Unless otherwise noted, assume that:

 T=25°C

R= 1.99 cal mol^-1 deg^-1

Faraday’s Constant= 23,062 cal volt^-1 equiv ^-1

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Please explain with as much detail as possible!! Thank you!!

Guanyl nucleotide regulatory proteins (N) alter cell function based on the type of guanyl nucleotide occupying the nucleotide site on the protein. The affinity of this site for guanyl nucleotides is to a certain extent under hormonal control. Given a Ka of the site for guanyl nucleotides of 3 x 10^7 M in the presence of hormone please calculate the following:

1. The fractional saturation of N ( Noccupied/Ntotal) when GDP is 0.4 μM. Assume that nucleotide concentration is unaffected by the reaction (GDP is constant).
2. The fractional saturation of N (Noccupied/Ntotal) when GTP is 1 μM. Assume that the nucleotide concentration is unaffected by the reaction (GTP is constant)
3. The fractional saturation of N (Noccupied/Ntotal) for GTP and GDP when they are both present at their above (constant) concentrations. \*Derive the equation for the fractional saturation for one of the nucleotides in terms of the other, solve for that nucleotide, then solve for the other.