II. Base on the provided pKa of the following compounds, briefly explain why compound III is more acidic than compound I, and why compound III is more acidic than compound II. (10 points)

\[
\begin{array}{ccc}
\text{I} & \text{II} & \text{III} \\
\begin{array}{c}
\text{phenol} \\
pKa = 9.95
\end{array} & \begin{array}{c}
\text{nitrophenol} \\
pKa = 8.35
\end{array} & \begin{array}{c}
\text{dinitrophenol} \\
pKa = 7.14
\end{array}
\end{array}
\]

1) The conjugate base of compound III can be stabilized by NO₂ (electron-withdrawing group) via resonance effect. The conjugate base of phenol has no resonance stabilization.

\begin{align*}
\text{conjugate base of III}
\end{align*}

2) The conjugate base of compound II cannot be stabilized by NO₂ (electron-withdrawing group) via resonance effect, only inductive effect.

\begin{align*}
\text{conjugate base of II}
\end{align*}

Next Pages: Periodic Table, pKa, and pKb Values