National Testing Agency

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Chemistry of D block elements

Group Number :	1
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Chemistry of D block elements-1

Section Id :	512452870
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	100
Number of Questions to be attempted :	100

Section Marks :	100
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	512452987
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 51245216614 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The compound of which element is corrosion-resistant?

1. Titanium
2. Iron
3. Manganese
4. None of the above

Options :

51245253339. 1
51245253340. 2
51245253341. 3
51245253342. 4

Question Number : 2 Question Id : 51245216615 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The possible oxidation state(s) for manganese is/are

A. +2

B. +7

C. +8

D. +4

E. +9

Choose the ***correct*** answer from the options given below:

1. A, B and D only
2. A and B only
3. C and E only
4. C only

Options :
51245253343. 1
51245253344. 2
51245253345. 3
51245253346. 4

Question Number : 3 Question Id : 51245216616 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which property is not required for being a catalyst?

1. Variable oxidation state
2. Larger size
3. High ionization energy
4. None of the above

Options :
51245253347. 1
51245253348. 2
51245253349. 3
51245253350. 4

Question Number : 4 Question Id : 51245216617 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which metal in the periodic table has the highest density?

1. Iron
2. Osmium
3. Gold
4. Platinium

Options :
51245253351. 1
51245253352. 2
51245253353. 3
51245253354. 4

Question Number : 5 Question Id : 51245216618 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which among the following metals is less reactive in comparison to the others?

1. Na
2. Cu
3. K
4. Rb

Options :
51245253355. 1

51245253356. 2
51245253357. 3
51245253358. 4

Question Number : 6 Question Id : 51245216619 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Atomic volume in a period of first transition series

1. decreases throughout in a period when going from left to right
2. deceases from d^1 to d^5 configuration and then starts increasing for rest of the elements
3. increases from d^1 to d^5 configuration and then decreases for rest of the elements
4. is directly proportional to the atomic density

Options :
51245253359. 1
51245253360. 2
51245253361. 3
51245253362. 4

Question Number : 7 Question Id : 51245216620 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which one of the following formulae is correct?

1. $\Delta G = -nFE$
2. $\Delta G = E - RT/nF$
3. $\Delta G = -nE$
4. $\Delta G = -nRE$

Options :
51245253363. 1
51245253364. 2
51245253365. 3

51245253366. 4

Question Number : 8 Question Id : 51245216621 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A combination of seven colours of the rainbow forms

1. White color
2. Yellow color
3. Black color
4. Brown color

Options :
51245253367. 1
51245253368. 2
51245253369. 3
51245253370. 4

Question Number : 9 Question Id : 51245216622 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The colour of an object is the colour of the

1. Incident light
2. Reflected light
3. Refracted light
4. Diffracted light

Options :
51245253371. 1
51245253372. 2
51245253373. 3
51245253374. 4

Question Number : 10 Question Id : 51245216623 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

According to Werner's theory, the geometry of the compound $[Fe(NH_3)_6]Cl_3$ would be,

1. Octahedral
2. Tetrahedral
3. Square planar
4. Square pyramidal

Options :
51245253375. 1
51245253376. 2
51245253377. 3
51245253378. 4

Question Number : 11 Question Id : 51245216624 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which among the following statement is NOT true for primary valency?

1. Central metal atom shows primary valency
2. Primary valency is ionizable
3. Primary valency of an atom may vary
4. The structure of a coordination compound depends on primary valency of the central atom

Options :
51245253379. 1
51245253380. 2
51245253381. 3
51245253382. 4

Question Number : 12 Question Id : 51245216625 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Which entity in the molecule $[Co(H_2O)_3(NH_3)_2CN]$ satisfies both the primary and secondary valency of cobalt?

1. H_2O
2. CN^-
3. NH_3
4. None of the above

Options :
51245253383. 1
51245253384. 2
51245253385. 3
51245253386. 4

Question Number : 13 Question Id : 51245216626 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A: Coordination isomerism is caused by the interchange of ligands between the *cis* and *trans* structures

Reason R: *Cis* and *trans* arrangements of molecules form geometrical isomers

Choose the correct answer from the options given below

1. Both A and R are true and and R is the correct reason for Assertion A.
2. A is true, but R is false.
3. Both A and R are true, but R is not the correct reason for Assertion A.
4. A is false, but R is true.

