Unit 8 - Week 6

Assignment 6

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-03-11, 23:59 IST.

1) A dielectric can be piezoelectric, pyroelectric or ferroelectric, only if it is — 1 point

(a) Centro symmetry

(b) Non- Centro symmetry

(c) Free electrons

(d) None of these

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b)

2) Spontaneous polarization takes place in ferroelectric crystals due to — 1 point

(a) Atoms

(b) Free-electrons

(c) Permanent dipoles

(d) None of these

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(c)

3) Which is ferroelectric material? — 1 point

(a) Cu

(b) $BaTiO_3$

(c) H_2O

(d) HCl

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b)

4) The substances which are expected to show electron spin resonance (E.S.R) spectroscopy when atoms and molecules of the substance have — 1 point

(a) No net electron spin

(b) No net electronic magnetic moment

(c) No interaction between the electron spins and an applied magnetic field

(d) Unpaired electron spins

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d)

5) The Lande g-factor for the level $^3D_3$ is — 1 point

(a) $\frac{2}{3}$

(b) $\frac{3}{2}$

(c) $\frac{3}{4}$

(d) $\frac{4}{3}$

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d)

6) The Most easily interpreted evidence for splitting of atomic energy levels in an external magnetic field is electron spin resonance. If the ^{11}Na atoms in their ground state are placed in a region containing electromagnetic radiation of frequency 'v', and a magnetic field of strength B is applied to the region, the energy of electromagnetic radiation will be strongly absorbed when the photons have energy hv which just equals the Zeeman splitting of the two components of the ground state energy level. The reason is that these photons are able to induce transitions between the components in which they are absorbed. If frequency of electronic radiation $v=9.3\times10^9$ Hz. Determine the value of B at which the frequency defined by the Zeeman splitting is in resonance with this frequency of electromagnetic radiation. — 1 point

Given: The ground state of ^{11}Na is a $^2S_{1/2}$ state, for which g = 2 and $m_j=\pm1/2$. Bohr magnetron $\mu_B = 9.3\times10^{-24}$ A/m^2 and Planck constant h =6.6×10^{-34} J.s

(a) 0.33 T

(b) 0.43 T

(c) 3.3 T

(d) 6.6 T

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a)

7) In an electron spin resonance experiment the sample having one free electron is placed in a magnetic field of 1.2 T. Calculate the resonance frequency of electromagnetic radiation when g = 2. (Given: Bohr magnetron $\mu_B = 9.3\times10^{-24}$ A/m^2 and Planck constant h =6.6×10^{-34} J.s) — 1 point

(a) 11.2 GHz

(b) 23.8 GHz

(c) 33.8 GHz

(d) 53.7 GHz

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(c)

8) Electron spin resonance is observed for atomic hydrogen with an instrument supplied electromagnetic radiation of frequency 1×10^{10} Hz. If the g value for the electron in the hydrogen atom is 2.003, what is the magnetic field applied? (Given: Bohr magnetron $\mu_B = 9.3\times10^{-24}$ A/m^2 and Planck constant h =6.626×10^{-34} J.s) — 1 point

(a) 1.212 T

(b) 0.356 T

(c) 2.712 T

(d) 0.126 T

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b)

9) Electron spin resonance is observed for atomic hydrogen at a magnetic field B = 0.35 T. Calculate g value for the electron in the hydrogen atom, if the operating frequency of electromagnetic radiation is 9.5GHz. (Given: Bohr magnetron $\mu_B = 9.3\times10^{-24}$ A/m^2 and Planck constant h =6.6×10^{-34} J.s) — 1 point

(a) 2.04

(b) 1.92

(c) 1.83

(d) 1.74

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a)

10) Calculate the ratio of the number of vacancies in equilibrium at temperature T = 300 K in aluminium to that produced by rapid quenching from 800 K. The average energy required to create a vacancy in aluminium is E_v = 7 eV. (Given: Boltzmann constant, $K_B = 8.6\times10^{-5}$ eV/K) — 1 point

(a) 4.3×10^{-4}

(b) 5.7×10^{-9}

(c) 8.6×10^{-10}

(d) 9.3×10^{-11}

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a)

11) Ionic crystals are very good insulators at room temperature but conducting at higher temperature due to — 1 point

(a) Production of electron-hole pairs as semiconductor material

(b) Thermal expansion of the ionic solid

(c) Transition of large number of electrons from valence band

(d) Motion of ionic charge

(a) (b) (c) (d)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d)