Acid dissociation constant or acidity constant (symbol: Ka) of the hypothetical compound HA is the equilibrium constant of the reaction (see, Brønsted-Lowry theory),

\[
HA + H_2O \rightleftharpoons A^- + H_3O^+
\]

in dilute aqueous solution at 25 °C.

For the above system,

\[
\frac{[A^-] [H_3O^+]}{[HA] [H_2O]} = \text{constant (K)}
\]

In dilute solution,

\[
[H_2O] : \text{large (} \sim 56 \text{ molL}^{-1} \text{)} \sim \text{constant (k)}
\]

\[
\frac{[A^-] [H_3O^+]}{[HA] k} = K
\]

\[
\frac{[A^-] [H_3O^+]}{[HA]} = K x k = K_a
\]

\[
K_a (HA) = \frac{[A^-] [H_3O^+]}{[HA]}
\]

\[
K_a (acid) = \frac{[\text{conjugate base}] [H_3O^+]}{[\text{acid}]}
\]

The larger the Ka of a species, the larger the fraction of the species that donates H+ to water, greater its acid strength. Thus, Ka of a species is a measure of its acid strength.

eg:

<table>
<thead>
<tr>
<th>compound</th>
<th>$K_a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI</td>
<td>$10^{10}$</td>
</tr>
<tr>
<td>HCl</td>
<td>$10^{7}$</td>
</tr>
</tbody>
</table>

Ka of HI is larger than that of HCl, meaning HI is a stronger acid than HCl.

**Contributors**

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