Options :

51245253387. 1

51245253388. 2

51245253389. 3

51245253390. 4

Question Number : 14 Question Id : 51245216627 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The number of possible geometrical isomers of the complex $[Co(NH_3)_3(NO_2)_3]$ is

1. 2
2. 4
3. 3
4. 6

Options :

51245253391. 1

51245253392. 2

51245253393. 3

51245253394. 4

Question Number : 15 Question Id : 51245216628 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Match **List I** with **List II**

List I	**List II**
Coordination compounds	**Type of isomers**
A. Nitropentamminechromium(III) chloride	I. *Cis* and *trans* isomers
B. $Co(NH_3)_4Cl_2(H2O)2$	II. Linkage isomers
C. $Pt(NH_3)_2(CN)_2$	III. Hydrate isomers
D. $Cr(NH_3)_4Cl_2Br_2$	IV. Ionization isomer

Choose the **correct** answer from the options given below:

1. A - II, B - I, C - IV, D - III
2. A - IV, B - III, C - II, D - I
3. A - II, B - III, C - IV, D - I
4. A - II, B - III, C - I, D - IV

Options :

51245253395. 1

51245253396. 2

51245253397. 3

51245253398. 4

Question Number : 16 Question Id : 51245216629 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following theory/theories help(s) to understand the bonding of coordination compounds?

A. Valence Bond Theory
B. Crystal Field Theory
C. Molecular Orbital Theory
D. Kinetic Theory

Choose the correct answer from the options given below

1. A, B and D only
2. B, C and D only
3. A, C and D only
4. A, B, and C only

Options :

51245253399. 1
51245253400. 2
51245253401. 3
51245253402. 4

Question Number : 17 Question Id : 51245216630 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Hybridization in MnO_4^- is

1. sp^3
2. sp^2
3. sd^3
4. None of the above

Options :

51245253403. 1
51245253404. 2

51245253405. 3
51245253406. 4

Question Number : 18 Question Id : 51245216631 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A: The structure of $Fe(CO)_5$ is trigonal bipyramidal

Reason R: Hybridization & type of d-orbital involved in $Fe(CO)_5$ are dsp^3 and d_z^2 respectively

In light of the above statements, choose the ***correct*** answer from the options given below

1. Both **A** and **R** are true and **R** is the correct explanation of **A**
2. Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
3. **A** is true but **R** is false
4. **A** is false but **R** is true

Options :
51245253407. 1
51245253408. 2
51245253409. 3
51245253410. 4

Question Number : 19 Question Id : 51245216632 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

According to Crystal Field Theory, the type of interaction between metal and ligand is

1. Covalent interaction
2. Electrostatic interaction
3. Both 1 and 2
4. None of the above

Options :
51245253411. 1
51245253412. 2
51245253413. 3
51245253414. 4

Question Number : 20 Question Id : 51245216633 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which type(s) of d-orbitals participate(s) in making bonds according to Crystal Field theory?

1. Inner d-orbitals
2. Outer d-orbitals
3. Both Inner and Outer d-orbitals
4. None of the above

Options :
51245253415. 1
51245253416. 2
51245253417. 3
51245253418. 4

Question Number : 21 Question Id : 51245216634 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Given below are two statements

Statement I: Crystal Field Theory is a quantitative model that provides a cause of stability behind the formation of a metal complex.

Statement II: Barycenter is the reference point from where stability or de-stability of d-orbitals is counted.

In light of the above statements, choose the ***most appropriate*** answer from the options given below

1. Both Statement I and Statement II are correct
2. Both Statement I and Statement II are incorrect
3. Statement I is correct but Statement II is incorrect
4. Statement I is incorrect but Statement II is correct

Options :
51245253419. 1
51245253420. 2
51245253421. 3
51245253422. 4

Question Number : 22 Question Id : 51245216635 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Given below are two statements

Statement I: Tetrahedral compounds may also be formed in the presence of a strong field complex.

Statement II: All tetrahedral complexes form the low spin complex.

In light of the above statements, choose the correct answer from the options given below

1. Both Statement I and Statement II are correct
2. Both Statement I and Statement II are incorrect
3. Statement I is correct but Statement II is incorrect
4. Statement I is incorrect but Statement II is correct

Options :
51245253423. 1
51245253424. 2
51245253425. 3
51245253426. 4

Question Number : 23 Question Id : 51245216636 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The correct order of ligands according to Crystal Field theory is

1. $I^- > H_2O > CN^- > NH_3$
2. $CN^- > NH_3 > H_2O > I^-$
3. $CN^- > NH_3 > I^- > H_2O$
4. $I^- > CN^- > H_2O > NH_3$

Options :
51245253427. 1
51245253428. 2

51245253429. 3
51245253430. 4

Question Number : 24 Question Id : 51245216637 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Considering constant pairing energy for Fe(III), Mn(III) and Ru(III), the order of values of CFSE will be:

