

Unit 4 - Week 2 - Glimpse of Quantum Informatics

Course outline

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Assignment-2

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) Enclosing a free particle in an infinite boundary potential result in:

1 point

- quantum mechanical nature
- discrete energy levels
- restricted motion
- all the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
all the above

2) For a rigid rotor at $l = 3$ state level:

1 point

- Both energy and linear momentum remain constant with time
- Both energy and linear momentum change with time
- Linear momentum changes but energy remains constant with time
- Energy changes but linear momentum remains constant with time

No, the answer is incorrect.
Score: 0

Accepted Answers:

Linear momentum changes but energy remains constant with time

3) The energy spacing of the vibrational (ΔE_{vib}), rotational (ΔE_{rot}) and translational (ΔE_{tr}) states of a diatomic molecule follow the order:

1 point

- $\Delta E_{\text{vib}} > \Delta E_{\text{rot}} > \Delta E_{\text{tr}}$
- $\Delta E_{\text{vib}} = \Delta E_{\text{rot}} = \Delta E_{\text{tr}}$
- $\Delta E_{\text{vib}} < \Delta E_{\text{rot}} < \Delta E_{\text{tr}}$
- $\Delta E_{\text{tr}} > \Delta E_{\text{rot}} > \Delta E_{\text{vib}}$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$\Delta E_{\text{vib}} > \Delta E_{\text{rot}} > \Delta E_{\text{tr}}$

4) The Schrodinger equation for all multi- electron atom can not be solved exactly due to the

1 point

- spin of the electron
- electron-electron repulsion
- angular momentum of the nucleus
- electron- nucleus attraction

No, the answer is incorrect.
Score: 0

Accepted Answers:

electron-electron repulsion

5)

1 point

If the molecular axis of F_2 is chosen as x-axis instead of the commonly chosen z-axis, the lowest unoccupied molecular orbital would be:

- same as before σ
- π instead of σ
- σ^* instead of σ
- σ instead of σ^*

No, the answer is incorrect.
Score: 0

Accepted Answers:

σ^* instead of σ

6) The number of ways in which two identical spin-half particles can be oriented relative to a magnetic field is

1 point

- 2
- 4
- 5
- 3

No, the answer is incorrect.
Score: 0

Accepted Answers:

3

7) Transition between two electronic states is vertical since there is hardly any nuclear motion while this transition occurs. This principle of vertical transitions is known as

1 point

- Franck-Condon Principle
- Born-Oppenheimer Principle
- Pauli exclusion Principle
- Maximum Multiplicity Principle

No, the answer is incorrect.
Score: 0

Accepted Answers:

Franck-Condon Principle

8) Any two-electron wave function changes sign when the electron indices are exchanged .This is known as the

1 point

- Franck-Condon principle
- Born-Oppenheimer principle
- Pauli exclusion principle
- Hunds rule of maximum multiplicity

No, the answer is incorrect.
Score: 0

Accepted Answers:

Pauli exclusion principle

9) The fact that the nuclear mass is extremely large compared to that of the electron mass is used for the separation of variables in solving the Schrodinger equation. This is known as the

1 point

- Franck-Condon principle
- Born-Oppenheimer principle
- Pauli exclusion principle
- Heisenberg uncertainty principle

No, the answer is incorrect.
Score: 0

Accepted Answers:

Born-Oppenheimer principle

10) The increasing order of bond energy for the diatomic molecules and ions: $O_2^-, N_2, C_2, O_2^+, He_2^+, Be_2$, is as follows

1 point

- $He_2^+ > C_2 > Be_2 > O_2^- > O_2^+ > N_2$
- $Be_2 < He_2^+ < O_2^- < C_2 < O_2^+ < N_2$
- $Be_2 > He_2^+ > O_2^- > C_2 > O_2^+ > N_2$
- $He_2^+ < C_2 < Be_2 < O_2^- < O_2^+ < N_2$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$Be_2 < He_2^+ < O_2^- < C_2 < O_2^+ < N_2$