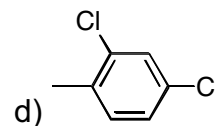
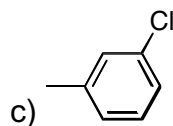
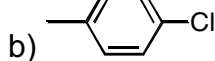
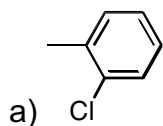


21 points (3 points each) Mark your answers on the scantron sheet. You may keep this copy.

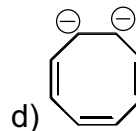
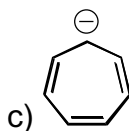
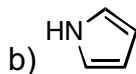
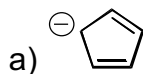
1. What is the major product of the reaction of toluene with Cl_2 and FeCl_3 ?



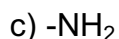
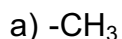
2. Nucleophilic Aromatic Substitution will only occur if . . .

- a) there are electron donating groups on the aromatic ring.
- b) there are electron withdrawing groups on the ring.
- c) there are no ortho substituents.
- d) none of the above

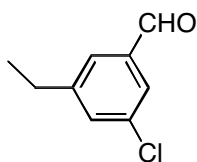
3. Which of the following molecules are **not** aromatic?



4. Which of the following is **not** an ortho-para directing group?

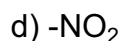
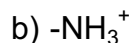
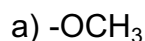


5. What is a correct name for the following compound?



- a) meta-chloro-meta-ethylbenzaldehyde
- b) 3-chloro-5-carboxytoluene
- c) 3-chloro-5-ethylbenzaldehyde
- d) 3-chloro-5-ethylbenzoic acid

6. Which of the following would be an activating group for electrophilic aromatic substitution?



7. Which of the following is **not** a valid resonance structure for nitrobenzene?