1. Fe(III) > Ru(III) >Mn(II)
2. Fe(III) >Mn(II) > Ru(III)
3. Ru(III) > Fe(III) >Mn(II)
4. Mn(II) > Fe(III) > Ru(III)

Options :
51245253431. 1
51245253432. 2
51245253433. 3
51245253434. 4

Question Number : 25 Question Id : 51245216638 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A: An octahedral complex is always formed by strong ligands

Reason R: Crystal field splitting energy decides the formation of low spin or a high spin complexes

In light of the above statements, choose the ***correct*** answer from the options given below

1. Both **A** and **R** are true and **R** is the correct explanation of **A**
2. Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
3. **A** is true but **R** is false
4. **A** is false but **R** is true

Options :
51245253435. 1
51245253436. 2
51245253437. 3
51245253438. 4

Question Number : 26 Question Id : 51245216639 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The correct order of crystal field splitting would be

1. $\Delta_t < \Delta_o < \Delta_{sp}$
2. $\Delta_o < \Delta_{sp} < \Delta_t$
3. $\Delta_o < \Delta_t < \Delta_{sp}$
4. None of the above

Options :
51245253439. 1
51245253440. 2

51245253441. 3
51245253442. 4

Question Number : 27 Question Id : 51245216640 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Second and third transition series prefer to form

1. Low spin complex
2. High spin complex
3. Both low and high spin complex
4. None of the above

Options :
51245253443. 1
51245253444. 2
51245253445. 3
51245253446. 4

Question Number : 28 Question Id : 51245216641 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A: All octahedral complexes do not form a symmetrical structure

Reason R: An unsymmetrical filling of electrons may distort the structure of the square planar complex.

In light of the above statements, choose the ***correct*** answer from the options given below

1. Both **A** and **R** are true and **R** is the correct explanation of **A**
2. Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
3. **A** is true but **R** is false
4. **A** is false but **R** is true

Options :
51245253447. 1
51245253448. 2
51245253449. 3
51245253450. 4

Question Number : 29 Question Id : 51245216642 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In an octahedral arrangement which electronic configuration is symmetrically filled?

1. d^1
2. d^3
3. d^7
4. d^2

Options :
51245253451. 1

51245253452. 2
51245253453. 3
51245253454. 4

Question Number : 30 Question Id : 51245216643 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The correct order of d-orbital splitting in a square planar geometry is

1. $d_{z^2} > d_{x^2-y^2} > d_{xy} > d_{xz}, d_{yz}$
2. $d_{x^2-y^2} > d_{z^2} > d_{xz}, d_{yz} > d_{xy}$
3. $d_{z^2} > d_{x^2-y^2} > d_{xz}, d_{yz} > d_{xy}$
4. $d_{x^2-y^2} > d_{xy} > d_{z^2} > d_{xz}, d_{yz}$

Options :
51245253455. 1
51245253456. 2
51245253457. 3
51245253458. 4

Question Number : 31 Question Id : 51245216644 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In d^6 electronic configuration of tetrahedral arrangement, CFSE is

1. $-0.27\ \Delta_o$
2. $-0.13\Delta_o$
3. $-0.54\Delta_o$
4. $-0.26\Delta_o$

Options :
51245253459. 1
51245253460. 2
51245253461. 3

51245253462. 4

Question Number : 32 Question Id : 51245216645 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Fill in the blank

The magnitude of crystal field splitting for the octahedral complex is _____ than the crystal field splitting of tetrahedral complex

1. Equal
2. More
3. Less
4. Zero

Options :
51245253463. 1
51245253464. 2
51245253465. 3
51245253466. 4

Question Number : 33 Question Id : 51245216646 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A: In the tetrahedral arrangement, t_2 orbitals have higher energy than e orbitals

Reason R: In the tetrahedral arrangement, the ligands approach from exactly in between the axis

In light of the above statements, choose the ***correct*** answer from the options given below

1. Both **A** and **R** are true and **R** is the correct explanation of **A**
2. Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
3. **A** is true but **R** is false
4. **A** is false but **R** is true

Options :

51245253467. 1
51245253468. 2
51245253469. 3
51245253470. 4

Question Number : 34 Question Id : 51245216647 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Match **List I** with **List II**

List I	List II
A. Low spin	I. E = 0
B. High spin	II. d^4
C. Barycenter	III. $\Delta_o > P$
D. Unsymmetrical arrangement	IV. $\Delta_o < P$
	V. Square planar

Choose the **correct** answer from the options given below:

