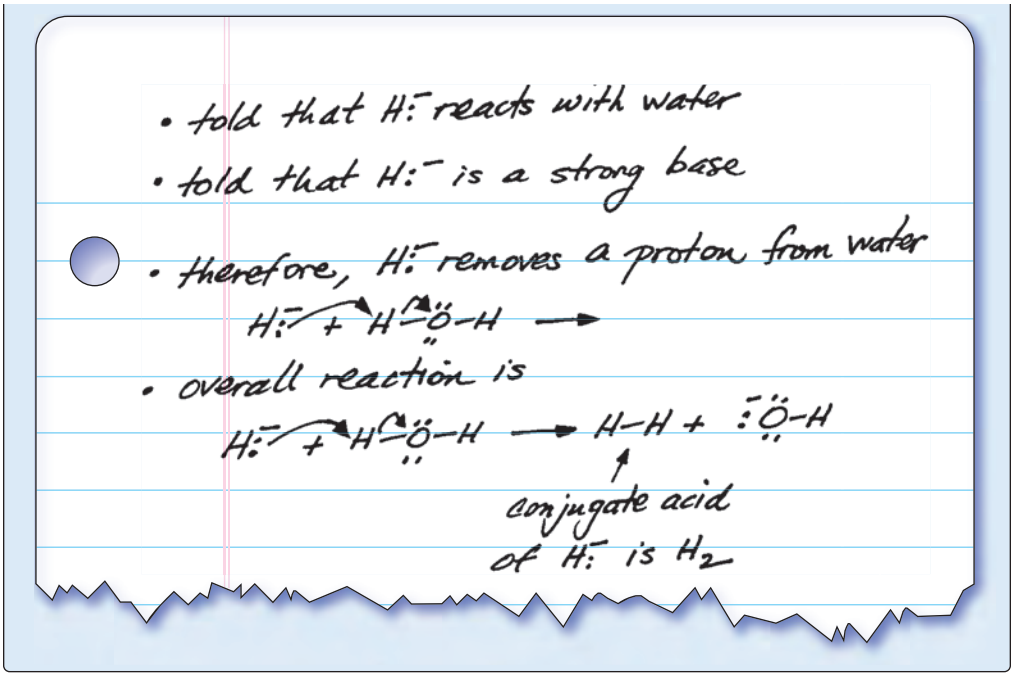
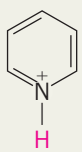
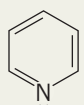


Table 1.8 lists a number of acids, their acidity constants, and their conjugate bases. The list is more extensive than we need at this point, but we will return to it repeatedly throughout the text as new aspects of acid–base behavior are introduced. The table is organized so that acid strength decreases from top to bottom. Conversely, the strength of the conjugate base increases from top to bottom. Thus, *the stronger the acid, the weaker its conjugate base. The stronger the base, the weaker its conjugate acid.*

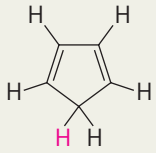
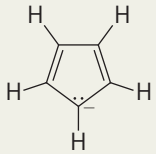
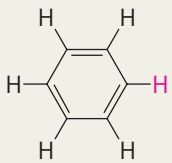
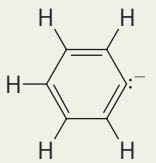
TABLE 1.8 Acidity Constants (pK_a) of Acids

Acid	pK_a	Formula	Conjugate base	Discussed in section
Hydrogen iodide	−10.4	HI	I^-	1.15
Hydrogen bromide	−5.8	HBr	Br^-	1.15
Sulfuric acid	−4.8	$HOSO_2OH$	$HOSO_2O^-$	1.16
Hydrogen chloride	−3.9	HCl	Cl^-	1.15
Hydronium ion*	−1.7	H_3O^+	H_2O	1.16
Nitric acid	−1.4	$HONO_2$	$^-ONO_2$	1.15
Hydrogen sulfate ion	2.0	$HOSO_2O^-$	$^-OSO_2O^-$	1.16
Hydrogen fluoride	3.1	HF	F^-	1.15
Anilinium ion	4.6	$C_6H_5\overset{+}{N}H_3$	$C_6H_5NH_2$	22.4
Acetic acid	4.7	$CH_3\overset{\overset{O}{\|\|}}{C}OH$	$CH_3\overset{\overset{O}{\|\|}}{C}O^-$	1.15; 19.4
Pyridinium ion	5.2			1.14; 22.4

*For acid–base reactions in which water is the solvent, the pK_a of H_3O^+ is zero and the pK_a of H_2O is 14.

