Report on the Evaluation of Chapter 14 More Polyatomic Molecules And Hydrocarbons in "The Grand Unified Theory of Classical Physics" by Dr. Randell L. Mills

Prepared by

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Executive Summary

In my analysis, I verified calculations and equations involving the CO_2 carbon dioxide molecule, the C_2H_6 ethane molecule, and the hydrocarbon molecules Propane, Butane, Pentane, Hexane, Heptane, Octane, Nonane, Decane, Undecane, Dodecane, and Octadecane found in Chapter 14 More Polyatomic Molecules and Hydrocarbons of the book "The Grand Unified Theory of Classical Physics" by Dr. Randell L. Mills. I verified equations and values to a high degree of accuracy that are associated with these molecular systems. There is a remarkable agreement between the GUTCP calculated values for the energies, bond distances, and bond angles of these molecular systems and experimental values of those corresponding quantities.

Purpose

In Chapter 14, the GUTCP theory is applied to predict results pertaining to several molecules and molecular systems including the CO_2 Molecule, the Nitrogen Dioxide Molecule, Ethane Molecule C_2H_6, Ethylene Molecule, Acetylene Molecule, Benzene Molecule, and the hydrocarbon molecules Propane, Butane, Pentane, Hexane, Heptane, Octane, Nonane, Decane, Undecane, Dodecane, and Octadecane.

I chose to investigate in detail three of these molecular systems: the CO_2 Molecule, the Ethane Molecule, and the hydrocarbon molecules listed above. For the CO_2 molecule, the force balance equation is set up. This determines equations for the internuclear separation, the semiminor axis, and the eccentricity of the ellipsoid. Next equations for the different energies in the molecule are derived. Then values for the internuclear distance, the semiminor axis, and the eccentricity are calculated. There is excellent agreement between the GUTCP-calculated value for the internuclear distance and the experimental result for the internuclear distance. Next, values for the different energies in the molecule are calculated. Then a discussion of vibration in CO_2 is presented. Next the Doppler energy term of the molecule is derived. This is used to derive expressions for the total energies and bond energies of CO_2. There is remarkable agreement between the GUTCP-derived bond dissociation energy and the experimental result for CO_2.

Ethane is formed from the reaction of two CH_3 methyl radicals. The solution for CH_3 was given in Chapter 13. The force balance equation is derived for C_2H_6. This determines equations for the internuclear separation, the semiminor axis, and the eccentricity of the molecular orbital ellipsoid. Next equations for the different energies in the molecule are derived. Then values for the internuclear distance, the semiminor axis, and the eccentricity are calculated. There is excellent agreement between the GUTCP-calculated value for the internuclear distance and the experimental result for the internuclear distance. Next, values for the different energies in the molecule are calculated. Then a

discussion of vibration in C_2H_6 is presented. Next the Doppler energy term of the ethane molecule is derived. This is used to derive expressions for the total and bond energies of C_2H_6. There is remarkable agreement between the GUTCP-derived bond dissociation energy and the experimental result.

For the hydrocarbon molecules Propane, Butane, Pentane, Hexane, Heptane, Octane, Nonane, Decane, Undecane, Dodecane, and Octadecane, only the total bond dissociation energy is calculated from the GUTCP theory and compared with the experimental total bond dissociation energy. However, for each hydrocarbon, there is remarkable agreement between the GUTCP-derived bond dissociation energy and the experimental result. Diagrams of what each hydrocarbon looks like are shown.

Calculation

Carbon Dioxide Molecule

I have verified that Equations 14.1 and 14.3-14.11 are true.

I verified that the value r_3/a_o in the line before Eqn. 14.11 is true.

I have verified that Equations 14.16, 14.17, and 14.19 along with their associated values are also correct.

The values and equations listed in Equations 14.20-14.25 are correct as listed in the GUTCP book.

There is very good agreement between the internuclear distance calculated from the GUTCP theory and the experimental bond distance. These are compared in Equations 14.25 and 14.26.

I have verified that the values and equations listed in Equations 14.27-14.46 are correct as listed.

I have verified that Equations 14.47-14.65 and their values are also valid and correct.

There is excellent agreement between the GUTCP value calculated for the CO_2 bond dissociation energy and its experimental result, given in Equations 14.65 and 14.66.

Ethane Molecule

I have verified as correct Equations 14.138, 14.141, and 14.143-151, and the values they contain.

I have verified as correct Equations 14.153-14.160 and the values they contain.

There is an excellent agreement between the internuclear distance calculated from the GUTCP theory and its experimental result, listed in Equations 14.160 and 14.161.

I have verified as correct Equations 14.162-14.165 and their associated values.

I verified that Equations 14.167-14.168 and Equations 14.170 and 14.172 and their values are correct.

I verified that Equations 14.174-14.179 are correct including the values they produce.

There is very good agreement between the ethane bond distance calculated from the GUTCP theory and the experimental result (Equations 14.179 and 14.180).

I have verified that Equations 14.181-14.184 and their values are correct.

I have also verified that Equations 14.186-14.187 and Equation s 14.189 and 14.191 and their values are correct.

I have verified that Equations 14.192-14.201 and their values are correct.

There is a remarkable agreement between the bond angle between the C-H bonds from the GUTCP theory and its experimental value, as seen in Equations 14.201 and 14.202.

I have also verified that Equations 14.203-14.207 and their values are correct.

I have also verified that Equations 14.209-14.239 and their values are correct.

There is very good agreement between the dissociation energy of the C-C bond from the GUTCP theory and the experimental value, as seen in Equations 14. 239 and 14.240.

Hydrocarbon Molecules: Propane, Butane, Pentane, Hexane, Heptane, Octane, Nonane, Decane, Undecane, Dodecane, and Octadecane

I have verified that Equations 14.646-14.667 are correct.

There is an excellent agreement between the total bond dissociation energy of each hydrocarbon from the GUTCP theory and the experimental bond dissociation energy, as seen between each odd-numbered equation and even-numbered equation.

Conclusion

I was able to verify the GUTCP results of Chapter 14 in excellent agreement with my own calculations for the molecules CO_2, C_2H_6, and the hydrocarbon molecules Propane, Butane, Pentane, Hexane, Heptane, Octane, Nonane, Decane, Undecane, Dodecane, and Octadecane. I successfully reproduced almost all of the equations and their corresponding values for these molecules found in Chapter 14. There was excellent agreement between many of the calculated results based on the GUTCP theory and their corresponding experimental values, such as internuclear distances and bond dissociation energies for these molecules. This chapter demonstrates that the GUTCP theory is successful at describing molecular systems, to a high degree of accuracy.

I find my results and calculations to be confirmation that the calculations and equations of these Chapter 14 molecules I investigated are indeed accurate, valid, and reproducible.