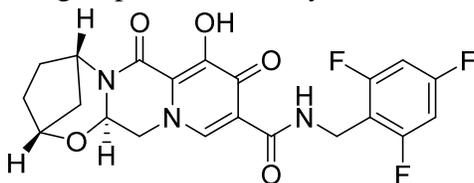


- 1) Biktarvy, shown below, is a new drug that is being investigated for the treatment of HIV. Which of the listed functional groups does biktarvy contain? Circle all that apply. (12 pts)



Alcohol	Aldehyde	Alkene	Amide	Amine
Acid anhydride	Carboxylic acid	Ester	Ether	Ketone

- 2) Molecular Orbital Diagrams (16 pts total)

a. Draw an MO diagram for a molecule of hydrogen gas, H_2 . Also draw the shapes of all MOs in this molecule. (10 pts)

b. When the hydrogen molecule absorbs a photon of light, an electron can jump from the bonding MO to the antibonding MO. Draw the MO diagram after this happens, and explain why this leads to the breaking of the bond between hydrogen atoms in 30 words or less. (6 pts)

3) The following compounds were named incorrectly. Complete these steps for each one: (24 pts total)

- Draw the skeletal structure (2 pts per problem)
- Write the correct IUPAC name (4 pts per problem)
- Write the degrees of unsaturation (2 pts per problem)

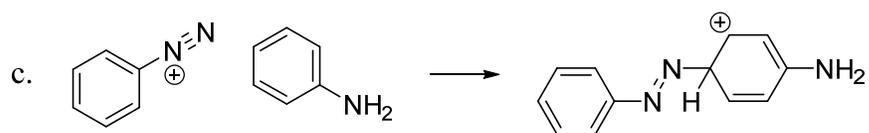
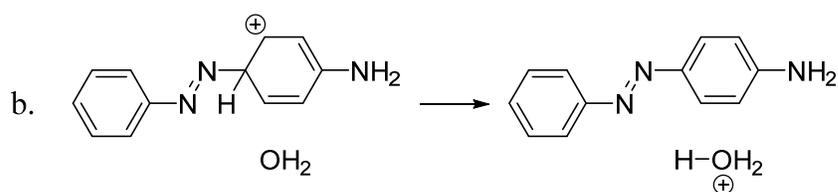
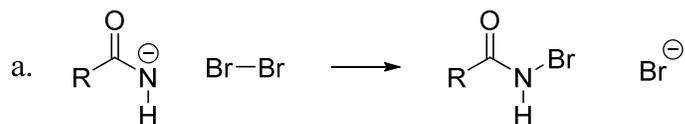
a. 1-(2-bromocyclohexyl)butane

b. 4,6-dimethyl-3-propylnonane

c. 1-cycloheptyl-cyclopropane

4) For the following reactions, complete these steps: (18 pts total)

- add arrows to show the movement of electrons (2 pts per problem)
- classify each species as either an acid, base, nucleophile, or electrophile (2 pts per problem). Please use the labels “nucleophile” and “electrophile” only for things that are NOT acting as acids/bases.
- identify the HOMO and LUMO for each reaction (2 pts per problem)



5) Draw all reasonable resonance forms for this molecule, including valid arrow-pushing to convert each form into the next. (Ignore any forms where the **only** difference is within the nitro group, NO₂, at the left end of the molecule). Circle the most stable resonance form. (12 pts)

