Energy to ionize the electron $E = mc^2$

$1eV = 1.6 \times 10^{-19} J$ $= (9.11 \times 10^{-31} kg)(3 \times 10^8 \frac{m}{s})^2$

$= 0.51 MeV$

$5.12 \times 10^5 eV$ $E = 8.2 \times 10^{-14} J$

Problems in-class

MC ③ ~~[illegible]~~ what is the the de Broglie wavelength of an electron accelerated from rest through a potential difference of 50 V?

$\lambda = \frac{h}{mv}$ $\lambda = 6.63 \times 10^{-34}$

$m_e = 9.91 \times 10^{-31} kg$.

voltage = 50 V

$V = \frac{energy}{charge}$ $50 = \frac{energy}{1.6 \times 10^{-19}}$ $8 \times 10^{-18} J = \frac{1}{2} m v^2$

$8 \times 10^{-18} = \frac{1}{2}(9.11 \times 10^{-31}) v^2$

$v = 4.19 \times 10^6$

$\lambda = \frac{6.63 \times 10^{-34}}{(9.11 \times 10^{-31})(4.19 \times 10^6)}$ $\lambda = 1.74 \times 10^{-10} m \rightarrow .174 \times 10^{-9} m$

$.174 nm$ (B)

④ An electron is accelerated through a potential difference of 3.00 V before colliding with a metal target. What minimum wavelength light can such an electron emit?

Chapter 27
In addition to powerpoint:

27.3 Quantum Particles: The Compton Effect

- X-rays with high enough frequency, ionize everything
- Longer wavelength=less energy
- The Compton effect makes initial wave of energy scatter at various angles with longer wavelength
- Different scattering angles=different wavelengths
- Some energy goes through the material that is being hit with the x-ray and some is scattered, but all the energy is conserved

27.4 The Bohr Theory of the Hydrogen Atom

- Probability levels of where we find electrons is related to energy
- The different wavelengths creates a spectrum
- Spectrum is emitted in discrete amounts which is why there isn't a blend of colors emitted
- Higher to lower energy levels=spectral lines

27.5 The laser

- Pump energy into laser, pump electrons into metastable state, the higher up they are pushed then allows them to cascade back down when stimulated
- Red laser→ helium/neon
- Difference in energy levels in the wavelength of light seen
- When hit with the correct photon it releases the energy

Chapter 28
28.4 The Heisenberg Uncertainty Principle

- It's a one-or-the-other concept: if you want the positron, then the momentum is uncertain and vice versa
- Can know the energy, but not the time as accurately, again its one or the other
- When we go to the atomic scale, our ability to measure has a degree of uncertainty
- Positron→ positive electron