

National Testing Agency

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Advances in Chemistry and Physics of Materials

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Advances in Chemistry and Physics of Materials

Section Id : 489994281
Section Number : 1
Section type : Online
Mandatory or Optional: Mandatory
Number of Questions: 100
Number of Questions to be attempted: 100
Section Marks: 100
Display Number Panel: Yes
Group All Questions: No

Sub-Section Number: 1
Sub-Section Id: 489994307
Question Shuffling Allowed : Yes

Question Number : 1 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Materials having high dielectric constant are must for

- A. insulation of wires
- B. conduction in wires
- C. transistors
- D. none of these

Options :

- 1. 1
- 2. 2

3. 3

4. 4

Question Number : 2 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Band gap of a material depends upon

- A. particle size
- B. defect structure
- C. grain boundaries
- D. all of above

Options :

1. 1

2. 2

3. 3

4. 4

Question Number : 3 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

When phosphorous atoms are added to silicon, the Fermi level

- A. shifts toward the conduction band
- B. shifts towards the valence band
- C. remains at the center
- D. moves into the valence band

Options :

1. 1

2. 2

3. 3

4. 4

Question Number : 4 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following statement is not true about graphite?

- A. Graphite cannot conduct electricity
- B. Graphite contains delocalized electrons
- C. Graphite has planar hexagonal rings of carbon
- D. Graphite is used as a lubricant

Options :

1. 1

2. 2

3. 3

4. 4

Question Number : 5 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is the principle factor leading the properties of nanomaterials to differ significantly from other materials?

- A. Size distribution
- B. Specific surface area
- C. Quantum size effects
- D. All of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 6 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The energy gap is higher in silicon than in germanium because

- A. it has less number of electrons
- B. it has a high atomic mass number
- C. its crystal has much stronger ionic bonds
- D. its valence electrons are more tightly bound to their parent nuclei

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 7 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Elements present in GaAs compound semiconductor belongs to which column in periodic table?

- A. First and fourth
- B. Fifth and sixth
- C. Third and fifth
- D. None of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 8 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The market forecast of organic electronics for the year 2027 is around

- A. 330 billion USD
- B. 330 Million USD
- C. 100 billion USD
- D. 100 Million USD

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 9 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Against the processing temperature of silicon-based materials, organic materials can be processed at

- A. 500-800°C
- B. 80-120°C
- C. 1000-1500°C
- D. 1800-2000°C

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 10 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Organic field-effect transistors are used as

- A. testbeds for checking the efficacy of organic semiconductors
- B. light emitting devices
- C. one of the components of organic semiconductors
- D. gate electrodes

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 11 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In bottom gate top contact OFET device configuration,

- A. the semiconductor layer is below the source and drain electrodes
- B. the semiconductor layer is immediately above the gate
- C. the current is injected by the gate electrode
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 12 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In bottom gate top contact OFET device, upon application of a gate voltage

- A. charge accumulates at the interface of organic semiconductor and drain
- B. charge accumulates at the interface of organic semiconductor and gate dielectric
- C. charge accumulates on the organic semiconductor layer
- D. charge accumulates in the conducting channel

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 13 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Direct band gap materials are favoured over indirect bandgap materials for optoelectronics devices, because

- A. they have strong light absorption coefficient
- B. transition probability for direct transitions is much larger as compared to indirect one
- C. a few layers can have significant absorption
- D. all of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 14 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Sharing of pi-electrons between two polymer chains may lead to

- A. stabilization of LUMO energy
- B. the raising of LUMO energy
- C. redshift and broadening of absorption bands
- D. all of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 15 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The sulphur atoms in oligothiophenes assist in

- A. developing short intermolecular contacts
- B. lowering the polarizability
- C. solubility
- D. all of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 16 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Tetrathiafulvalene is a

- A. 14-pi aromatic system
- B. 14 pi non-aromatic system
- C. 18-pi aromatic system
- D. 19-pi non-aromatic system

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 17 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

High thermal stability of small molecules can be inferred from

- A. their low HOMO-LUMO gap
- B. the lower optical band gap
- C. their high HOMO-LUMO gap
- D. None of these

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 18 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which out of the following meso-porphyrins are used as organic semiconductors?

