STUDENT WORKSHEET - Electrophilic Aromatic Substitution

Name _____ Date _____ Section _____

Instructions: Choose the best answer for items 1-6. Show complete reasoning and clear structures for items 7-8. Compare with the separate answer key only after trying each problem.

Part A. Concept and product prediction

1. What type of intermediate forms after electrophilic attack on benzene?

(A) An arenium (sigma) ion
(B) A stable benzene dianion
(C) An organometallic compound

2. What restores aromaticity at the end of EAS?

(A) Addition of hydroxide
(B) Removal of H+ from the substituted ring carbon
(C) Reduction of the ring

3. Which substituent strongly favors meta nitration?

(A) -CH3
(B) -OH
(C) -NO2

4. How does bromine direct a second EAS event?

(A) Meta and activating
(B) Ortho/para but deactivating
(C) Only para and strongly activating

5. Nitration of benzene most commonly uses

(A) HNO3/H2SO4
(B) NaBH4/ethanol
(C) H2/Pd

6. Why is Friedel-Crafts acylation often easier to control than alkylation?

(A) The acyl group is a strong activator
(B) Acyl electrophiles avoid common alkyl-carbocation rearrangements
(C) Acylation never uses a catalyst

Part B. Show your reasoning

7. Draw the EAS nitration of toluene. Label the electrophile, the favored orientations, and the role of deprotonation.

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8. Predict the major bromination orientation for nitrobenzene with Br2/FeBr3. Explain the electronic effect and relative reaction rate.

Finish: Check atom counts, formal charges, nomenclature, and any reaction conditions.