1. A-II, B - III, C - IV, D - I
2. A - IV, B - III, C - II, D - I
3. A - III, B - IV, C - I, D - II
4. A-II, B - I, C - IV, D - V

Options :
51245253471. 1
51245253472. 2
51245253473. 3
51245253474. 4

Question Number : 35 Question Id : 51245216648 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The correct order of ionic radii of transition metal ions in presence of weak ligands in an octahedral environment is

1. $Ti^{2+} > V^{2+} > Mn^{2+} > Sc^{2+}$
2. $Sc^{2+} > Mn^{+2} > Ti^{+2} > V^{+2}$
3. $V^{+2} > Ti^{+2} > Mn^{+2} > Sc^{+2}$
4. $Sc^{+2} > Ti^{+2} > V^{+2} > Mn^{+2}$

Options :
51245253475. 1
51245253476. 2
51245253477. 3
51245253478. 4

Question Number : 36 Question Id : 51245216649 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A: Lattice energy of covalent solids are generally high

Reason R: Lattice energy of solids containing small cations are higher

In light of the above statements, choose the ***correct*** answer from the options given below

1. Both **A** and **R** are true and **R** is the correct explanation of **A**
2. Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
3. **A** is true but **R** is false
4. **A** is false but **R** is true

Options :
51245253479. 1
51245253480. 2
51245253481. 3
51245253482. 4

Question Number : 37 Question Id : 51245216650 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Maximum lattice energy in hexahydrated metal halide will be of

1. d^2, d^7
2. d^2, d^8
3. d^3, d^8
4. d^2, d^5

Options :
51245253483. 1
51245253484. 2
51245253485. 3
51245253486. 4

Question Number : 38 Question Id : 51245216651 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which one of the following transitions is allowed?

1. s to s
2. s to d
3. p to d
4. f to f

Options :
51245253487. 1
51245253488. 2
51245253489. 3
51245253490. 4

Question Number : 39 Question Id : 51245216652 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which factor(s) affect the colour of a compound?

A. Nature of ligand

B. Oxidation state of central metal

C. Geometry of the molecule

D. Size of central metal

Choose the ***correct*** answer from the options given below:

1. A, B and D only
2. A, B and C only
3. A, C and D only
4. B, C and D only

Options :

51245253491. 1
51245253492. 2
51245253493. 3
51245253494. 4

Question Number : 40 Question Id : 51245216653 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

$KMnO_4$ shows intense purple color due to

1. d-d transition
2. Metal to ligand charge transfer
3. Ligand to metal charge transfer
4. None of the above

Options :

51245253495. 1
51245253496. 2
51245253497. 3
51245253498. 4

Question Number : 41 Question Id : 51245216654 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which one of the following ions would be paramagnetic?

1. Zn^{2+}
2. Cu^{+2}
3. Sc^{+3}
4. Ti^{4+}

Options :
51245253499. 1
51245253500. 2
51245253501. 3
51245253502. 4

Question Number : 42 Question Id : 51245216655 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which one of the following ions is expected to have the highest spin only magnetic moment?

1. Mn^{+2}
2. Zn^{+2}
3. Cr^{+3}
4. Cu^{+2}

Options :
51245253503. 1
51245253504. 2

51245253505. 3
51245253506. 4

Question Number : 43 Question Id : 51245216656 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A: 3d metals ions are generally paramagnetic in nature

Reason R: They are reducing agents

In light of the above statements, choose the ***correct*** answer from the options given below

1. Both **A** and **R** are true and **R** is the correct explanation of **A**
2. Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
3. **A** is true but **R** is false
4. **A** is false but **R** is true

Options :
51245253507. 1
51245253508. 2
51245253509. 3
51245253510. 4

Question Number : 44 Question Id : 51245216657 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Lanthanoids and actinoids are known as:

A. Main group elements

B. Inner transition metals

C. f-block elements

D. Part of transition metals

Choose the ***correct*** answer from the options given below:

1. A, B and D only
2. A, B and C only
3. B, C and D only
4. A, C and D only

Options :
51245253511. 1
51245253512. 2
51245253513. 3
51245253514. 4

Question Number : 45 Question Id : 51245216658 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Most common oxidation state of lanthanoids and actinoids is:

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

Options :
51245253515. 1

51245253516. 2
51245253517. 3
51245253518. 4

Question Number : 46 Question Id : 51245216659 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The exact order of basic strength of hydroxide is:

1. $La(OH)_3 > Lu(OH)_3 > Al(OH)_3$
2. $Al(OH)_3 > La(OH)_3 > Lu(OH)_3$
3. $La(OH)_3 > Al(OH)_3 > Lu(OH)_3$
4. Order varies with temperature

Options :

51245253519. 1
51245253520. 2
51245253521. 3
51245253522. 4

Question Number : 47 Question Id : 51245216660 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which combination of ions shows the same color?

