

परीक्षेचे नांव : सहायक प्राध्यापक, रसायनशास्त्र,

परीक्षेचा दिनांक : 27 जुलै, 2014

अस्वायत्त शासकीय अभियांत्रिकी महाविद्यालय, महाराष्ट्र अभियांत्रिकी महाविद्यालयीन शिक्षक सेवा, गट -अ,  
चाळणी परीक्षा-2014

विषय : रसायनशास्त्र

महाराष्ट्र लोकसेवा आयोगामार्फत सहायक प्राध्यापक, रसायनशास्त्र, अस्वायत्त शासकीय अभियांत्रिकी महाविद्यालय, महाराष्ट्र अभियांत्रिकी महाविद्यालयीन शिक्षक सेवा, गट -अ, चाळणी परीक्षा-२०१४ या परीक्षेच्या प्रश्नपत्रिकेची उत्तरतालिका उमेदवारांच्या माहितीसाठी संकेतस्थळावर प्रसिध्द करण्यात आली आहे. सदर उत्तरतालिकेतील प्रश्न-उत्तरांसंबंधी उमेदवारांना निवेदन करावयाचे असल्यास त्यांनी अधिप्रमाणीत स्पष्टीकरण / संदर्भ देऊन तसेच विषय, परीक्षेचे नाव, प्रश्नसंच, प्रश्नक्रमांक यांच्या उल्लेखासह आपले लेखी निवेदन उपसचिव (गोपनीय), महाराष्ट्र लोकसेवा आयोग, बँक ऑफ इंडिया बिल्डिंग, ३ रा मजला, हुतात्मा चौक, मुंबई ४०० ००१ या पत्त्यावर टपालाने पाठवावे. यासंदर्भात दि. ०८ ऑगस्ट, २०१४ पर्यंत आयोगाकडे प्राप्त झालेल्या निवेदनांचीच दखल घेतली जाईल. तदनंतर आलेली निवेदने विचारात घेतली जाणार नाहीत, याची कृपया नोंद घ्यावी

उत्तरतालिका - KEY

# MPSC

## MPSC 27th July 2014 Shift 1

### Notations :

- Options shown in green color and with ✓ icon are correct.
- Options shown in red color and with ✗ icon are incorrect.

<b>Question Paper Name:</b>	Assistant Professor Chemistry ACTUAL final
<b>Subject Name:</b>	Assistant Professor Chemistry
<b>Duration:</b>	60

### Group 1

Group Maximum Duration :	0
Group Minimum Duration :	60
Revisit allowed for view? :	No
Revisit allowed for edit? :	No

### Assistant Professor Chemistry

Mandatory or Optional:	Mandatory
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Question Number : 1 Question Type : MCQ

Correct : 2 Wrong : 0

The correct range of wavelengths of visible region in the electromagnetic spectrum is :

Options :

- ✗ 100 – 200 nm
- ✗ 100 – 400 nm
- ✓ 380 – 780 nm
- ✗ 480 – 580 nm

Question Number : 2 Question Type : MCQ

Correct : 2 Wrong : 0

According to Hooke's law, the stretching vibrational frequency ( $\bar{\nu}$ ) of a bond is represented by which of the following equation?

Options :

- ✓  $\bar{\nu} = \frac{1}{2\pi c} \sqrt{K/\mu}$

2. ✘  $\bar{\nu} = \frac{1}{4\pi c} \sqrt{K/\mu}$

3. ✘  $\bar{\nu} = 2\pi c / \sqrt{K\mu}$

4. ✘  $\bar{\nu} = 2\pi c / K\mu$

Question Number : 3 Question Type : MCQ

Correct : 2 Wrong : 0

NMR spectra of which of the following compound will give two proton signals?

Options :

1. ✔ 2 - Chloropropane

2. ✘ 1 - Chloropropane

3. ✘ 2 - Bromopropene

4. ✘ Vinyl chloride

Question Number : 4 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following spectroscopy technique is used to elucidate structure especially of conjugated molecules?

Options :

1. ✘ Mass spectroscopy

2. ✘ Infrared spectroscopy

3. ✘ NMR spectroscopy

4. ✔ Ultraviolet spectroscopy

Question Number : 5 Question Type : MCQ

Correct : 2 Wrong : 0

A Polymer sample contains 30 percent molecules of molecular mass 20,000; 40 percent molecules of molecular mass 30,000 and the rest molecules of molecular mass 60,000. The value of PDI of this polymer is:

Options :

1. ✘ 2.106

2. ✔ 1.204

3. ✘ 1.240

4. ✘ 0.837

Question Number : 6 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is correct for Ziegler- Natter polymers ?

