

Unit 4 - Week 3

Course outline

How to access the portal?

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Week 3

- Rotational, rotational Raman Spectroscopy theory & Application -I

- Rotational, rotational Raman Spectroscopy theory & Application -II

- Vibrational Spectroscopy Theory & Application -I

- Quiz : Assignment 3

- Feedback

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Download Videos (mp4,flv,3gp,mp3)

Lecture Slides

Assignment 3

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

Due on 2019-08-21, 23:59 IST.

 1) Energy gap between rotational energy levels (Jmol⁻¹)

1 point

- 10¹-10³
 10-10⁵
 10³-10⁵
 10⁴-10⁶

No, the answer is incorrect.

Score: 0

Accepted Answers:

 10¹-10³

2) Relationship between Cartesian coordinate (x,y and z) and polar co-ordinates as

1 point

- $x=rsin\theta\cos\phi, y=rsin\theta, z=r\cos\theta$
 $x=rsin\theta\cos\phi, y=rsin\theta\sin\phi, z=r\cos\theta$
 $x=r\cos\phi, y=rsin\theta, z=r\cos\theta$
 $x=rsin\phi, y=rsin\theta, z=r\cos\theta$

No, the answer is incorrect.

Score: 0

Accepted Answers:

 $x=rsin\theta\cos\phi, y=rsin\theta\sin\phi, z=r\cos\theta$

 3) In a rotational spectrum, transitions are only observed between rotational levels of $\Delta J=$

1 point

- ± 1
 ± 2
 $\pm 1/2$
 ± 4

No, the answer is incorrect.

Score: 0

Accepted Answers:

 ± 1

4) The Rotational spectrum of a rigid diatomic rotor consists of equally spaced lines with spacing equal to :

1 point

- B
 B/9
 3B/2
 2B

No, the answer is incorrect.

Score: 0

Accepted Answers:

2B

 5) For a Two Dimensional rigid rotor what is a solution of ϕ

1 point

- $\Phi = \frac{1}{2\pi} e^{-im\phi}$
 $\Phi = \frac{1}{2\pi} e^{im\phi}$
 I & II.
 None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

None of these

6) What is value is value Y(l,m) when l&m =0

1 point

- $\frac{1}{\sqrt{4\pi}}$
 1/4
 1/2
 None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

 $\frac{1}{\sqrt{4\pi}}$

7) Which one of the following transitions between two rotational levels is not allowed?

1 point

- J(1)→J(0)
 J(2)→J(1)
 Both I. and II.
 No Transitions

No, the answer is incorrect.

Score: 0

Accepted Answers:

No Transitions

 8) The Rotational spectrum of HI is found to contain a series of lines with a separation of 12.8cm⁻¹. Moment of inertia for the molecule is

1 point

- 4.36x10⁻⁴⁰ gcm²
 1.13 x10⁻⁴⁰ gcm²
 2.23 x10⁻⁴⁰ gcm²
 8.72 x10⁻⁴⁰ gcm²

No, the answer is incorrect.

Score: 0

Accepted Answers:

 4.36x10⁻⁴⁰ gcm²

 9) The J_{max} for a rigid diatomic molecule for which at 300K, the rotational constant is 1.566cm⁻¹ , is

1 point

- 4
 8
 6
 10

No, the answer is incorrect.

Score: 0

Accepted Answers:

8

10) The relationship that is true for a prolate symmetrical rotor is:

1 point

- I_A < I_B = I_C
 I_B < I_A = I_C
 I_A < I_B < I_C
 I_A = I_B = I_C

No, the answer is incorrect.

Score: 0

Accepted Answers:

 I_A < I_B = I_C

11) Example for oblate symmetrical rotor:

1 point

- Benzene molecule
 Methane molecule
 Both
 None of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

Benzene molecule

12) Identify which of the following pairs of molecules exhibit both a pure rotational spectrum and a rotational Raman spectrum

1 point

- O₂ and H₂O
 CO₂ and N₂O
 CO and CH₄
 NO and DCCH

No, the answer is incorrect.

Score: 0

Accepted Answers:

NO and DCCH

13) Upon application of a weak magnetic field, a line in the microwave absorption spectrum of a rigid rotor splits into 3 lines. The quantum number (J) of the rotational energy level from which the transition originates is:

1 point

- 1
 2
 0
 4

No, the answer is incorrect.

Score: 0

Accepted Answers:

1

14) For which of the molecule pure rotational spectrum will be observed:

1 point

- N₂
 CO₂
 H₂
 OCS

No, the answer is incorrect.

Score: 0

Accepted Answers:

OCS

15) Which of the following diatomic molecule will not give a rotational spectrum?

1 point

- N₂
 CO
 NO
 HF

No, the answer is incorrect.

Score: 0

Accepted Answers:

 N₂