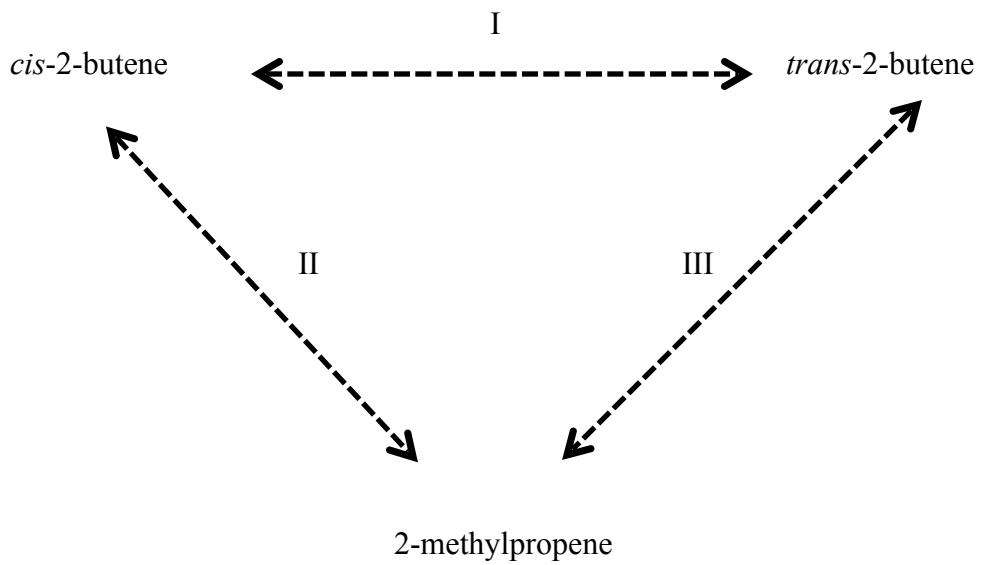
Consider the isomerization equilibria of an alkene (C_4H_8) that co-exists as three isomers:



At 300 K, the following thermodynamic quantities are known:

Substance	**ΔG**	**ΔH**
cis-2-butene	+66.0	−7.0
trans-2-butene	+63.0	−11.2
2-methylpropene	+58.0	(not known)

The temperature of the above system is raised to 400K and equilibrium is re-established. The mole % of *trans*-2-butene at the new equilibrium is determined to be 18%. Calculate the ΔH^0 and ΔS^0 for the following reactions (indicate units):

cis-2-butene ⟷ 2-methylpropene

ΔH^0 =_____ ΔS^0 =_____

trans-2-butene ⟷ 2-methylpropene

ΔH^0 =_____ ΔS^0 =_____