

Bond Energy

What makes a reaction endothermic or exothermic?

Why?

Chemical reactions can be a lot like playing with Legos®—you must take apart part of your last creation before you can replace it with something new. For many chemical reactions, we have to first break bonds in the reactants before we can put the atoms back into a new arrangement to form the products. Both of these processes involve changes in energy. The net energy change for a reaction is called the **heat of reaction** or the **change in enthalpy** (ΔH). In this activity we will look at one way energy changes can be approximated for chemical reactions.

Model 1 – Breaking and Forming Bonds

	Reaction	Change in Energy (kJ/mol _{rxn})		Reaction	Change in Energy (kJ/mol _{rxn})
A)	$\text{PCl}_3(\text{g}) \rightarrow \text{P}(\text{g}) + 3\text{Cl}(\text{g})$	+ 966.7 <i>broken</i>	E)	$\text{P}(\text{g}) + 3\text{Cl}(\text{g}) \rightarrow \text{PCl}_3(\text{g})$	- 966.7 <i>formed</i>
B)	$\text{PCl}_5(\text{g}) \rightarrow \text{P}(\text{g}) + 5\text{Cl}(\text{g})$	+ 1,297.9 <i>broken</i>	F)	$\text{P}(\text{g}) + 5\text{Cl}(\text{g}) \rightarrow \text{PCl}_5(\text{g})$	- 1,297.9 <i>formed</i>
C)	$\text{PF}_3(\text{g}) \rightarrow \text{P}(\text{g}) + 3\text{F}(\text{g})$	+ 1,470.4 <i>broken</i>	G)	$\text{P}(\text{g}) + 3\text{F}(\text{g}) \rightarrow \text{PF}_3(\text{g})$	- 1,470.4 <i>formed</i>
D)	$\text{PF}_5(\text{g}) \rightarrow \text{P}(\text{g}) + 5\text{F}(\text{g})$	+ 2,305.4 <i>broken</i>	H)	$\text{P}(\text{g}) + 5\text{F}(\text{g}) \rightarrow \text{PF}_5(\text{g})$	- 2,305.4 <i>formed</i>

- Identify four reactions in Model 1 where bonds are being broken. Write "broken" in the Change in Energy box in the table for each reaction you identify.
- Identify four reactions in Model 1 where bonds are being formed. Write "formed" in the Change in Energy box in the table for each reaction you identify.
- Circle the correct word to complete each sentence below.
 - When bonds are (broken/formed) there is a positive energy change.
 - Breaking bonds is (endothermic/exothermic).
 - When bonds are (broken/formed) there is a negative energy change.
 - Forming bonds is (endothermic/exothermic).
- Find two reactions in Model 1 that are exact opposites of each other, that is, one reaction is the reverse of the other reaction.

- How do the changes in energy for the reverse reactions compare?

The changes in energy for these reactions are the same, but opposite in sign.

- Explain your answer to part a considering what you learned from Questions 1–3 about bond breaking and bond formation.

If a given amount of energy is required to break a bond, then the same amount of energy will be released when the bond is formed.

Bond Energy The Activity Series Answer Key

**Carla C. Johnson, Janet B. Walton, Erin
E. Peters-Burton**



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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 Dynamic Response and Failure of Composite Materials Valentina Lopresto, Ilaria Papa, 2024-12-21 This book gathers the latest advances and innovations in the field of dynamic loads and testing of composite materials and sandwich structures as presented by international researchers and engineers at the 5th International Symposium on Dynamic Response and Failure of Composite Materials DRAF held in Ischia Italy on June 17 21 2024 Contributions include a wide range of topics such as low and high velocity impacts smart composites hull slamming shock and blast hail and bird impact damage resistance and tolerance failure mechanisms composite structures delamination and fractures progressive damage modeling micromechanics ballistic impacts ceramic and CMC auxetic materials and structures additive manufacturing crashworthiness green composites and structural health monitoring *Publications of the National Institute of Standards and Technology ... Catalog* National Institute of Standards and Technology (U.S.), 1971 Publications of the National Bureau of Standards ... Catalog United States. National Bureau of Standards, 1972 **Lakhmir Singh's Science Chemistry for ICSE Class 8** Lakhmir Singh & Manjit Kaur, Series of books for class 1 to 8 for ICSE schools The main goal that this series aspires to accomplish is to help students understand difficult scientific concepts in a simple manner and in an easy language **NBS Special Publication** ,1976 **Human Biology: Breathing** Craig H. Heller, 1999 **AQA Smart GCSE Chemistry: AQA Smart GCSE Chemistry Teacher Handbook** Kristy Turner, 2025-09-11 This AQA GCSE Chemistry Teacher Handbook ebook edition has been brought right up to date to meet the needs of today's science teachers Subject and non subject specialists can be confident that this guide gives them what they need to pick up and teach GCSE Chemistry lessons that will have a lasting impact on their students This book is full of clear guidance and explanations including topic overviews common misconceptions key terminology and ideas to help you to relate the content to relevant contexts and students experiences Drawing on insights from current research evidence informed teaching strategies support your professional development Use this along with the Biology and Physics AQA GCSE Science Teacher Handbooks as well as the matching Student Books A print version of this book 9781382051453 is also available to buy separately **Energy Efficiency Analysis and Intelligent Optimization of Process Industry** Zhiqiang Geng, Xiang Zhang, Yongming Han, Xingxing Zhang, 2023-10-09 *Oxford Resources for IB Diploma Programme: IB Prepared: Chemistry 2023 Edition eBook* Sergey Bylikin, 2024-12-12 Please note this title is suitable for any student studying Exam Board International Baccalaureate Level and subject Diploma Programme Chemistry First teaching 2023 First exams 2025 IB Prepared resources are developed directly with the IB to provide the most up to date authentic and authoritative guidance on DP assessment IB Prepared Chemistry 2023 edition combines a concise review of course content with strategic guidance past paper material and exam style practice opportunities allowing learners to consolidate the knowledge and skills that are essential to success

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In a digital era where connections and knowledge reign supreme, the enchanting power of language has been apparent than ever. Its ability to stir emotions, provoke thought, and instigate transformation is truly remarkable. This extraordinary book, aptly titled "**Bond Energy The Activity Series Answer Key**," published by a very acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound effect on our existence. Throughout this critique, we shall delve into the book's central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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