- A. 18-pi electron, fully aromatic
- B. 20-pi electron, fully aromatic
- C. 18-pi electron, ant aromatic
- D. Non-conjugated

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 19 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Negative charge carrier accumulates in the OFET device when

- A. no gate voltage is applied
- B. the negative gate voltage is applied
- C. the positive gate voltage is applied
- D. device is annealed

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 20 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The most characteristic feature of the absorption spectrum of aromatic porphyrins is

- A. presence of broad bands
- B. presence of sharp Soret bands
- C. presence of ICT bands
- D. all of the above

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 21 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Tetraoxa[22]porphyrin(2.1.2.1s) is assembled in the solid state as

- A. face-to-face pattern
- B. face-to-edge pattern
- C. layer by layer Herringbone pattern
- D. shifted face to face pattern

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 22 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The single crystal OFET devices based on tetrathia[22]porphyrins with 7,7',8,8'-tetracyanoquinodimethane

- A. show significant degradation upon storage
- B. show insignificant degradation upon storage
- C. show redshift and broadening of absorption bands
- D. all of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 23 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The overall dimensions of thin film OFET devices are in the order of

- A. cm
- B. nm
- C. mm
- D. μm

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 24 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Surface morphology of thin film OFET devices can be recorded using

- A. Powder XRD
- B. AFM
- C. SEM
- D. both (b) and (c)

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 25 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is not a reducing gas?

- A. Chlorine
- B. Methane
- C. Hydrogen Sulfide
- D. Ammonia

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 26 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The sensing material and the analytic can interact by

- A. covalent bonding
- B. hydrogen bonding
- C. molecular recognition
- D. all of above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 27 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Generally, sensors are used in

- A. accelerometers
- B. motion detectors
- C. security surveillance
- D. all of these

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 28 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Chemiresistive gas sensors based on phthalocyanine molecules anchored on carbon nanotubes show improved

- A. selectivity
- B. response
- C. reproducibility
- D. all of the above

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 29 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Higher is the air mass, _____ will be light intensity level.

- A. higher
- B. lower
- C. 10%
- D. none of these

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 30 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For terrestrial applications, solar cell efficiencies are generally measured at

- A. AM0
- B. AM1
- C. AM2
- D. AM1.5

Options :

1. 1
2. 2
3. 3

4. 4

Question Number : 31 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Photovoltaic effect was discovered by

- A. Adams
- B. Becquerel
- C. Green
- D. Hallwachs

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 32 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In an ideal solar cell, diffusion length of minority carriers _____ than solar cell width.

- A. should be much larger
- B. should be much smaller
- C. is sometimes smaller & sometimes larger
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 33 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Metals have conductivity (in $\Omega^{-1}\text{m}^{-1}$)

- A. $>10^3$
- B. 10^2-10^{-6}
- C. $<10^{-7}$
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 34 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

V_{oc} _____ of/with increasing saturation current value.

- A. is independent
- B. decreases
- C. increases
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 35 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A solar cell with light trapping will have an optical path which may be about _____ times larger than device thickness.

- A. 1
- B. 1000
- C. 50
- D. 2

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 36 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Seed crystal used in Czochralski process is _____ crystal.

- A. poly
- B. nano
- C. single
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 37 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In silicon solar cells, base is doped to give a resistivity of _____ ohm-cm.

- A. 10^{-3}
- B. 10^{-2}
- C. 1
- D. 10^3

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 38 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A PV module consists of \approx _____ interconnected solar cells encapsulated into a single unit.

