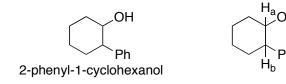
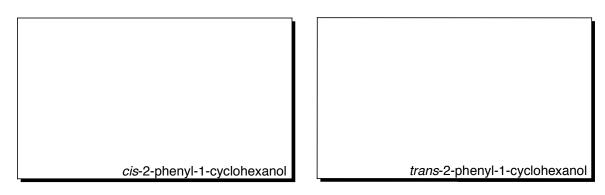
**4.** <sup>1</sup>H NMR spectra are shown below for a single diastereomer of 2-phenyl-1-cyclohexanol. (15 points)



**a**. Draw *cis*-2-phenyl-1-cyclohexanol in the most stable chair conformation and draw *trans*-2-phenylcyclohexanol in the most stable chair conformation.



**b**. Name the multiplets (multiplicity and *J* values) you would expect for  $H_a$  and  $H_b$  in the *cis*- and *trans*-diastereomers.

cis-2-phenyl-1-cyclohexanol H <sub>a</sub>
cis-2-phenyl-1-cyclohexanol H <sub>b</sub>
trans-2-phenyl-1-cyclohexanol H <sub>a</sub>
<i>trans</i> -2-phenyl-1-cyclohexanol H <sub>b</sub>

c. Shown below is a 300 MHz  $^{1}$ H NMR spectrum of a single diastereomer of 2-phenyl-1-cyclohexanol in CDCl<sub>3</sub>.

Which stereoismer is it?

How do you know?

3.6 ppm			
$\wedge \wedge \wedge$	2.4 ppm		
0 10 20 40 Hz 0	10 20 40 Hz		
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