study Guide Key
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
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 - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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