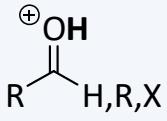
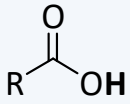
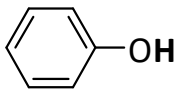
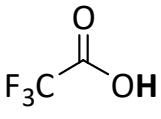
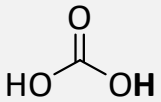
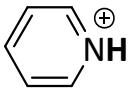
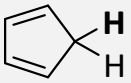
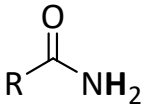
The Essential pK_a Values: students should memorize these values on page 1

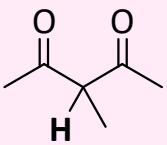
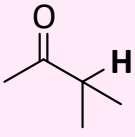
	Structure	pK_a	Compound	Notes
strong acid (pK_a < 0)	**H**F **H**Cl **H**Br **H**I	3.2 -7 -9 -11	hydrohalic acid	• Note the periodic table trend: as atom gets larger, acidity increases. • Hydrofluoric acid is **much** less acidic than the other 3.
	H_2SO_4	-9	sulfuric acid	• Depending on your resources, this pK_a value may be shown as low as -10 and as high as 0.
	 *(X = heteroatom)*	between -6 and 0	*sp^2* oxonium ion	• A ⊕-charged oxygen is called an oxonium ion. The pK_a value is typically between -6 and 0.
	H_3O^+ ROH_2^+ R_2OH^+	-2	hydronium ion, protonated alcohol, and protonated ether (*sp^3* oxonium ions)	• A ⊕-charged oxygen is called an oxonium ion. The pK_a value is typically between -6 and 0.
moderate acid (pK_a 0-7)		5	carboxylic acid (OH attached to carbonyl)	
weak acid (pK_a 7-14)	**H**C≡N	9	hydrogen cyanide	
	NH_4^+ RNH_3^+ $R_2NH_2^+$ R_3NH^+	9-11	protonated *sp^3* amine (ammonium and aminium ions)	• Do not confuse the protonated amine with the neutral amine.
		10	phenol (OH attached to benzene)	• Phenol can be shown as PhOH or C_6H_5OH.
very weak acid, or non-acid (pK_a > 14)	H_2O	15.7 (often rounded to 16)	water	
	ROH	16-18	alcohol (OH attached to *sp^3* carbon)	• Do not categorize phenol as an alcohol. Phenol pK_a is about 10.
	RC≡C**H**	24-25	terminal alkyne	
	NH_3 RNH_2 R_2NH	35-38	neutral *sp^3* amine	• Do not confuse the neutral amine with the protonated amine.
	H_2	38	hydrogen gas	
	$H_2C=CH_2$	44	alkene	
	$H_3C\text{-}CH_3$	50-60	alkane	

Too many students confuse these two.

Don't be that student.

Additional pK_a Values You Will Likely Encounter

Structure	pK_a	Compound	Notes
$RC{\equiv}N\mathbf{H}^+$	-10	protonated nitrile	
$\mathbf{H}_3PO_4$	2	phosphoric acid	pK_a 1 = 2; pK_a 2 = 7.2; pK_a 3 = 12.4
$\mathbf{H}N_3$	4.6	hydrogen azide	
	0.2	trifluoroacetic acid (TFA)	
	6.3 (pK_a 1) 10.25 (pK_a 2)	carbonic acid	Potassium carbonate (K_2CO_3) is a commonly used base in organic chemistry. The pK_a of its conjugate acid is 10.25. K_2CO_3 is commonly used to deprotonate moderately acidic protons such as phenols (pK_a ~10) and 1,3-dicarbonyl compounds (pK_a ~9-13).
	5.2	pyridinium ion	• This pK_a value can be used for other sp^2 hybridized protonated amines (& imines).
$\mathbf{H}_2S$	7	hydrogen sulfide	
R**S**H	11	thiol	
	16	cyclopentadiene (sometimes abbreviated CPD)	• Our most acidic hydrocarbon (similar acidity as water!), the conjugate base becomes aromatic.
	18-22	amide (1° and 2°)	

	< 16	α-hydrogen of a 1,3-dicarbonyl	• **Crucial knowledge** when doing enolate chemistry.
	> 16	α-hydrogen of a monocarbonyl	• **Crucial knowledge** when doing enolate chemistry.