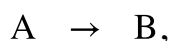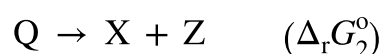# stable

As applied to chemical species, the term expresses a thermodynamic property, which is quantitatively measured by relative molar standard Gibbs energies. A chemical species A is more stable than its isomer B if $\Delta_r G^\circ > 0$ for the (real or hypothetical) reaction

A $\rightarrow$ B,

under standard conditions. If for the two reactions:

P $\rightarrow$ X + Y   ($\Delta_r G_1^o$)

Q $\rightarrow$ X + Z   ($\Delta_r G_2^o$)

$\Delta_r G_1^o > \Delta_r G_2^o$, P is more stable relative to the product Y than is Q relative to Z. Both in qualitative and quantitative usage the term stable is therefore always used in reference to some explicitly stated or implicitly assumed standard. The term should not be used as a synonym for unreactive or 'less reactive' since this confuses thermodynamics and kinetics. A relatively more stable chemical species may be more reactive than some reference species towards a given reaction partner.
See also: inert, unstable

Source:
PAC, 1994, *66*, 1077 *(Glossary of terms used in physical organic chemistry (IUPAC Recommendations 1994))* on page 1166