- A. 36
- B. 100
- C. 4
- D. 1000

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 39 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Heavy doping under front contacts of solar cell is carried out to avoid

- A. surface recombination
- B. bulk recombination
- C. junction recombination
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 40 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Catalytic activity of graphene can be improved by using

- i. Nitrides, carbides, sulfides, oxides, and selenides of some nano-scaled early-transition-metal
 - ii. Abundant ternary or quaternary materials such as Copper zinc tin sulfide (CZTS)
- A. (i)
B. (ii)
C. both (i) and (ii)
D. Neither (i) nor (ii)

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 41 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Why do we need to replace the platinum material in CE of DSSCs?

- A. To reduce the cost of DSSCs
- B. To reduce the recombination rate
- C. To increase the absorption of photons
- D. None of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 42 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The units of short circuit current density are

- A. mA/cm^3
- B. mA/cm^2
- C. mA/cm^2
- D. mA/cm^3

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 43 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

N719 dye molecules absorb mostly _____ part of electromagnetic spectrum.

- A. UV
- B. visible
- C. infrared
- D. X-rays

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 44 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Upconversion phosphors transfers the energy to

- A. sensitizer
- B. activator
- C. counter electrode
- D. electrolyte

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 45 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The incorporation of rare earth metals

- A. increases the resistance of CE
- B. decreases the resistance of photoanode
- C. decreases the resistance of CE
- D. increases the resistance of photoanode

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 46 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Back recombination means the recombination of electrons from

- A. LUMO to HOMO level of dye molecules
- B. conduction band of TiO_2 to redox electrolyte potential
- C. LUMO level of dye to redox electrolyte potential
- D. all of these

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 47 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The transition temperature of a high-temperature superconductor is

- A. always above room temperature
- B. below liquid helium temperature
- C. above liquid helium temperature but below room temperature
- D. very close to room temperature

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 48 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The superconducting magnetic energy storage system (SMES)

- A. has a very high energy storage density
- B. has a low energy storage density
- C. is the cheapest energy storage system
- D. can be operated at room temperature with high T_c superconductors

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 49 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In India, about 50% of electricity is generated by

- A. coal and gas
- B. hydroelectric power stations
- C. nuclear power
- D. solar and wind energy

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 50 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Float glass is

- A. made out of silica, soda and lime
- B. made out of metals such as copper and iron
- C. prepared by floating glass melt on tin metal bath
- D. both (a) and (c)

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 51 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In heavy-duty ZnCl_2 batteries,

- A. zinc and NH_4Cl are used as anode and cathode, respectively
- B. ZnCl_2 is used as an electrolyte
- C. MnO_2 and carbon are used as electrodes
- D. zinc and copper are used as electrodes

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 52 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following materials can be used as an electrode in lithium batteries?

- A. Zinc
- B. Copper
- C. LiFePO_4
- D. Platinum

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 53 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The bandgap in monolayer MoS₂ is of the order of

- A. 4.1 eV
- B. 0.4 eV
- C. 3.1 eV
- D. 1.8 eV

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 54 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

MoS₂ exist in three different polytypes, 1T (Trigonal prismatic), 2H (Hexagonal) and 3R (Rhombohedral). Which one of these is unstable?

- A. 1T
- B. 2H
- C. 3R
- D. All are stable

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 55 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Transition Metal Dichalcogenides (TMDCs) are most suitable for electronic or spintronic devices as compared to graphene because

- A. they possess a direct band gap in monolayer form
- B. they have larger mobility as compared to graphene
- C. they have smaller spin-orbit coupling as compared to graphene
- D. their absorption coefficient is smaller

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 56 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following mode arises from in-plane vibrations of a chalcogen atom?

- A. E^1_{2g}
- B. A_{1g}
- C. E^2_{2g}
- D. None of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 57 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

How many atoms are present in a unit cell of MoS_2 ?

