8) Usando o estado $\cos(\theta/2)|0\rangle + e^{i\varphi}\,\text{sen}(\theta/2)|1\rangle$, que pode ser representado na esfera de bloch:

— // —

• $|+\rangle = \frac{1}{\sqrt{2}}(|0\rangle + |1\rangle)$, logo $\cos\left(\frac{\theta}{2}\right) = \frac{1}{\sqrt{2}}$ $\therefore$ $\boxed{\theta = \frac{\pi}{2}}$

E temos que $e^{i\varphi} = 1$, logo usando a propriedade $\boxed{e^{ia\pi} = (-1)^a}$

$\therefore e^{ia\pi} = (-1)^a$, com $\boxed{a=0}$, temos $\boxed{\varphi = 0}$

Logo: $\boxed{|+\rangle \rightarrow \theta = \frac{\pi}{2} \text{ e } \varphi = 0}$

— // —

• $|-\rangle = \frac{1}{\sqrt{2}}(|0\rangle - |1\rangle)$, logo $\cos\left(\frac{\theta}{2}\right) = \frac{1}{\sqrt{2}}$ $\therefore$ $\boxed{\theta = \frac{\pi}{2}}$

E temos que $e^{i\varphi} = -1$, logo usando a propriedade $\boxed{e^{ia\pi} = (-1)^a}$

$\therefore e^{ia\pi} = (-1)^a$, com $\boxed{a = 1}$, temos $\boxed{\varphi = \pi}$

$\boxed{e^{i\pi} = -1}$

Logo $\boxed{|-\rangle \rightarrow \theta = \frac{\pi}{2} \text{ e } \varphi = \pi}$

— // —

• $|i\rangle = \frac{1}{\sqrt{2}}(|0\rangle + i|1\rangle)$, logo $\cos(\theta/2) = \frac{1}{\sqrt{2}}$ $\therefore$ $\boxed{\theta = \pi/2}$

E temos que $e^{i\varphi} = i$, logo usando a propriedade $\boxed{e^{ia\pi} = (-1)^a}$

$\therefore e^{ia\pi} = (-1)^a$, com $\boxed{a = 1/2}$, temos $\boxed{\varphi = \pi/2}$

$e^{i\pi/2} = (-1)^{1/2}$

$= \sqrt[2]{(-1)} = \boxed{i}$

Logo $\boxed{|i\rangle \rightarrow \theta = \frac{\pi}{2} \text{ e } \varphi = \frac{\pi}{2}}$

— // —

• $|-i\rangle = \frac{1}{\sqrt{2}}(|0\rangle - i|1\rangle)$, logo $\cos(\theta/2) = \frac{1}{\sqrt{2}}$ $\therefore \theta = \pi/2$

$\therefore \boxed{e^{ia\pi} = (-1)^a}$, com $\boxed{a = 3/2}$, temos $\boxed{\varphi = \frac{3\pi}{2}}$

$e^{i\frac{3\pi}{2}} = (-1).(-1)^{1/2}$

$= \boxed{-i}$

Logo $\boxed{|-i\rangle \rightarrow \theta = \frac{\pi}{2} \text{ e } \varphi = \frac{3\pi}{2}}$