The Richard Stockton College of New Jersey
Chemistry Program, School of Natural Sciences and Mathematics
PO Box 195, Pomoma, NJ

CHEM 3420: Physical Chemistry II — Spring 2009

Homework 2

Due in Class: Friday, January 30, 2009

1. One of the most powerful modern techniques for studying structure is neutron diffraction. This technique involves generating a collimated beam of neutrons at a particular temperature from a high-energy neutron source and is accomplished at several accelerator facilities around the world. If the speed of a neutron is given by

$$v_n = \left(\frac{3k_BT}{m_n}\right)^{\frac{1}{2}}$$

   where m_n is the mass of a neutron, then what temperature is needed so that the neutrons have a de Brolie wavelength of 50 pm?

2. The work function for metallic cesium is 2.14 eV. Calculate the kinetic energy and the speed of the electrons ejected by light of wavelength (a) 700 nm, (b) 300 nm.

3. Some data for the kinetic energy of ejected electrons as a function of the wavelength of the incident radiation for the photoelectron effect for sodium metal are

λ (nm)	100	200	300	400	500
kinetic energy (eV)	10.1	3.94	1.88	0.842	0.222

   Use these data to obtain Planks constant h and the work function for sodium metal.