

Bond Energy

Chem Worksheet 16-2

Name _____

Bond energy is defined as the amount of energy required to break a bond. These values are positive, indicating that bond breaking is endothermic. Bond energies are reported in kilojoules per mole (kJ/mol). The energy for breaking a hydrogen-hydrogen bond is 436 kJ/mol so when a hydrogen-hydrogen bond is formed the process releases 436 kJ/mol.

In a chemical reaction several bonds are broken and formed. For example in the reaction below a hydrogen-hydrogen bond is broken and a fluorine-fluorine bond is broken. Two hydrogen-fluorine bonds are formed. The overall energy change for this process is calculated below.

example



$$\begin{aligned}\Delta H_{\text{rxn}} &= [\text{energy used for breaking bonds}] - [\text{energy formed in making bonds}] \\ &= [436 \text{ kJ/mol} + 155 \text{ kJ/mol}] - [2(567 \text{ kJ/mol})] \\ &= -543 \text{ kJ/mol}\end{aligned}$$



Bond energy: 436 kJ/mol



Bond Energy: 155 kJ/mol



Bond Energy: 567 kJ/mol

Average Bond Energies (kJ/mol)

H-H	436 kJ/mol	C-H	413 kJ/mol	C=C	614 kJ/mol
H-Cl	431 kJ/mol	C-C	348 kJ/mol	C≡C	839 kJ/mol
H-F	567 kJ/mol	C-N	293 kJ/mol	C=O	799 kJ/mol
N-H	391 kJ/mol	C-O	358 kJ/mol	O=O	495 kJ/mol
N-O	201 kJ/mol	C-F	485 kJ/mol	C=O	1072 kJ/mol
O-H	463 kJ/mol	C-Cl	328 kJ/mol	C=N	615 kJ/mol
O-O	146 kJ/mol	C-S	259 kJ/mol	N=N	418 kJ/mol
F-F	155 kJ/mol	Cl-Cl	242 kJ/mol	N≡N	941 kJ/mol
				C≡N	891 kJ/mol

Estimate the enthalpy change (ΔH_{rxn}) of the following reactions using the bond energies above.



Draw Lewis structures for reactants and products. Estimate the enthalpy change (ΔH_{rxn}) for the reactions using bond energies.



Bond Energy Extension Questions

Eileen Ramsden

A red circular graphic with a gradient, appearing as a semi-circle or a partial circle, located to the right of the author's name.

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Chemistry Extension File Eileen Ramsden, 2002 This chemistry extension file includes teaching notes guidance on coursework activities and equipment It has at least one assignment for each topic in the textbooks suitable for classwork and homework A comprehensive range of practical activities are included It contains extensive Key Skills and ICT materials An exam file resource containing a complete set of exam style questions in a format that can be used throughout Years 10 and 11 or as a resource for a revision programme is included **Objective Question Bank in Chemistry** B.K. Sharma, 1997

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The large number of references to all significant topics mentioned should make this book useful not only to undergraduates but also to graduate students and academic and industrial researchers

Chemistry of Chemical Bonding R. K. Sharma, 2007 Chemistry For B.Sc. Students Semester I | Inorganic Chemistry | Organic Chemistry - NEP 2020

Maharashtra Ravin M Jugade, Vijay M Tangde, This textbook is designed specifically for the B Sc Chemistry curriculum under the National Education Policy NEP in Maharashtra provides a comprehensive and solid foundation of the subject The chapters have been meticulously selected and structured to align with the educational objectives of fostering analytical thinking enhancing problem solving skills and cultivating a deep understanding of fundamental chemistry More than just a collection of theoretical concepts this textbook encourages students to apply these principles Through a wealth of examples and problems the students are guided to develop a practical and profound understanding of chemistry preparing them for future academic and professional pursuits Whether you are a student aiming to excel in your studies or an educator seeking a reliable resource this textbook is an indispensable tool on the journey to mastering the fascinating world of chemistry

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Some Thermodynamic Aspects of Inorganic Chemistry D. A.

Johnson,1982-02-25 An important part of inorganic chemistry is the study of the behaviour of chemical elements and their compounds If this behaviour is to be explained with any confidence it needs first to be described in quantitative language Thermodynamics provides such a language and Dr Johnson s 1982 book is concerned with the theoretical explanations that become possible after the translation into thermodynamic language has taken place This book will continue to be of interest to advanced undergraduate and postgraduate students of chemistry as well as teachers of chemistry in both schools and universities **CUET PG Chemistry - Question Bank (2400 MCQs Chapterwise)** Mocktime Publication, 2400 MCQs CUET PG Question Bank Chemistry CUEG PG Previous Papers CUET PG Syllabus CUET PG Exam Pattern **IIT Chemistry-II ,**

Polymer Mechanochemistry Roman Boulatov,2015-10-17 The series Topics in Current Chemistry presents critical reviews of the present and future trends in modern chemical research The scope of coverage is all areas of chemical science including the interfaces with related disciplines such as biology medicine and materials science The goal of each thematic volume is to give the non specialist reader whether in academia or industry a comprehensive insight into an area where new research is emerging which is of interest to a larger scientific audience Each review within the volume critically surveys one aspect of that topic and places it within the context of the volume as a whole The most significant developments of the last 5 to 10 years are presented using selected examples to illustrate the principles discussed The coverage is not intended to be an exhaustive summary of the field or include large quantities of data but should rather be conceptual concentrating on the methodological thinking that will allow the non specialist reader to understand the information presented Contributions also offer an outlook on potential future developments in the field Review articles for the individual volumes are invited by the volume editors Readership research chemists at universities or in industry graduate students **Introduction to**

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Adhesive Bonding L.H. Lee,2013-06-29 For several years I have been responsible for organizing and teaching in the fall a short course on Fundamentals of Adhesion Theory Practice and Applications at the State University of New York at New Paltz Every spring I would try to assemble the most pertinent subjects and line up several capable lecturers for the course However there has always been one thing missing an authoritative book that covers most aspects of adhesion and adhesive bonding Such a book would be used by the participants as a main reference throughout the course and kept as a sourcebook after the course had been completed On the other hand this book could not be one of those All you want to know about volumes simply because adhesion is an interdisciplinary and ever growing field For the same reason it would be very difficult for a single individual especially me to undertake the task of writing such a book Thus I relied on the principle that one leaves the truly monumental jobs to experts and I finally succeeded in asking several leading scientists in the field of adhesion to write separate chapters for this collection Some chapters emphasize theoretical concepts and others experimental techniques In the humble beginning we planned to include only twelve chapters However we soon realized that such a plan would leave too much ground uncovered and we resolved to increase the coverage After the book had evolved into thirty chapters we started to feel that perhaps our mission had been accomplished *Atomic Industry Reporter* ,1959

High Entropy Materials Krishanu Biswas,Nilesh Prakash Gurao,Tanmoy Maiti,Rajiv S. Mishra,2022-11-22 This book provides a detailed overview of high entropy materials and alloys discussing their structure the processing of bulk and nanostructured alloys as well as their mechanical and functional properties and applications It covers the exponential growth in research which has occurred over the last decade discussing novel processing techniques estimation of mechanical functional and physical properties and utility of these novel materials for various applications Given the expanding scope of HEAs in ceramics polymers thin films and coating this book will be of interest to material scientists and engineers alike

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