

Worksheet: Atoms

IB · Class 12 · Physics · 9 questions · 27 marks

Name: _____

Date: _____

Score: _____ / 27

Q1. Find the energy of the $n = 3$ level of hydrogen. *[2 marks]*

Q2. The Bohr radius is 0.53×10^{-10} m. Find the radius of the $n = 4$ orbit. *[2 marks]*

Q3. The total energy of an electron in a hydrogen orbit is -3.4 eV. Find its kinetic and potential energies. *[2 marks]*

Q4. Find the wavelength of the photon emitted when a hydrogen atom falls from $n = 3$ to $n = 2$. *[3 marks]*

Q5. To which series does a transition ending on $n = 2$ belong, and in which region of the spectrum does it lie? *[3 marks]*

Q6. An alpha particle of kinetic energy 5.0 MeV is fired head-on at a gold nucleus of $Z = 79$. Find the distance of closest approach. *[3 marks]*

Q7. Find the ratio of the orbital periods of the $n = 2$ and $n = 4$ levels of hydrogen. *[4 marks]*

Q8. A hydrogen atom in the ground state absorbs a photon and is excited to $n = 3$. Find the wavelength of the absorbed photon and the number of spectral lines that can then be emitted. *[4 marks]*

Q9. Show that requiring a whole number of de Broglie wavelengths to fit around a Bohr orbit reproduces the angular momentum quantisation condition. *[4 marks]*
