

# Chemistry 455A

First Exam  
April 27, 2007

Name \_\_\_\_\_

Helpful Information:

$\omega = ck$ $\lambda \nu = c$ $E = \hbar\omega$ $E = \frac{p^2}{2m}$ $p = \hbar k$ $ka = \pi n$	$\hbar = 1 \cdot 10^{-34} \text{ J} \cdot \text{sec}$ $m_e = 1 \cdot 10^{-30} \text{ Kg}$ $c = 3 \cdot 10^8 \text{ m/sec}$ $N_A = 6 \cdot 10^{23} \text{ molecules/mole}$ $V = \frac{q_1 q_2}{(4\pi\epsilon_0)r}$ $E_n = -22 \cdot 10^{-19} \left(\frac{Z}{n}\right)^2 \text{ J}$	$H\Psi = E\Psi$ $\hat{H} = \hat{T} + \hat{V}(x)$ $T = \frac{\hat{p}^2}{2m}$ $\hat{p} = -i\hbar \frac{d}{dx}$ $\psi(x) = A \sin(kx)$ $e^{i\phi} = \cos \phi + i \sin \phi$	$\int_x \phi_n^* \phi_m dx = \delta_{m,n}$ $\int_{x=0}^a \sin\left(\frac{\pi mx}{a}\right) \sin\left(\frac{\pi nx}{a}\right) dx = \frac{a}{2} \delta_{m,n}$ $1 = \int_x \Psi^* \Psi dx$ $\langle A \rangle = \frac{\int_x \Psi^* \hat{A} \Psi dx}{\int_x \Psi^* \Psi dx}$
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There are 6 pages; be sure you have all the pages before you start.

Be sure your name is on the exam before you start.

This is a timed 50 minute exam.

To receive full credit on all problems you must show your work or reasoning.