An article in *ACS Catalysis*, “Energetics of Adsorbed Formate and Formic Acid on Cu(111) by Calorimetry,” from the group of Charles Campbell (*ACS Catal.* **2022**, *12*, 10950-10960; <https://doi.org/10.1021/acscatal.2c02608>) investigated the adsorption of formate and formic acid onto copper surfaces to elucidate the heats of formation of the adsorbate-Cu bonds and the bond enthalpies of these species.

1. What is the significance of the results presented in this article? Why is this work important?
2. Why are formate and formic acid molecules of interest? What implications does this presented work have for other applications?
3. Draw the Lewis structure of formate and formic acid.
4. Sketch bidentate formate adsorbed on the copper surface (this surface can be represented with a line or a box).
5. The Miller index notation Cu(111) refers to the orientation of the copper’s surface relative to the crystallographic axes of the solid crystal. Why did the authors choose to use this crystal surface for this work?
6. When discussing Figure 3, the authors state that the top pathway “must be energetically equivalent to the parallel pathway; therefore, the sum of the steps in the top pathway must equal −90. kJ/mol.”

Explain how this statement is consistent with Hess’s Law. How is this used to determine the value for the bond enthalpy of bidentate formate on copper?