

Name: Ken

Quiz 5

The standard Gibbs free energy change for converting 3-phosphoglycerate to 2-phosphoglycerate is $1.12 \text{ kcal mole}^{-1}$. Within a fed cardiac myocyte, the Gibbs free energy change for converting 3-phosphoglycerate to 2-phosphoglycerate is $-0.14 \text{ kcal mole}^{-1}$.

1. At equilibrium, is 3-phosphoglycerate or 2-phosphoglycerate molecule is more prevalent?
2. Within a fed cardiac myocyte, is the conversion of 3-phosphoglycerate to 2-phosphoglycerate unfavorable or unfavorable?
3. Within a fed cardiac myocyte, is the conversion of 3-phosphoglycerate to 2-phosphoglycerate spontaneous or nonspontaneous?
4. For the condition within a fed cardiac myocyte, complete the following expression:

$$[2\text{-phosphoglycerate}] = \underline{0.13} [3\text{-phosphoglycerate}]$$

$$\Delta G = \Delta G^\circ + RT \ln \left(\frac{[2\text{-phosphoglycerate}]}{[3\text{-phosphoglycerate}]} \right)$$
$$-0.14 \frac{\text{kcal}}{\text{mole}} = 1.12 \frac{\text{kcal}}{\text{mole}} + \left(1.99 \frac{\text{kcal}}{\text{K mole}} \right) (310 \text{ K}) \ln \left(\frac{[2\text{-phosphoglycerate}]}{[3\text{-phosphoglycerate}]} \right)$$
$$-1.26 \frac{\text{kcal}}{\text{mole}} \quad \text{①} = 616.9 \frac{\text{cal}}{\text{mole}} \ln \left(\frac{[2\text{-PG}]}{[3\text{-PG}]} \right)$$