

## Quiz 8

Friday, April 21, 2017 8:44 AM

Using the generalized solution to find specific wavefunctions

---

The generalized LCAO energy eigenstates for an  $N$ -atom monatomic chain (assuming only one atomic orbital per atom, and periodic boundary conditions) are:

$$|k\rangle = \frac{1}{\sqrt{N}} \sum_{n=1}^N e^{ikna} |n\rangle$$

where  $|n\rangle$  is the atomic orbital centered on the  $n^{\text{th}}$  nuclei.

For this quiz, assume  $N=4$ .

a) Write out the specific wavefn  $|k=\frac{\pi}{2a}\rangle$  in terms of the basis states  $|1\rangle, |2\rangle, |3\rangle$  and  $|4\rangle$ .

b) Write out the wavefunction  $|k=\frac{\pi}{a}\rangle$  in terms of the basis states  $|1\rangle, |2\rangle, |3\rangle$  and  $|4\rangle$ .