

# Bond Energy and the Types of Reactions

## Homework – Teacher’s Edition

### 1. Draw a line between term and its correct definition:

Definitions	Key Terms
1. The amount of energy required to break the chemical bonds in the reactants compared to the amount required to form them in the products	a) Thermochemistry
2. The average kinetic energy possessed by the molecules of a substance	b) Bond length
3. Energy released when new bonds form.	c) Bond energy
4. The total energy of molecular motion in a substance	d) Bond order
5. Energy absorbed when the bonds in the reactants break	e) Temperature
6. The distance between the nuclei of the atoms at the minimum point of energy	f) Thermal (heat) energy
7. The area of chemistry that focuses on the amount of heat absorbed or released in a chemical reaction	g) Balance of energy
8. The number of electron pairs shared by two atoms	h) Endothermic process
9. The energy required to break a bond.	i) Exothermic process

### 2. Watch the following clip [https://www.youtube.com/watch?v=I9jd1Ew\\_YGU](https://www.youtube.com/watch?v=I9jd1Ew_YGU) on bond length and bond energy and use it to answer the questions which follow:

- What is the source of the attractive force between two atoms?
- What is negative bond energy? Where is it found?
- How is bond energy related to bond strength?

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- d) How is bond order related to bond strength?
- e) How does bond length affect bond strength?
- f) Sketch a graph to show the relationship between the distance between atoms, bond length and bond strength.
- g) How does bond length affect bond energy?
- h) Order the following bonds in by increasing order of length  
N-N, N=N, N≡N
- i) Order the following bonds by decreasing order of bond energy  
C-C, C=C, C≡C

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Answer Key:

1. g	2. e	3. i	4. f	5. h	6. b	7. a	8. d	9. c
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- What is the source of the attractive force between two atoms?  
The attraction between the electrons from one atom for the protons of the other
- What is negative bond energy? Where is it found?  
Energy being released, when a bond is formed.
- How is bond energy related to bond strength?  
Increasing the bond energy increases the bond strength

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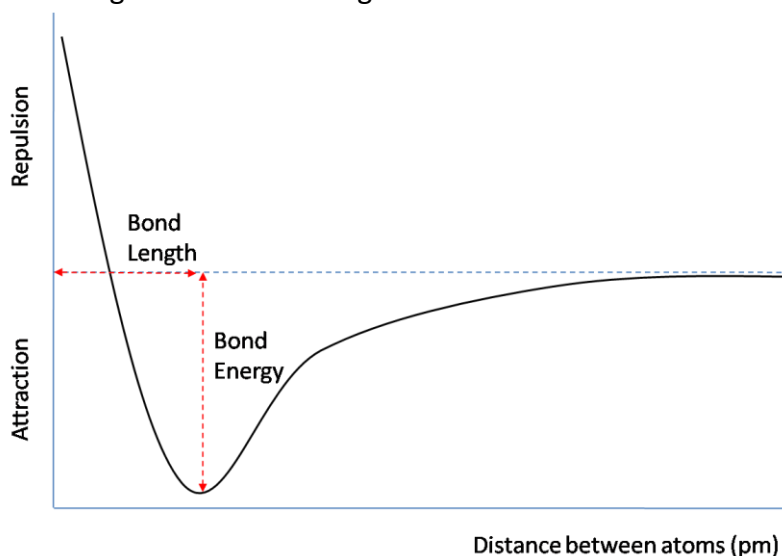
d) How is bond order related to bond strength?

Bond order (number of electrons involved in the bond), higher the bond order the greater the bond strength

e) How does bond length affect bond strength?

The shorter the bond length the greater the bond strength

f) Sketch a graph to show the relationship between the distance between atoms, bond length and bond strength.



g) How does bond length affect bond energy?

The shorter the bond length, the more overlap there is between the atoms and the higher the bond energy.

h) Order the following bonds in by increasing order of length

N-N, N=N, N≡N

(Shortest) N≡N < N=N < N-N (longest)

i) Order the following bonds by decreasing order of bond energy

C-C, C=C, C≡C

C≡C > C=C > C-C