Options :

1. ✘ They are linear with 70 percent branching
2. ✔ They are linear and have practically no chain branching
3. ✘ They are linear with 30 percent branching
4. ✘ They are stereo-chemically uncontrollable

Question Number : 7 Question Type : MCQ

Correct : 2 Wrong : 0

Cationic polymerization is fastest in which of the following?

Options :

1. ✔ 2 – methylpropene
2. ✘ 2 – Chloroprene
3. ✘ Butene – 1
4. ✘ Butene – 2

Question Number : 8 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following ion is not aromatic in character?

Options :

1. ✘ Cyclopentadienyl anion
2. ✘ Cycloheptatrienyl cation
3. ✔ Cyclopentadienyl cation
4. ✘ Cyclopropenyl cation

Question Number : 9 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is correct for annulenes?

Options :

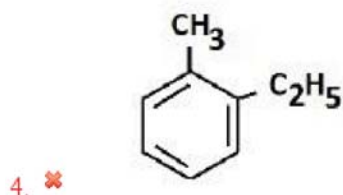
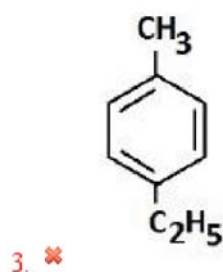
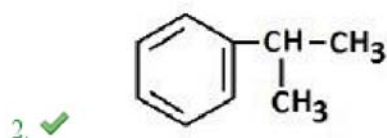
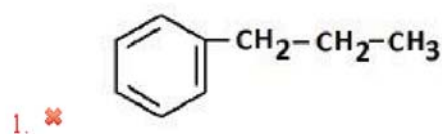
1. ✓ 1. They are monocyclic conjugated polyenes containing ten or more carbon atoms in the ring
2. ✘ 2. They are bicyclic conjugated polyenes containing ten or more carbon atoms in the ring
3. ✘ 3. They are tricyclic conjugated polyenes containing more than ten carbon atoms in the ring
4. ✘ 4. They are monocyclic conjugated polyenes containing eight carbon atoms in the ring

Question Number : 10 Question Type : MCQ

Correct : 2 Wrong : 0

The major product obtained by the reaction of benzene with 1 – Bromopropane in the presence of  $\text{FeBr}_3$  is:

Options :



Question Number : 11 Question Type : MCQ

Correct : 2 Wrong : 0

Out of lactic acid, 2–Bromobutane, 2–methylcyclohexanone and methylcyclohexane, achiral molecule is :

Options :

1. ✘ Lactic acid

2.  Methylcyclohexane
3.  2-Bromobutane
4.  2-Methylcyclohexanone

Question Number : 12 Question Type : MCQ  
Correct : 2 Wrong : 0

. Which of the following does not hold good for  $[\alpha]_D$ , the specific rotation of a compound?

Options :

1.  Sample pathlength ( $l$ ) is 1 decimeter
2.  Sample concentration  $C$  is 1g/mL
3.  Sample pathlength ( $l$ ) is 1 meter
4.  Light of 589 nanometer (nm) wavelengths is used

Question Number : 13 Question Type : MCQ  
Correct : 2 Wrong : 0

Which of the following is correct for mesotartaric acid?

Options :

1.  It is monohydroxydicarboxylic acid
2.  It is optically inactive due to external compensation
3.  It is optically active due to internal compensation
4.  It is optical inactive due to internal compensation

Question Number : 14 Question Type : MCQ  
Correct : 2 Wrong : 0

Correct decreasing order of stability of different conformations of cyclohexane is :

Options :

1.  Twist form > Boat form > Chair form > Half chair form
2.  Chair form > Twist form > Boat form > Half chair form
3.  Half chair form > Boat form > Twist form > Chair form



4. ✓ Chair form > Half chair form > Boat form > Twist form

Question Number : 15 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is not correct for pericyclic reactions?

Options :

