**EXERCISE #12: multiple substituent effects for aromatic substitution**

Organic Chem II Alfred State College (see also : text pp 464-473)

1)

o directing (can’t go p since already occupied)





o directing (can’t go p since already occupied)

2)

 major minor (sterically more

Crowded)

SO3/H2SO4



NH2 directs here

NO2 directs here

3)



Very strongly

o,p directs here



Least (steric crowding)

All four sites are available, but activating group sites (first two above) probably preferred

Very strongly meta directs here

4)





Mostly…since amine is strongly directing and activating whereas Cl is weakly deactivating

Very strongly

o directs here  
(p site blocked by Cl)

Weakly o,p directs here

Very strongly o directs here  
(p site blocked by C(O)H)

5)





CH3Cl /AlCl3

Strongly directs m here

**2) Building Specific Multi-substituted Aromatics**



**1) Pick a route to m-bromobenzaldehyde**





acet

Formyl is m directing



**2) Pick a route to p-nitrobenzoic acid**





Methyl is p directing oxidize methyl to carboxyl



**3) Pick a route to the compound shown on the right**





Either NO2 or formyl is m directing, so add methyl last

4) Pick a route to compound shown on the right





direct Br adjacent CH3



CH3 is o,p direction + ortho form

NO2 and CH3 both

From **Organic Chemistry,** Carey, 6th edition page 518: **Director Properties of Aromatic Substituents**

(see also : text pp 464-473)

reference standard

-H

Hydrogen

Electron

donating

ors

Electron

withdrawingg

