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CHEMISTRY

NCERT - NCERT CHEMISTRY(GUJRATI)

ATOMIC STRUCTURE - II



1. The kinetic energy of sub-atomic particle is $5.85 imes 10^{-25}$ J. Calculate the frequency of the

particle wave. (Planck's constant,

 $h = 6.626 imes 10^{-34}$ Js)

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2. Calculate the de-Broglie wavelength of an

electron that has been accelerated from rest

through a potential difference of 1 kV

3. Calculate the wavelength associated with an electron (mass $9.1 imes 10^{-31}$ kg) moving with a velocity of

 $10^3m\,{
m sec}^{-1}ig(h=6.626 imes10^{-34}kgm^2\,{
m sec}^{-1}ig)\,.$

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4. A moving electron has 4.55×10^{-25} joules of kinetic energy. Calculate its wavelength (mass = 9.1×10^{-31} kg and $h = 6.626 \times 10^{-34} kgm^2 s^{-1}$).



5. Calculate the kinetic energy of a moving electron which has a wavelength of 4.8 pm. [mass of electron $= 9.11 \times 10^{-31} kg, h = 6.626 \times 10^{-34} Kgm^2 s^{-1}$].]. Watch Video Solution

6. Two particles A and B are in motion. If the wavelength associated with the particle A is

 $5 imes 10^{-8}m$, calculate the wavelength of

particle B, if its momentum is half of A.

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1. Calculate the uncertainty in the velocity of a wagon of mass 3000kg whose position is known to an accuracy of ± 10 pm (Planck's constant = $6.626 \times 10^{-34} Kgm^2 s^{-1}$.

2. Calculate the uncertainty in the position of an electron if the uncertainty in its velocity is $5.7 \times 10^5 m / \sec(h = 6.626 \times 10^{-34} kgm^2 s^{-1})$, mass of the electron $= 9.1 \times 10^{-31} kg$).

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3. The ionization energy of hydrogen atom in the ground state is $1312kJmol^{-1}$. Calculate the wavelength of radiation emitted when the electron in hydrogen atom makes a transition from n = 2 state to n = 1 state (Planck's constant, $h=6.626 imes10^{-34}Js$, velocity of light, $c=3 imes10^8ms^{-1}$, Avogadro's constant, $N_A=6.0237 imes10^{23}{
m mol}^{-1}$).

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4. The electron energy of hydrogen atom in the ground state works out to be -2.18×10^{-18} J per atom. Calculate what will happen to the position of the electron in this atom if an energy of $1.938 imes 10^{-18}$ J is

supplied to the each hydrogen atom.

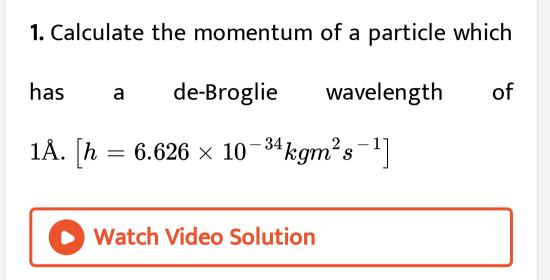


5. Calculate the ionisation energy of hydrogen

atom as well as energy needed to promote its

electron from first energy level to third energy

level



2. What is the mass of a photon of sodium light with a wavelength of 5890 Å? $ig[h=6.626 imes10^{-34}Jsig]$



moving with a velocity of 300 km per hour.



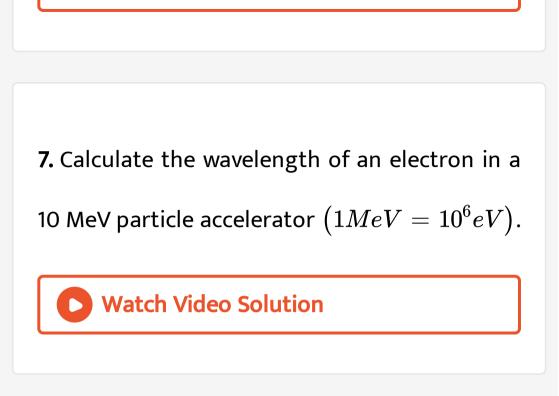
4. What must be the velocity of a beam of electrons if they are to display a de- Broglie wavelength of 100Å?



5. The wavelength of a moving body of mass 0.1 mg is $3.31 imes10^{-29}$ m. Calculate its kinetic energy $\left(h=6.626 imes10^{-34}Js
ight)$.

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6. Calculate the wavelength of a particle of mass $m=6.62 imes10^{-27}$ kg moving with kinetic energy $7.425 imes10^{-13}J(h=6.626 imes10^{-34}kgm^2\,{
m sec}^{-1})$



8. What will be the wavelength of oxygen molecule in picometers moving with a velocity of $660ms^{-1}(h=6.626 imes10^{-34}kgm^2s^{-1})$.