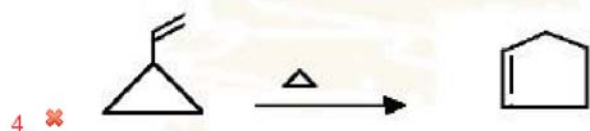
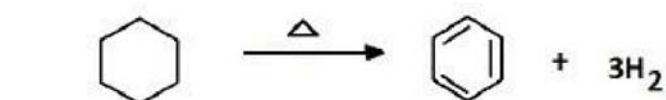
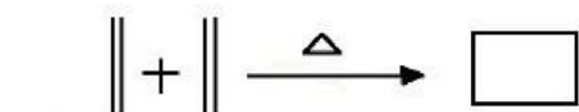
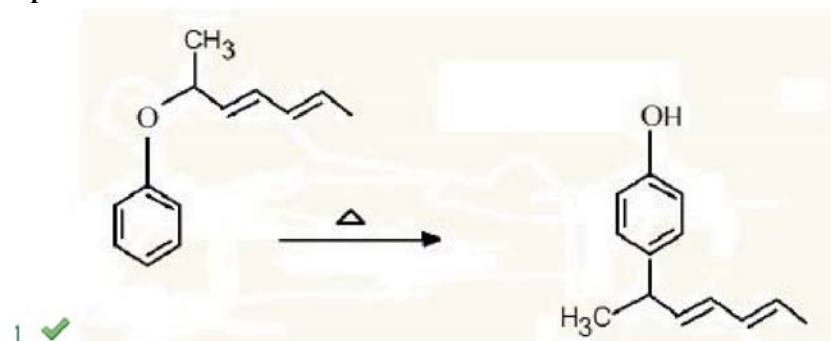
1. ✗ They are single stage concerted reactions
2. ✗ They are intramolecular electrocyclic reactions
3. ✗ They are cycloaddition reactions
4. ✓ They are shown only by alicyclic compounds

Question Number : 16 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is the example of sigmatropic change?

Options :



Question Number : 17 Question Type : MCQ

Correct : 2 Wrong : 0

Cope rearrangement is exhibited by:

Options :

1. ✗ Conjugated dienes

2. ✓ Biallylic hydrocarbons

3. ✗ Conjugated trienes

4. ✗  $\gamma$ -alkylallylaryl ethers

Question Number : 18 Question Type : MCQ

Correct : 2 Wrong : 0

Thiophene is synthesized industrially by cyclisation of:

Options :

1. ✗ Butene – 1

2. ✗ Butene – 2

3. ✓ 1,3 – Butadiene

4. ✗ 1,4 – Pentadiene

Question Number : 19 Question Type : MCQ

Correct : 2 Wrong : 0

The usual reactivity order of pyrrole, furan, and thiophene towards electrophilic substitution reactions is :

Options :

1. ✗ Thiophene > Pyrrole > Furan

2. ✓ Furan > Pyrrole > Thiophene

3. ✗ Pyrrole > Furan > Thiophene

4. ✗ Thiophene > Furan > Pyrrole

Question Number : 20 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following reaction is not involved during skraup synthesis of quinoline?

Options :

1. ✗ Dehydration

2. ✗ 1:4 addition

3. ✓ Hydrogenation



#### 4. ✘ Cyclisation

Question Number : 21 Question Type : MCQ

Correct : 2 Wrong : 0

Benzopyrrole has:

Options :

1. ✔ 4  $\pi$  and 17  $\sigma$  bonds
2. ✘ 4  $\pi$  and 16  $\sigma$  bonds
3. ✘ 3  $\pi$  and 17  $\sigma$  bonds
4. ✘ 4  $\pi$  and 18  $\sigma$  bonds

Question Number : 22 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is correct for killiani- Fischer Synthesis?

Options :

1. ✔ Reaction of aldose with HCN followed by hydrolysis and reduction
2. ✘ Reaction of aldose with KCN followed by hydrolysis and oxidation
3. ✘ Reaction of aldose with HCN followed by hydrolysis and oxidation
4. ✘ Reaction of ketose with HCN followed by hydrolysis and reduction

Question Number : 23 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following hormone contains a benzene like aromatic ring?

Options :

1. ✘ Testosterone
2. ✘ Androsterone
3. ✘ Androstenedione
4. ✔ Estrone

Question Number : 24 Question Type : MCQ

Correct : 2 Wrong : 0

Main components of plant essential oils are:

Options :

1. ✘ Carbohydrates
2. ✔ Terpenes
3. ✘ Steroids
4. ✘ Proteins

Question Number : 25 Question Type : MCQ  
Correct : 2 Wrong : 0

Which of the following  $\alpha$  - amino acid has the lowest value of isoelectric points ?

Options :

1. ✘ Glutamic acid
2. ✘ Glycine
3. ✔ Aspartic acid
4. ✘ Cysteine

Question Number : 26 Question Type : MCQ  
Correct : 2 Wrong : 0

Which of the following is not present in DNA?

Options :

1. ✘ Adenine
2. ✘ Uracil
3. ✘ Guanine
4. ✔ Pyridine

Question Number : 27 Question Type : MCQ  
Correct : 2 Wrong : 0

Which of the following is not correct for enzymes?