—Continued

TABLE 1.8 Acidity Constants (pK_a) of Acids (*Continued*)

Acid	pK_a	Formula	Conjugate base	Discussed in section
Carbonic acid	6.4	H_2CO_3	HCO_3^-	19.9
Hydrogen sulfide	7.0	H_2S	HS^-	15.13
2,4-Pentanedione	9	$CH_3CCH_2CCH_3$ (O, O)	$CH_3\bar{C}CHCCH_3$ (O, O)	18.1
Hydrogen cyanide	9.1	HCN	CN^-	
Ammonium ion	9.3	NH_4^+	NH_3	1.14; 22.4
Glycine	9.6	$H_3\overset{+}{N}CH_2CO^-$ (O)	$H_2NCH_2CO^-$ (O)	27.3
Phenol	10	C_6H_5OH	$C_6H_5O^-$	1.16; 24.4
Hydrogen carbonate ion	10.2	HCO_3^-	CO_3^{2-}	19.9
Methanethiol	10.7	CH_3SH	CH_3S^-	15.13
Dimethylammonium ion	10.7	$(CH_3)_2\overset{+}{N}H_2$	$(CH_3)_2NH$	22.4
Ethyl acetoacetate	11	$CH_3CCH_2COCH_2CH_3$ (O, O)	$CH_3\bar{C}CHCOCH_2CH_3$ (O, O)	21.1
Diethyl malonate	13	$CH_3CH_2OCCH_2COCH_2CH_3$ (O, O)	$CH_3CH_2OC\bar{C}HCOCH_2CH_3$ (O, O)	21.8
Methanol	15.2	CH_3OH	CH_3O^-	1.15
2-Methylpropanal	15.5	$(CH_3)_2CHCH$ (O)	$(CH_3)_2\bar{C}CH$ (O)	18.1
Water*	15.7	H_2O	HO^-	1.15
Ethanol	16	CH_3CH_2OH	$CH_3CH_2O^-$	1.15
Cyclopentadiene	16			11.22
Isopropyl alcohol	17	$(CH_3)_2CHOH$	$(CH_3)_2CHO^-$	1.15
tert-Butyl alcohol	18	$(CH_3)_3COH$	$(CH_3)_3CO^-$	1.15
Acetone	19	CH_3CCH_3 (O)	$CH_3\bar{C}CH_2$ (O)	18.1
Ethyl acetate	24	$CH_3COCH_2CH_3$ (O)	$H_2\bar{C}COCH_2CH_3$ (O)	21.1
Acetylene	26	$HC{\equiv}CH$	$HC{\equiv}C:^-$	9.5
Ammonia	36	NH_3	H_2N^-	1.15
Diisopropylamine	36	$[(CH_3)_2CH]_2NH$	$[(CH_3)_2CH]_2N^-$	18.1
Benzene	43			14.5
Ethylene	45	$H_2C{=}CH_2$	$H_2C{=}\bar{C}H$	9.4; 9.5
Methane	60	CH_4	$:\bar{C}H_3$	1.15; 14.5
Ethane	62	CH_3CH_3	$CH_3\bar{C}H_2$	14.5

Web collections of pK_a data include those of H. Reich (University of Wisconsin) at *http://www.chem.wisc.edu/areas/reich/pkatable/kacont.htm* and D. Ripin and D. A. Evans (Harvard) at *http://daecr1.harvard.edu/pka/pka.html*.

*For acid–base reactions in which water is the solvent, the pK_a of H_3O^+ is zero and the pK_a of H_2O is 14.