1. Ce^{+3} & Pr^{+3}
2. Ce^{+3} & Sm^{+3}
3. Eu^{+3} & Dy^{+3}
4. Eu^{+3} & Tb^{+3}

Options :

51245253523. 1
51245253524. 2
51245253525. 3
51245253526. 4

Question Number : 48 Question Id : 51245216661 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which electronic configuration of actinoids shows the diamagnetic property?

1. f^2
2. f^8
3. f^{14}
4. f^4

Options :
51245253527. 1
51245253528. 2
51245253529. 3
51245253530. 4

Question Number : 49 Question Id : 51245216662 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The g value for Ce^{+3} is

1. 3/7
2. 6/7
3. 2/5
4. 4/5

Options :
51245253531. 1
51245253532. 2
51245253533. 3
51245253534. 4

Question Number : 50 Question Id : 51245216663 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Given below are two statements, one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A: The atomic and ionic sizes of elements of the lanthanoid & actinoid series are very very close.

Reason R: They have identical electronic motions and equal energy.

In light of the above statements, choose the ***correct*** answer from the options given below

1. Both **A** and **R** are true and **R** is the correct explanation of **A**
2. Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
3. **A** is true but **R** is false
4. **A** is false but **R** is true

Options :

51245253535. 1
51245253536. 2
51245253537. 3
51245253538. 4

Question Number : 51 Question Id : 51245216664 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The physicochemical properties of the lanthanoids are expected to be very close and practically found nearby due to similar

A. Melting Point

B. Valency

C. Oxidation State

D. size

Choose the ***correct*** answer from the options given below:

1. A, B and D only
2. A, B, and C only
3. A, C, and D only
4. B, C, and D only

Options :

51245253539. 1
51245253540. 2
51245253541. 3
51245253542. 4

Question Number : 52 Question Id : 51245216665 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Absorption of light by a sample depends on

1. Nature of sample
2. Velocity of light
3. Refractive index
4. None of the above

Options :

51245253543. 1
51245253544. 2
51245253545. 3
51245253546. 4

Question Number : 53 Question Id : 51245216666 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Rotational spectroscopy is observed in which one of the following regions?

1. Infrared
2. Radiowave
3. Microwave
4. None of the above

Options :
51245253547. 1
51245253548. 2
51245253549. 3
51245253550. 4

Question Number : 54 Question Id : 51245216667 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following statements are correct?

A. Spectrum obtained from molecular species appears to be broad.

B. Spectrum obtained from molecular species is called band spectrum.

C. Spectrum obtained from molecular species is identical to the spectrum obtained from constituent atomic spectra.

D. The absorption spectrum obtained from benzene vapour is called band spectrum

Choose the ***correct*** answer from the options given below:

1. A, B and D only
2. A and B only
3. B and C only
4. B, C and D only

Options :
51245253551. 1
51245253552. 2
51245253553. 3
51245253554. 4

Question Number : 55 Question Id : 51245216668 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which molecule will be microwave active?

1. H_2
2. HCl
3. N_2
4. CO_2

Options :
51245253555. 1
51245253556. 2
51245253557. 3
51245253558. 4

Question Number : 56 Question Id : 51245216669 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The mass of the electron is

1. 9.109×10^{-28} kg
2. 9.109×10^{-31} kg
3. 1.602×10^{-31} kg
4. 1.602×10^{-28} kg

Options :
51245253559. 1
51245253560. 2
51245253561. 3
51245253562. 4

Question Number : 57 Question Id : 51245216670 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Neutron was discovered by

1. Hideki Yukawa
2. Rutherford
3. Chadwick
4. Niels Bohr

Options :
51245253563. 1

51245253564. 2
51245253565. 3
51245253566. 4

Question Number : 58 Question Id : 51245216671 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Existence of positron was predicted theoretically, by

1. Dirac (1928)
2. Anderson (1932)
3. Albert Einstein (1905)
4. Niels Bohr (1912)

Options :
51245253567. 1
51245253568. 2
51245253569. 3
51245253570. 4

Question Number : 59 Question Id : 51245216672 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The shape of the orbital and the electronic angular momentum is controlled by

