$$
\begin{aligned}
\mathcal{J}(\eta) &= \int D_{KL}(\pi||q_\lambda)p(\mathbf{y})\mathrm{d}\mathbf{y} \\
&= \int p(\mathbf{y}) \int p(\mathbf{x}|\mathbf{y}) \log \left[\frac{p(\mathbf{x}|\mathbf{y})}{q(\mathbf{x}|\varphi(\eta, \mathbf{y}))} \right] \mathrm{d}\mathbf{x}\mathrm{d}\mathbf{y} \\
&= \mathbb{E}_{p(\mathbf{x},\mathbf{y})} \left[-\log q(\mathbf{x}|\varphi(\eta, \mathbf{y})) \right] + const.
\end{aligned}
$$