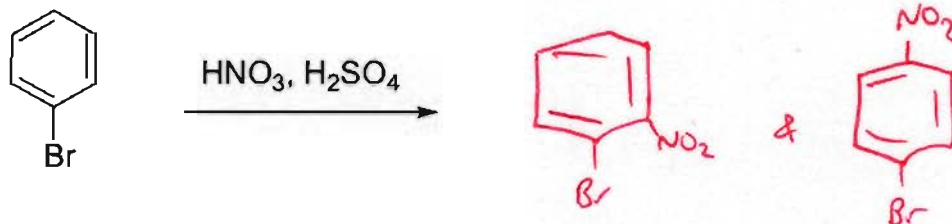
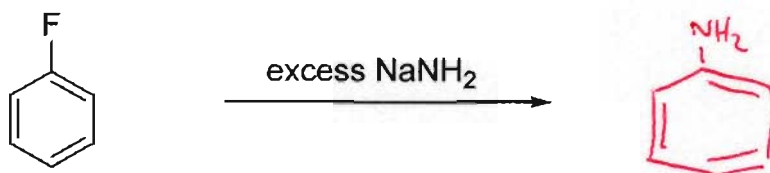


11-15) Give the products for the following reactions (and indicate stereo/regiochemistry where applicable).

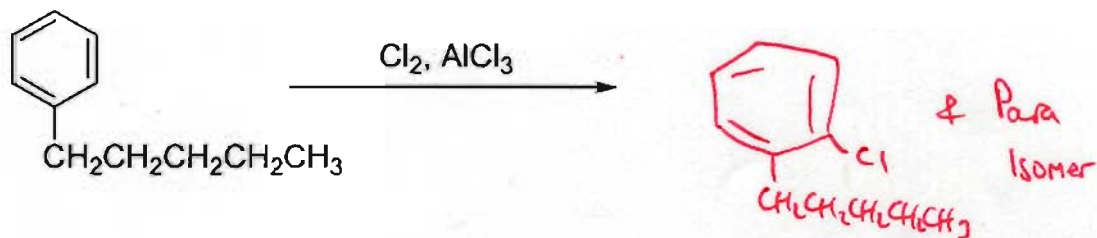
11)



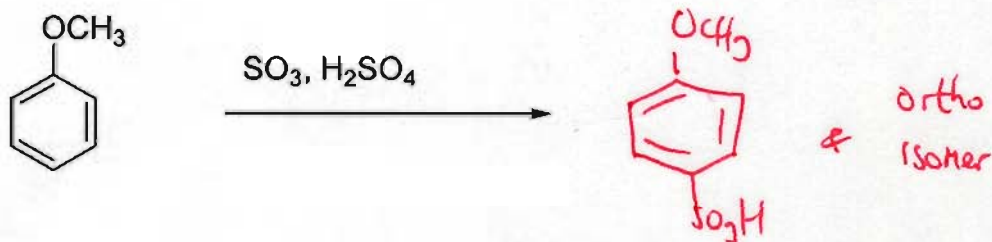
12)



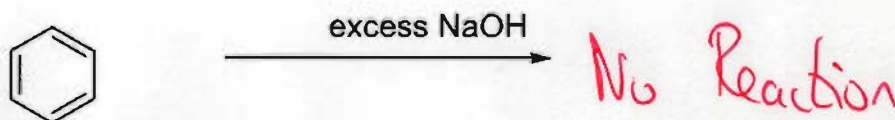
13)



14)



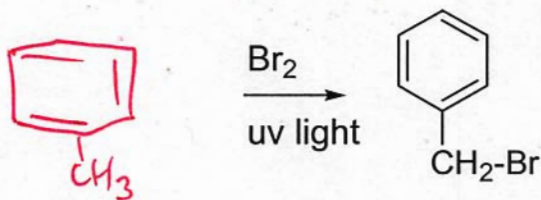
15)



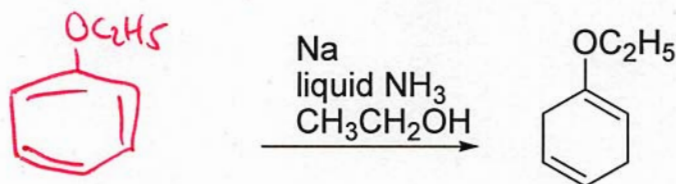
the

16-18) Give the starting materials for the following transformations.

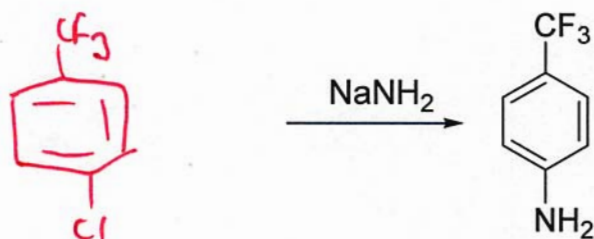
16)



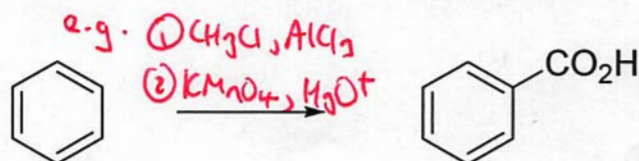
17)



18)

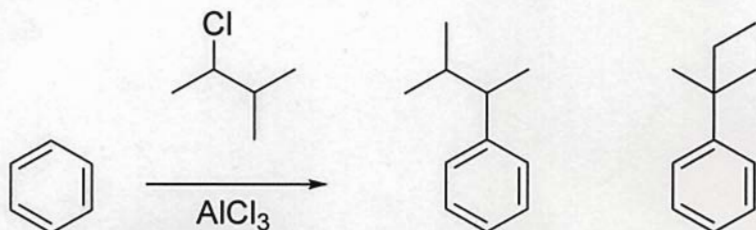


19) Provide reagents to convert benzene to benzoic acid.



20) For the 2 products produced in the reaction below: are they related as... (pick one)...

structural isomers or stereoisomers or diastereomers or enantiomers or resonance structures or tautomers or not isomeric?



BONUS QUESTION for 1 extra point

For the reaction in question 20, explain how you could **experimentally** calculate the relative amounts of each isomer, and thus determine which is the major product.

^1H NMR ; HPLC/MS ; separate them & weigh them, ...