9. A moving electron has $4.9 imes 10^{-25}$ joules of kinetic energy. Find out its de - Broglie wavelength (Given

 $h = 6.626 imes 10^{-34} Js, m_e = 9.1 imes 10^{-31}$ kg).

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10. The approximate mass of an electron is 10^{-27} g. Calculate the uncertainty in its velocity if the uncertainty in its position were of the order of 10^{-11} m

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11. Calculate the product of uncertainity in position and velocity for an electron of mass 9.1×10^{-31} kg according to Heisenberg uncertainty principle.

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12. Calculate the uncertainty in velocity (Δv)

of a cricket ball (mass = 0.15 kg) if the

uncertainty position (Δx) is of the order of 1

Å
$$\left(i.\ e.\ 10^{-10}m
ight)$$
 .

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13. Using uncertainity principle, calculate the uncertainty in velocity of an electron if the uncertainty in position is $10^{-4}m$.



14. The uncertainity in the position of a moving bullet of mass 10 g is 10^{-5} m.Calculate the uncertainty in its velocity .

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Self Evaluation Choose The Correct Answer

1.
$$E_n = -\frac{313.6}{n^2}$$
 , If the value of E_i = -34.84 to which value 'n' corresponds

B. 3

C. 2

D. 1

Answer:

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2. Dual character of an electron was explained

by

A. Bohr

B. Heisenberg

C. de-Broglie

D. Pauli

Answer: Bohr

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3. de-Broglie equation is

A.
$$\lambda = rac{mv}{h}$$

B.
$$\lambda = hmv$$

C.
$$\lambda = \frac{hv}{m}$$

D. $\lambda = \frac{h}{mv}$
Answer: $\lambda = \frac{h}{mv}$
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4. The value of Bohr radius for hydrogen atom

is

A.
$$0.529 imes10^{-8}$$

B. $0.529 imes 10^{-10} cm$

C. $0.529 imes 10^{-6} cm$

D. $0.529 imes10^{-12}cm$

Answer: $0.529 imes 10^{-8}$



5. Which of the following particle having same

kinetic energy, would have the maximum de-

Broglie wave length

A. α - particle

B. proton

C. β - particle

D. neutron

Answer: β - particle

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6. If the energy of an electron in the second Bohr orbit of H-atom is -E, what is the energy of the electron in the Bohr's first orbit? A. 2E

B.-4E

C. - 2E

D. 4E

Answer: -4E

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7. The bond order of oxygen molecule is

B. 1

C. 3

D. 2

Answer: (d) 2

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8. The hybridisation in SF6 molecule is

A. sp^3

$\mathsf{B.}\, sp^3d^2$

 $\mathsf{C.}\,sp^3d$

D. sp^2d^3

Answer: (b) sp^3d^2



9. The intramolecular hydrogen bonding is present in

A. o-nitrophenol

B. m-nitro phenol

C. p-nitrophenol

D. None

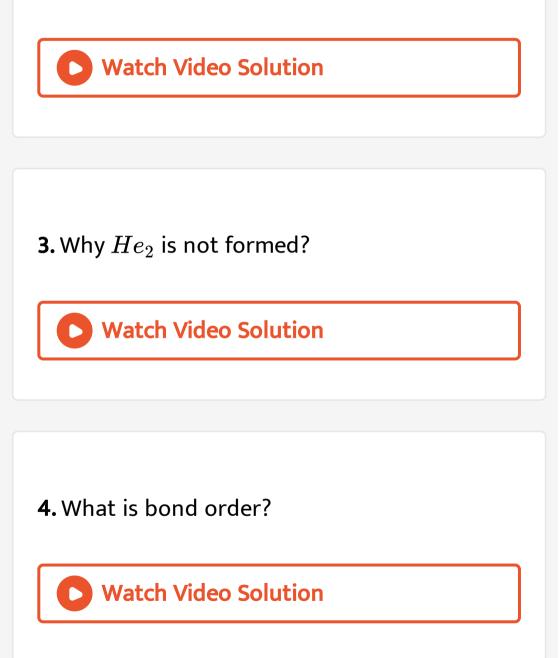
Answer: (a) o-nitrophenol

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Self Evaluation Answer In One Or Two Sentences

1. Define an orbital

2. What are molecular orbitals?



5. Define hybridisation



Self Evaluation Answer Not Exceeding 60 Words

1. Derive de-Broglie's equation. What is its

significance?

2. Discuss the shapes of s, p and d orbitals.