- A. 3
- B. 4
- C. 5
- D. 6

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 58 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Facile exfoliation of TMDCs is feasible because

- A. interlayer coupling is stronger
- B. interlayer coupling is weaker
- C. intralayer coupling is stronger
- D. intralayer coupling is weaker

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 59 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Recently it has been shown that 1 nm thick MoS₂ or WS₂ can act as a potential sunlight absorber. The maximum absorbance in this case is in the range of

- A. 2-5%
- B. 5-10%
- C. 20-30%
- D. 30-40%

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 60 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Monolayer MoS₂ is most suitable for light-sensitive applications because

- A. it is a direct band gap material
- B. its band gap lies in the visible region
- C. it is a potential sunlight absorber
- D. all of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 61 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

As the MoS₂ or WS₂ change from bulk to monolayer form, an indirect to direct band gap transition is observed. This is because,

- A. the states which govern direct transition are less affected by interlayer coupling
- B. the states which govern indirect transitions are affected by interlayer coupling
- C. the energy corresponding to direct transition becomes smaller than the indirect transition
- D. all of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 62 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The final entropy of the system in the electrocaloric cycle

- A. decreases w.r.t. initial entropy
- B. increases w.r.t. initial entropy
- C. vanishes
- D. is equal to the initial entropy

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 63 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Multicaloric effect corresponds to the change in entropy of material driven by

- A. electric field
- B. magnetic field
- C. more than one stimuli
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 64 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Entropy value for a system having a negative electrocaloric effect

- A. decreases
- B. increases
- C. remains the same
- D. becomes zero

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 65 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In the process of phosphorescence, the re-emission of absorbed light is

- A. immediate
- B. delayed
- C. dependent upon the nature of the material
- D. none of these

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 66 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The H-aggregates are usually

- A. non-emissive
- B. highly emissive
- C. moderately emissive
- D. none of these

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 67 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The emission band of the enol form in contrast to keto form is at

- A. lower wavelength
- B. higher wavelength
- C. higher energy
- D. both (a) and (c)

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 68 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For core expansion, 1,7-dibromo-PDI was coupled with various 1-alkynes by _____ reaction.

- A. Stille
- B. Sonogashira
- C. Suzuki
- D. all of the above

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 69 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

“Push–Pull” family of perylenes was generated by functionalization at

- A. N-imide, bay-, ortho- position
- B. only peri-position
- C. only bay- position
- D. only the N-imide position

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 70 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

8-Hydroxyquinoline functionalized PDI form hexagonal self-assemblies in the presence of _____ ion.

- A. Pb^{2+}
- B. Zn^{2+}
- C. Pd^{2+}
- D. Ru^{2+}

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 71 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Slip angle (θ) in J-type aggregates is equal to

- A. 90 degree
- B. 180 degree
- C. 0 degree
- D. 260 degree

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 72 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

PDI containing estradiol group may be useful for binding

- A. estrogen receptor
- B. diol receptor
- C. ester receptor
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 73 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

PDI-Hg²⁺ based ensemble can be used for selective detection of

- A. bleomycin
- B. spermine
- C. thiols
- D. avidin proteins

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 74 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For application in bio-labeling chromophore dye should

- A. possess water solubility
- B. possess high quantum yield and biocompatibility
- C. absorb and emit above 500 nm
- D. all of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 75 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

_____ Formation of aromatic radical anions in aqueous solution, which improved the photo thermal conversion efficiency.

- A. Host-guest complex prevent aggregation of PDI and promote
- B. Host-guest complex promote aggregation of PDI and promote
- C. Aggregation of PDI promote
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 76 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In immunotherapy,

- A. drugs are used to treat any disease
- B. the host immune system is activated to destroy cancer cells
- C. rays are used to treat diseases
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 77 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Perylene dyes are not as good as fullerenes due to

- A. intrinsic π - π stacking
- B. fast bimolecular recombination
- C. bay substitution which leads to twisting
- D. all of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 78 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Perylene diimide dye functionalized with phosphonate groups, show water oxidation with internal quantum efficiencies for water oxidation

- A. ~1%
- B. ~50%
- C. ~100%
- D. ~150%

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 79 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Different printing technologies such as _____ can be used for the fabrication of devices.

- A. Thermal evaporation technique
- B. sputtering
- C. roll-to-roll
- D. all of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 80 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is not an application of ionic liquids?

