

Solutions

2.1 A An emitted photon corresponds to a transition to a lower energy level. Absorption requires a compatible energy difference. Rutherford scattering supported a small dense nucleus, but that experiment alone did not establish the complete quantum model.

2.2 Photon energy=upper−lower= $(-2.0)-(-7.0)=5.0$ eV.

2.3 False. Negative bound-state energies are relative to a chosen zero; they do not mean a negative photon energy is emitted. A larger downward energy difference gives higher frequency.

2.4 emission spectrum. emission spectrum means Wavelength pattern of radiation emitted by a source.

3.1 Differences are 5, 7 and 2 eV; 7 eV has shortest wavelength because $E=hc/\lambda$. Selection rules and populations may suppress a candidate transition.