1. Principal quantum number
2. Azimuthal quantum number
3. Magnetic quantum number
4. Spin quantum number

Options :
51245253571. 1
51245253572. 2
51245253573. 3

51245253574. 4

Question Number : 60 Question Id : 51245216673 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The selection rules governing transition for the single electron of the hydrogen atom

A. $\Delta n = 0$

B. $\Delta l = \pm 1$

C. $\Delta m = \pm 1$

D. Δn = anything

Choose the ***correct*** answer from the options given below:

1. A, B and D only
2. A and B only
3. B and C only
4. B and D only

Options :
51245253575. 1
51245253576. 2
51245253577. 3
51245253578. 4

Question Number : 61 Question Id : 51245216674 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Balmer series arises

1. Due to the transition of an electron from any of the higher energy levels to the second energy level
2. Due to the transition of an electron from any of the higher energy levels to the first energy level
3. Due to the transition of an electron from any of the higher energy level to the third energy level
4. None of the above

Options :
51245253579. 1
51245253580. 2
51245253581. 3
51245253582. 4

Question Number : 62 Question Id : 51245216675 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The operator $\hat{H}$ is normally known as

1. Hermitian operator
2. Hamiltonian Operator
3. Nonlinear operator
4. None of the above

Options :
51245253583. 1
51245253584. 2
51245253585. 3
51245253586. 4

Question Number : 63 Question Id : 51245216676 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

All quantum mechanical operators are

1. Linear
2. Nonlinear
3. Commutative
4. None of the above

Options :

51245253587. 1
51245253588. 2
51245253589. 3
51245253590. 4

Question Number : 64 Question Id : 51245216677 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The first derivative of wave function psi is

1. Discontinuous
2. Continuous
3. Zero
4. None of the above

Options :

51245253591. 1
51245253592. 2
51245253593. 3
51245253594. 4

Question Number : 65 Question Id : 51245216678 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The wave function Psi is

1. Zero
2. Multiple valued
3. Single valued
4. None of the above

Options :
51245253595. 1
51245253596. 2
51245253597. 3
51245253598. 4

Question Number : 66 Question Id : 51245216679 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Quantum mechanics describe

1. Laws of motion of microscopic particles
2. Laws of motion of macroscopic particles
3. Laws of motion of both microscopic and macroscopic particles
4. None of the above

Options :
51245253599. 1
51245253600. 2
51245253601. 3
51245253602. 4

Question Number : 67 Question Id : 51245216680 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

"Matter has wave-like properties under certain conditions and can exhibit wave-particle duality as light" was postulated by

1. Lord Rayleigh
2. Schrödinger
3. Heisenberg
4. Louis de Broglie

Options :
51245253603. 1
51245253604. 2
51245253605. 3
51245253606. 4

Question Number : 68 Question Id : 51245216681 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Energy of a particle in one-dimensional box is designated as

1. $E_n = \frac{n^2 h^3}{8mL^2}$ where, n = 1, 2, 3, ...
2. $E_n = \frac{n^2 h^2}{8mL^2}$ where, n = 1, 2, 3, ...
3. $E_n = \frac{n^2 h^2}{8mL^2}$ where, n = 0, 1, 2, 3, ...
4. None of the above

Options :
51245253607. 1
51245253608. 2
51245253609. 3
51245253610. 4

Question Number : 69 Question Id : 51245216682 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The most probable position of finding a particle for the first quantum state (n = 1) anywhere in the range 0 < x < L according to the particle in the one-dimensional box model system is

1. L/4
2. L/2
3. L
4. L/3

Options :
51245253611. 1
51245253612. 2
51245253613. 3
51245253614. 4

Question Number : 70 Question Id : 51245216683 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If J is the rotational quantum number, the allowed transitions in rotational spectroscopy will follow the selection rule:

1. $\Delta J = \pm 2$
2. $\Delta J = \pm 1$
3. $\Delta J = 0$
4. None of the above

Options :
51245253615. 1
51245253616. 2
51245253617. 3
51245253618. 4

Question Number : 71 Question Id : 51245216684 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which one of the following molecules exhibits a pure rotational spectrum?

1. N_2
2. O_2
3. CO_2
4. CO

Options :
51245253619. 1
51245253620. 2
51245253621. 3
51245253622. 4

Question Number : 72 Question Id : 51245216685 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Microwave spectroscopy deals with

1. Translational degree of freedom
2. Rotational degree of freedom
3. Vibrational degree of freedom
4. None of the above

Options :
51245253623. 1
51245253624. 2
51245253625. 3
51245253626. 4

Question Number : 73 Question Id : 51245216686 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The moment of inertia of HCl molecule about an axis passing through the centre of mass and perpendicular to the line joining the H^+ and Cl^- ions will be:

(If the interatomic distance is 1A°).