Options :

1. ✘ Enzymes are colloidal in nature
2. ✔ They usually contain C, H, N and halogens

- The optimum temperature for enzymatic action is
3. ✘ between 20 - 40°C
4. ✘ The optimum pH for most of the enzyme actions is about 7

Question Number : 28 Question Type : MCQ  
Correct : 2 Wrong : 0

Which of the following does not belong to the category of proteins ?

Options :

1. ✘ Hair
2. ✘ Skin
3. ✘ Pulses
4. ✔ Sodium palmitate

Question Number : 29 Question Type : MCQ  
Correct : 2 Wrong : 0

Efficiency of a photochemical reaction is generally measured in terms of:

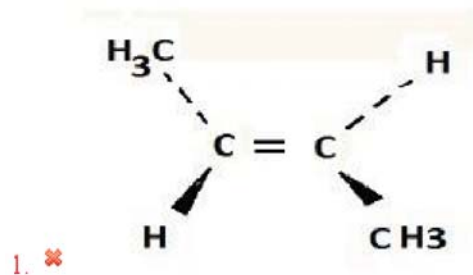
Options :

1. ✘ Primary quantum yield
2. ✘ Secondary quantum yield
3. ✘ Tertiary quantum yield
4. ✔ Overall quantum yield

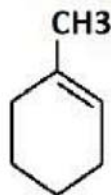
Question Number : 30 Question Type : MCQ  
Correct : 2 Wrong : 0

Cis-trans isomerization is not shown by which of the following compound?

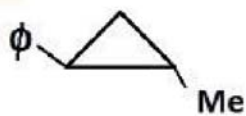
Options :



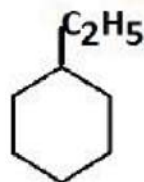
2. ✘



3. ✘



4. ✔



Question Number : 31 Question Type : MCQ

Correct : 2 Wrong : 0

The product obtained by reaction of benzene with excess of chlorine in the presence of sunlight is:

Options :

1. ✔ BHC

2. ✘  $C_6H_5Cl$

3. ✘ 1, 4 - Dichlorobenzene

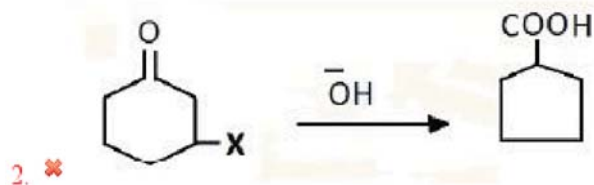
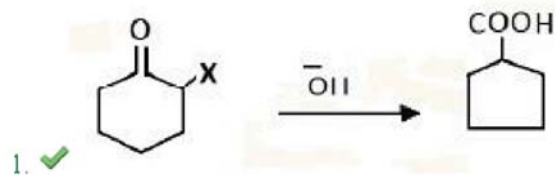
4. ✘ Hexachlorobenzene

Question Number : 32 Question Type : MCQ

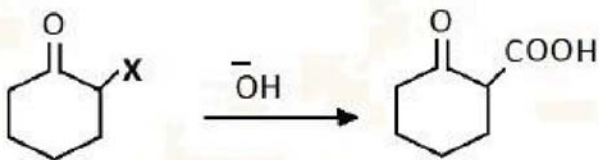
Correct : 2 Wrong : 0

Which of the following is correct for Favorski reaction?

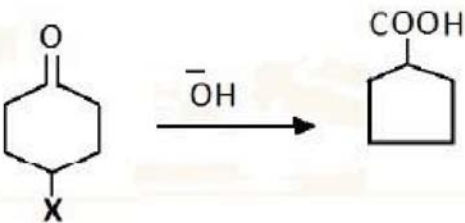
Options :



3. ✘



4. ✘



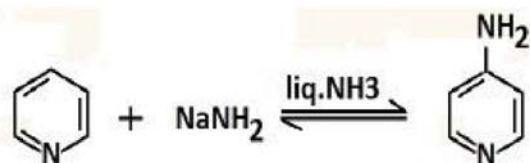
Question Number : 33 Question Type : MCQ

Correct : 2 Wrong : 0

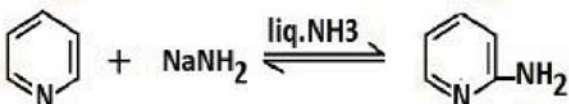
Which of the following is the correct representation of chichibabin reaction?

