The diagram illustrates the relationship between the change in free energy ($\Delta G_{FU}$) and pH, with specific pKₐ values for different amino acids. The slope of the line, $\frac{\partial \Delta G_{FU}}{\partial \text{pH}} = \Delta Q_{FU}$, indicates the rate of change of free energy with respect to pH. The pH at which $\Delta G_{FU}$ is minimized is denoted as pH[$\Delta G_{FU}(\text{min})$]. The pKₐ values for D, E, His, and K, R are indicated by the shaded regions.