1. 10.61×10^{-44} Kg.m^2
2. 9.3×10^{-47} Kg.m^2
3. 9.3×10^{-53} Kg.m^2
4. 9.3×10^{-41} Kg.m^2

Options :
51245253627. 1
51245253628. 2
51245253629. 3
51245253630. 4

Question Number : 74 Question Id : 51245216687 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following show simple harmonic motion?

A. Simple pendulum

B. Mass tied to spring

C. Motion of a kite

D. Motion of an accelerated car wheel

Choose the ***correct*** answer from the options given below:

1. A and D only
2. B and C only
3. A and B only
4. B and D only

Options :

51245253631. 1
51245253632. 2
51245253633. 3
51245253634. 4

Question Number : 75 Question Id : 51245216688 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Electromagnetic radiation that is responsible for the vibrational spectrum is

1. Microwave
2. Infrared
3. Radiowave
4. Visible

Options :

51245253635. 1
51245253636. 2
51245253637. 3
51245253638. 4

Question Number : 76 Question Id : 51245216689 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The nature of curve obtained for variation of potential energy of a Simple Harmonic Oscillator with displacement is:

1. Circle
2. Ellipse
3. Parabola
4. Hyperbola

Options :
51245253639. 1
51245253640. 2
51245253641. 3
51245253642. 4

Question Number : 77 Question Id : 51245216690 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Selection rule for vibrational transitions in a simple harmonic oscillator:

1. $\Delta\upsilon = \pm 1$
2. $\Delta\upsilon = \pm 2$
3. $\Delta\upsilon = 0$
4. None of the above

Options :
51245253643. 1

51245253644. 2
51245253645. 3
51245253646. 4

Question Number : 78 Question Id : 51245216691 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

What is the essential criterion for a molecule to show vibrational spectrum?

1. Change in dipole moment
2. Change in charge
3. Change in distance
4. None of the above

Options :
51245253647. 1
51245253648. 2
51245253649. 3
51245253650. 4

Question Number : 79 Question Id : 51245216692 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

With increase in the vibrational quantum number υ, the amplitude of vibration

1. Remains same
2. Decreases
3. Increases
4. Randomly changes

Options :
51245253651. 1
51245253652. 2
51245253653. 3

51245253654. 4

Question Number : 80 Question Id : 51245216693 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The order of spacing between consecutive vibrational energy levels of a diatomic molecule is

1. 10^{3} cm^{-1}
2. 10^{-3} cm
3. 10^{-3} cm^{-1}
4. None of the above

Options :
51245253655. 1
51245253656. 2
51245253657. 3
51245253658. 4

Question Number : 81 Question Id : 51245216694 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Fill in the blank

Energy required for rotation is _____as compared to energy required for vibration.

1. Greater
2. Less
3. Equal
4. Extremely high

Options :
51245253659. 1
51245253660. 2
51245253661. 3

51245253662. 4

Question Number : 82 Question Id : 51245216695 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Fill in the blank

As per _____approximation, the total energy of a molecule is the sum of its rotational, vibrational and electronic energies.

1. Einstein
2. Maxwell
3. Schrodinger
4. Born Oppenheimer

Options :
51245253663. 1
51245253664. 2
51245253665. 3
51245253666. 4

Question Number : 83 Question Id : 51245216696 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A transition from $\upsilon = 0$ to $\upsilon = 1$, but involving $\Delta J = 0$ will result in which type of branch?

1. 'P' branch
2. 'Q' branch
3. 'R' branch
4. 'S' branch

Options :
51245253667. 1
51245253668. 2
51245253669. 3

51245253670. 4

Question Number : 84 Question Id : 51245216697 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

What are the factors on which the Intensity of spectral lines depends?

A. Nature of the sample

B. Probability of transition

C. Relative population of energy states

D. Volume of sample

Choose the ***correct*** answer from the options given below:

1. A, B and D only
2. B, C and D only
3. A, C, and D only
4. A, B, and C only

Options :
51245253671. 1
51245253672. 2
51245253673. 3
51245253674. 4

Question Number : 85 Question Id : 51245216698 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If a molecule has 'N' atoms, total degrees of freedom will be

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

Options :
51245253675. 1
51245253676. 2
51245253677. 3
51245253678. 4

Question Number : 86 Question Id : 51245216699 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Translational motion of a body is described by the motion of its

1. Heavy point
2. Center of mass
3. End point
4. Starting point

Options :
51245253679. 1
51245253680. 2
51245253681. 3
51245253682. 4

Question Number : 87 Question Id : 51245216700 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Emission without a change in spin multiplicity

1. involves an intersystem crossing
2. is called phosphorescence
3. is spin forbidden
4. is called fluorescence

Options :
51245253683. 1
51245253684. 2
51245253685. 3
51245253686. 4

Question Number : 88 Question Id : 51245216701 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

What is (are) the selection rule(s) for the allowed electronic transition called?

