

Electrophilic frontier density using Gaussian, Multiwfn, and Jmol

J. Keller Univ of Alaska Fairbanks 11-5-2023

in Gaussian, optimize and do MO calculation for H₂O. ("formcheck" option saves the formatted checkpoint file necessary for Multiwfn operations.)

#N B3LYP/6-31G(d,p) SP GFINPUT POP=FULL formcheck

From WebMO, export job archive, expand the .zip file, rename Test.Fchk to water.fchk. Move or copy to the folder with Multiwfn program (/home/sally/Downloads/Multiwfn_3.8)

Gaussian must be installed. Follow WebMO instructions for G16 (webmo.net), and run test job per instructions as user Sally. Prior to starting Multiwfn, set the g16 environment:

\$ source g16setup

Run Multiwfn:

\$ Multiwfn water.fchk

5 / Output and plot specific property within a spatial region

1 / Electron density

2 / Medium quality

2 / Export data to a Gaussian-type cube file (saves density.cub in current directory)

0 / Return to main menu

22 / Conceptual DFT analysis

1 / Generate .wfn files for N, N+1, N-1 electrons states

(enter theory, e.g. B3LYP/6-31G(d,p))

enter (Input the net charge and spin multiplicity for N electrons state, e.g. 0 1

Note: If pressing ENTER button directly, (0 1), (-1 2) and (1 2) will be employed for N, N+1 and N-1)

y (to invoke Gaussian to calculate these .gjf files now to yield .wfn files)

4 / Set delta in orbital-weighted (OW) calculation

enter 0.08

7 / Calculate grid data of OW Fukui function

2 / Medium quality

6 / Export grid data of orbital-weighted f- as OW_f-.cub in current folder

0 / Return

0 / Return

26 / Structure and geometry related analyses

2 / Various geometry operations

-2 / Output system to .pdb file

-10 / Return

0 / Return

q / exit

In Jmol:

cd home/sally/Downloads/Multiwfn_3.8;

load water.pdb; background white; color bonds gainsboro;

isosurface efd cutoff 0.001 density.cub color absolute 0.000 0.0005 map OW_f-.cub;

isosurface fullylit translucent 90;

