**IB Physics**

**27I-O Group Quiz**

Name

**Show your work, and circle your answers and use sig figs to receive full credit.**

**Numerical Questions:**

1. An alpha particle (m = 6.64x10−27 kg) going 5.36x107 m/s will get how close to a lead (Z = 82) nucleus if it hits head on?

2. A speeding alpha particle (m = 6.64x10−27 kg) hits a cobalt (Z = 27) nucleus head on. If it comes within 56.0 fm of the nucleus’ center, how fast was it going to start with?

3. A 36.0 MeV alpha particle can get how close to a gold nucleus (Z = 79)? (36.0 MeV is the KE)

4. What is the wavelength of the photon associated with an electron transition from n = 2 to n = 1 in a hydrogen atom? Is the photon being absorbed, or emitted?

5. What is the wavelength of the photon associated with an electron transition from n = 2 to n = 5 in a hydrogen atom? Is the photon being absorbed, or emitted?

6. What is the radius of Cl-36 nucleus?

7. What is the likely mass number of a nucleus with a radius of 7.064x10-15 m?

8. To effect an alpha decay, an alpha particle must “borrow” 23.0 MeV of energy. What time does it have to escape?

9. A proton has an uncertainty in its velocity of ±1.20x106 m/s. What is the minimum uncertainty in its position?

**Conceptual Questions:**

I: How was Rutherford's atomic model different from Thomson's "plum pudding" model?

I: How did Rutherford discover the nucleus? What size did he determine for the atom and the nucleus?

I1: How does the density of a nucleus change with mass number? What is the density of the Uranium-235 nucleus? What is the density of the carbon-12 nucleus?

m = A(1.661x10-27 kg), V = 4/­3πr3, ρ = m/V

K: Specifically what phenomenon, what observed behavior of atoms was Bohr trying to explain with his quantum atomic model?

N: Energy indeterminacy accounts for nuclear decay - particles in the nucleus "borrow" energy to escape - Where does the energy come from that they "borrow", and where does it go after it has escaped?

O: What was the Einstein-Bohr debate about? What did Einstein object to in quantum mechanics?