A. Spin rule

B. Laporte selection rule

C. Hund's rule

D. Avogadro's rule

Choose the ***correct*** answer from the options given below:

1. A and B only
2. B and C only
3. C and D only
4. A and C only

Options :
51245253687. 1

51245253688. 2
51245253689. 3
51245253690. 4

Question Number : 89 Question Id : 51245216702 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Hamiltonian describes

1. Kinetic energy of an individual atom
2. Potential energy of an individual atom
3. Kinetic energy and potential energy of an individual atom
4. None of the above

Options :
51245253691. 1
51245253692. 2
51245253693. 3
51245253694. 4

Question Number : 90 Question Id : 51245216703 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The energy E of a photon emitted, as the particle makes a transition from the n = 2 state to the n = 1 state is

1. $\frac{3h^2}{8m_e l^2}$
2. $\frac{2h^2}{8m_e l^2}$
3. $\frac{h^2}{8m_e l^2}$
4. None of the above

Options :
51245253695. 1
51245253696. 2
51245253697. 3
51245253698. 4

Question Number : 91 Question Id : 51245216704 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

What is the colour of a substance if it absorbs the yellow portion of the spectrum?

1. Yellow
2. Blue
3. Red
4. Orange

Options :
51245253699. 1
51245253700. 2
51245253701. 3
51245253702. 4

Question Number : 92 Question Id : 51245216705 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

What happens when an auxochrome is introduced in a chromophore?

1. It deepens the colour
2. It lightens the colour
3. Does not change the colour
4. None of the above

Options :
51245253703. 1

51245253704. 2
51245253705. 3
51245253706. 4

Question Number : 93 Question Id : 51245216706 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The quantum efficiency of a photochemical reaction is defined as

1. Number of molecules decomposed in a given time
2. Ratio of molecules decomposed in a given time to the number of quanta absorbed in the same time
3. Number or quanta absorbed percent time
4. Rates ratio of molecules decomposed in a given time to the number of quanta emitted in the same time

Options :

51245253707. 1
51245253708. 2
51245253709. 3
51245253710. 4

Question Number : 94 Question Id : 51245216707 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which one of the following is an example of a photochemical reaction?

1. Photosynthesis
2. Decomposition of ammonia
3. Formation of NaOH
4. Decomposition of HCl

Options :

51245253711. 1
51245253712. 2
51245253713. 3
51245253714. 4

Question Number : 95 Question Id : 51245216708 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A quanta is a

1. bundle of energy
2. bundle of heavy mass atoms
3. bundle of molecules
4. bundle of photons

Options :
51245253715. 1
51245253716. 2
51245253717. 3
51245253718. 4

Question Number : 96 Question Id : 51245216709 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In the decomposition reaction of CH_3COCH_3, the quantum yield is-

1. 0
2. >1
3. <1
4. 1

Options :
51245253719. 1
51245253720. 2

51245253721. 3
51245253722. 4

Question Number : 97 Question Id : 51245216710 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In photochemical reactions, absorption of which type(s) of radiation takes place?

1. Ultraviolet and Visible
2. Radio
3. Visible only
4. Visible and X-rays

Options :
51245253723. 1
51245253724. 2
51245253725. 3
51245253726. 4

Question Number : 98 Question Id : 51245216711 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following are the reactions in which molecules absorbing light do not themselves react but induce other molecules to react?

1. Photosensitized reactions
2. Free radical reactions
3. Chain reactions
4. Reversible reactions

Options :
51245253727. 1
51245253728. 2
51245253729. 3

51245253730. 4

Question Number : 99 Question Id : 51245216712 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which among the following material is used in the solar cell?

1. Silicon
2. Barium
3. Selenium
4. Silver

Options :
51245253731. 1
51245253732. 2
51245253733. 3
51245253734. 4

Question Number : 100 Question Id : 51245216713 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The process of separation of molecular oxygen into individual oxygen atoms which subsequently combine to form ozone is called

1. Photochemical dissociation
2. Thermochemical dissociation
3. Thermal dissociation
4. Ionic dissociation

Options :
51245253735. 1
51245253736. 2
51245253737. 3
51245253738. 4