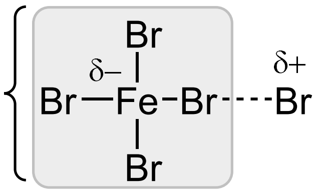
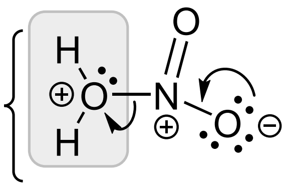
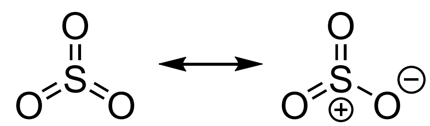
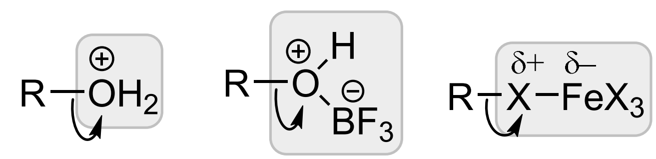
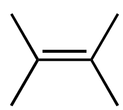
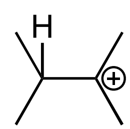
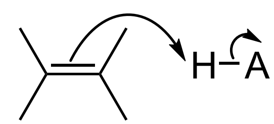
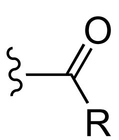
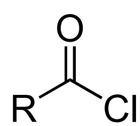
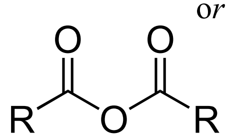
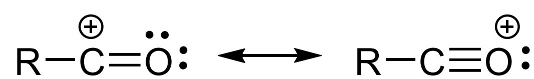
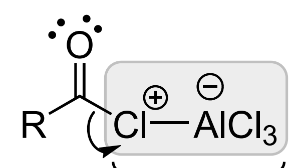
Electrophiles for Electrophilic Aromatic Substitution (EAS)

CHM 3150 Organic Chemistry II, Dr. Laurie S. Starkey, Cal Poly Pomona

Klein	EAS Reaction	Conditions	Electrophile (E^+)	Mech. to make E^+ (first steps in EAS)
18.2	**halogenation** –X	$Br_2/FeBr_3$ $Cl_2/FeCl_3$	$Br-\overset{\oplus}{Br}-\overset{\ominus}{Fe}Br_3 \approx Br^{\oplus}$ $Cl-\overset{\oplus}{Cl}-\overset{\ominus}{Fe}Cl_3 \approx Cl^{\oplus}$	great LG 
18.4	**nitration** $-NO_2$	HNO_3, H_2SO_4	$O=\overset{\oplus}{N}=O$ (nitronium ion)	great LG  *loss of water LG to make NO_2^+*
18.3	**sulfonation*** $-SO_3H$	SO_3, H_2SO_4		N/A (SO_3 is Electrophile) **reaction is reversible (heat removes $-SO_3H$ group)*
18.5	**Friedel-Crafts alkylation** –R	ROH/HA *or* ROH/BF_3 *or* RX/FeX_3	$R^{\oplus}$	 *loss of leaving group (LG) to make carbocation*
		or  + HA (HF)	 (carbocation - may rearrange, if unstable)	 *protonate pi bond to make carbocation*
18.6	**Friedel-Crafts acylation** 	 $+ AlCl_3$ *or*  $+ AlCl_3$	 (acylium ion)	 great LG