Chemistry 334

Substituent Effects in Electrophilic Aromatic Substitution Reactions

substituent	name
<u>activating and *ortho*-, *para*-directing</u>	
NH_2, NHR, or NR_2	amino
OH	hydroxyl (phenolic)
OR	alkoxyl
NHC**O**CH_3	acetamido
R	alkyl
Ar	aryl
<u>benzene itself (the reference standard)</u>	
H	
<u>deactivating and *ortho*-, *para*-directing</u>	
F	fluoro
Cl	chloro
Br	bromo
I	iodo
<u>deactivating and *meta*-directing</u>	
CH**O**	aldehyde
C**O**OR	ester
C**O**OH	carboxylic acid
C**O**R	ketone
SO_3H	sulfonic acid
C≡N	nitrile
NO_2	nitro
$^+NR_3$	ammonium

Notes:

1. An **O** (in contrast to an O) denotes a carbonyl oxygen.
2. Substituents that are ranked higher in the list are more activating. Conversely, substituents that are ranked lower in the list are more deactivating.