Classification of Hard and Soft Lewis Acids and Bases

Lewis Acids

Hard acids	Borderline acids	Soft acids
H^+ Li^+, Na^+, K^+ (Rb^+, Cs^+) Be^{2+}, $Be(CH_3)_2$ Mg^{2+}, Ca^{2+}, Sr^{2+} (Ba^{2+}) Sc^{3+}, La^{3+}, Ce^{4+}, Gd^{3+}, Lu^{3+} Th^{4+}, U^{4+}, UO_2^{2+}, Pu^{4+} Ti^{4+}, Zr^{4+}, Hf^{4+} VO^{2+}, Cr^{3+}, Cr^{6+}, MoO_3^+, WO_4^+ Mn^{2+}, Mn^{7+}, Fe^{3+} BF_3, BCl_3, $B(OR)_3$ Al^{3+}, $Al(CH_3)_3$, $AlCl_3$, AlH_3 Ga^{3+}, In^{3+} CO_2, RCO^+, NC^+, Si^{4+} Sn^{4+}, CH_3Sn^{3+}, $(CH_3)_2Sn^{2+}$ SO_3, RSO_2^+, $ROSO_2^+$ HX (hydrogen-bonding molecules) CO_3^{2+}, N_3^+, RPO_2^+, $ROPO_2^+$, As^{3+} Cl^+, Cl_7^+, I_5^+, I_7^+	Fe^{2+} Co^{2+}, Ni^{2+}, Cu^{2+}, Zn^{2+} Rh^{3+}, Ir^{3+}, Ru^{3+}, Os^{2+} $B(CH_3)_3$, GaH_3 R_3C^+, $C_6H_5^+$ Sn^{2+}, Pb^{2+} NO^+, Sb^{3+}, Bi^{3+} SO_2	$Co(CN)_5^{3-}$ Pd^{2+}, Pt^{2+}, Pt^{4+} BH_3 $Ga(CH_3)_3$, $GaCl_3$, $GaBr_3$, GaI_3 Tl^+, $Tl(CH_3)_3$ CH_2, carbenes π acceptors: trinitrobenzene, chloranil, quinones, tetracyanoethylene HO^+, RO^+, RS^+, RSe^+, Te^{4+}, RTe^+ Br_2, Br^+, I_2, I^+, ICN Bulk metals Cu^+, Ag^+, Au^+ Cd^{2+}, Hg^+, Hg^{2+}, CH_3Hg^+

Lewis Bases		
Hard bases	**Borderline bases**	**Soft bases**
NH_3, RNH_2, N_2H_4 H_2O, OH^-, O^{2-} ROH, RO^-, R_2O CH_3COO^- CO_3^{2-}, NO_3^- PO_4^{3-}, SO_4^{2-}, ClO_4^- F^- (Cl^-)	$C_6H_5NH_2$ (aniline) C_5H_5N (pyridine) N_3^-, N_2 NO_2^-, SO_3^{2-} Br^-	H^- C_2H_4 C_6H_6 CN^- RNC CO SCN^- R_3P, $(RO)_3P$, R_3As R_2S, RSH, RS^-, $S_2O_3^{2-}$ I^-

https://www.chemistrysteps.com/hard-and-soft-acids-and-bases/