- A. Green solvents
- B. Electrolytes for storage batteries
- C. Diazo dyes
- D. Gas separation

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 81 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following technique is destructive?

- A. Raman spectroscopy
- B. Photoluminescence
- C. Thermal ablation
- D. Scanning electron microscopy

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 82 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

ORR is an abbreviation for

- A. Organic Reduction Reaction
- B. Oxygen Reduction Reaction
- C. Oxygen Receiving Reaction
- D. none of the above

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 83 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Acyclovir is

- A. an antibacterial ionic liquid
- B. an anti-tuberculosis drug
- C. an anti-viral agent
- D. a natural ingredient

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 84 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Proton exchange membrane fuel cell is used to

- A. split water to give hydrogen
- B. convert chemical energy into electrical energy
- C. both (a) and (b)
- D. neither (a) nor (b)

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 85 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The industry standard for carbon dioxide absorption is

- A. Tetraethyl ammonium chloride
- B. Mono-ethanol amine
- C. Di-ethanol amine
- D. Ethyl methyl imidazolium chloride

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 86 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Sorbitan Laurate is also known as

- A. Tween 60
- B. Tween 80
- C. Span 80
- D. Span 20

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 87 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In third harmonic generations, the generated photons?

- A. twice the energy to that of the entering photons
- B. similar energy to that of the entering photons
- C. thrice the energy to that of the entering photons
- D. none of these

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 88 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is expected to have large charge delocalization?

- A. With $(-C=C-)_n$ linkage
- B. With $(-B=N-)_n$ linkage
- C. With $(-B-O-)_n$ linkage
- D. With $(-B-S-)_n$ linkage

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 89 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The number of bonding orbitals in ferrocene are

- A. 9
- B. 12
- C. 15
- D. 18

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 90 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following excitation is responsible for NLO activity in metal-pyridine chromophores?

- A. Metal to pyridine
- B. Pyridine to metal
- C. Metal to metal
- D. Pyridine to pyridine

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 91 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In the third harmonic generation, the output of Nd: YAG laser is

- A. 1064 nm
- B. 532 nm
- C. 834 nm
- D. 1500 nm

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 92 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Quadratic polarizability is also referred to as

- A. first-order polarizability
- B. first polarizability
- C. first hyperpolarizability
- D. second hyperpolarizability

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 93 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Difference frequency generation is a special case of

- A. second harmonic response with two frequency input
- B. third harmonic response with three frequency input
- C. second harmonic response with two frequency output
- D. third harmonic response with three frequency output

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 94 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Z-scan techniques allow computing contributions of

- A. linear absorption and refraction
- B. non-linear absorption and reflection
- C. non-linear absorption and refraction
- D. linear polarization

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 95 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Saturable absorption is the property of materials where

- absorption of light decreases with increasing light intensity
- absorption of light increases with increasing light intensity
- transmission of light increases with increasing light intensity
- none of these

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 96 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Low energy transitions in ferrocene-based donor-acceptor dyads can be attributed to

- π - π^* transition
- extended π systems
- LMCT
- MLCT

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 97 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The technique that can be used for evaluating second-order polarizability in redox systems is

- FTIR
- fluorescence spectroscopy
- spectroelectrochemistry
- absorption spectroscopy

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 98 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Bathochromic shift in ferrocene-based donor-acceptor systems can be attributed to

- A. stabilization of LUMO energy
- B. the raising of LUMO energy
- C. stabilization of HOMO energy
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 99 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Higher oscillator strength of the transition would mean

- A. higher quadratic hyperpolarizability
- B. lower quadratic hyperpolarizability
- C. higher dipole moment
- D. lower dipole moment

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4

Question Number : 100 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The position of the absorption band in ferrocene-based dyads depends on the

- A. strength of the acceptor
- B. length of the pi-conjugated chain
- C. both (a) and (b) are correct
- D. none of these

Options :

- 1. 1
- 2. 2
- 3. 3
- 4. 4