

숙제 7의 모범답안 및 채점기준

(다음 1번~4번 문제는 따로 채점기준이 제공되지 않습니다. 즉, 기본적인 채점 규정을 따를 것입니다.)

1. 교재 p. 264 #3

(답안) 이 문제의 답안은 다음과 같습니다.

7-3: For an electron, $s = (\sqrt{3}/2) \hbar$, $s_z = \pm(1/2) \hbar$, and so the possible angles are given by

$$\arccos\left(\frac{\pm(1/2)\hbar}{(\sqrt{3}/2)\hbar}\right) = \arccos\left(\pm\frac{1}{\sqrt{3}}\right) = 54.7^\circ, 125.3^\circ.$$

2. 교재 p. 264 #6

(답안) 이 문제의 답안은 다음과 같습니다.

7-6: Because the system of electrons has the minimum total energy possible, each of the lowest five energy states is occupied by two electrons, with one of each spin. The lowest unoccupied level is the sixth, and the energy of the photon would be

$$\begin{aligned}\Delta E &= \frac{\hbar^2}{8mL^2} (6^2 - 1^2) = \frac{(6.626 \times 10^{-34} \text{ J}\cdot\text{s})^2}{8 (9.1095 \times 10^{-31} \text{ kg}) (1.00 \times 10^{-9} \text{ m})} \quad (35) \\ &= 2.11 \times 10^{-18} \text{ J} = 13.1 \text{ eV}.\end{aligned}$$

3. 교재 p. 264 #13

(답안) 이 문제의 답안은 다음과 같습니다.

7-13: All of the atoms are hydrogenlike, in that there is a completely filled subshell that screens the nuclear charge and causes the atom to “appear” to be a single charge. The outermost electron in each of these atoms is further from the nucleus for higher atomic number, and hence has a successively lower binding energy.

4. 교재 p. 265 #22

(답안) 이 문제의 답안은 다음과 같습니다.

7-22: In the ground state, a hydrogen atom has no orbital angular momentum, and there can be no spin-orbit coupling.