Options :

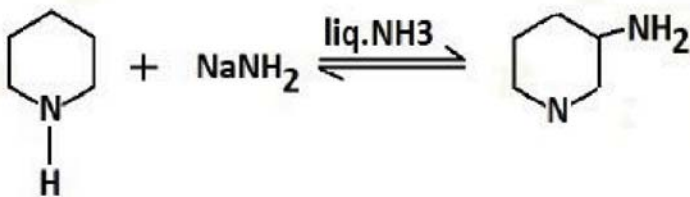
1. ✘



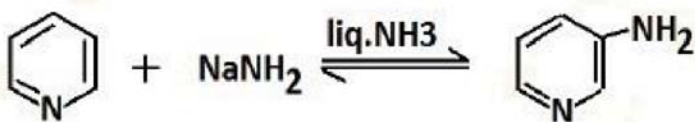
2. ✔



3. ✘



4. ✘



Question Number : 34 Question Type : MCQ

Correct : 2 Wrong : 0

The intermediate ion formed during Mannich reaction is:

Options :

1. ✘ Carbanion

2. ✘ Aminocarbanion

3. ✔ Aminocarbocation

## Anilinium ion

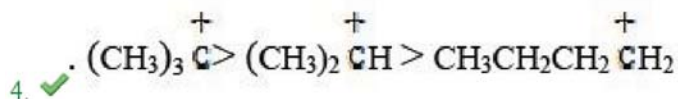
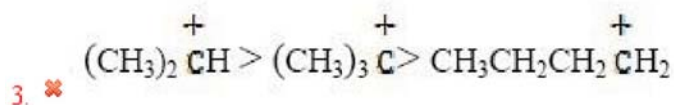
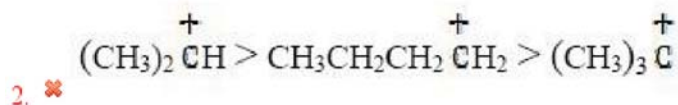
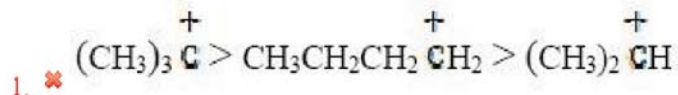
4. ✘

Question Number : 35 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is the correct decreasing order of stability of carbocations?

Options :

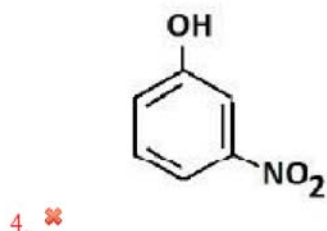
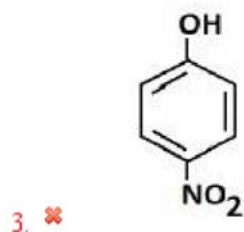
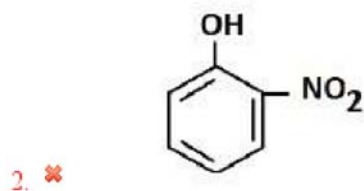
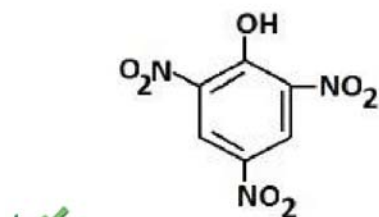


Question Number : 36 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is the strongest acid?

Options :





Question Number : 37 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is correct decreasing order of  $pK_b$  values for different acids?

Options :

- $\text{CH}_3\text{COOH} > \text{CH}_2\text{ClCOOH} > \text{CHCl}_2\text{COOH} > \text{CCl}_3\text{COOH}$
- $\text{CH}_3\text{COOH} > \text{CHCl}_2\text{COOH} > \text{CCl}_3\text{COOH} > \text{CH}_2\text{ClCOOH}$
- $\text{CCl}_3\text{COOH} > \text{HCCl}_2\text{COOH} > \text{CH}_2\text{ClCOOH} > \text{CH}_3\text{COOH}$
- $\text{CH}_3\text{COOH} < \text{CH}_2\text{ClCOOH} < \text{CHCl}_2\text{COOH} < \text{CCl}_3\text{COOH}$

Question Number : 38 Question Type : MCQ

Correct : 2 Wrong : 0

pH of  $10^{-8}$  M HCl Solution is :

Options :

- 8
- 6
- 7.6
- between 6 and 7

Question Number : 39 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is correct decreasing bond angle order?

Options :

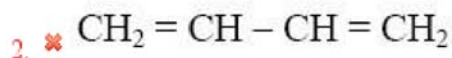
- $\text{NH}_3 > \text{H}_2\text{O} > \text{CCl}_4 > \text{BeF}_2$
- $\text{CCl}_4 > \text{H}_2\text{O} > \text{NH}_3 > \text{BeF}_2$
- $\text{BeF}_2 > \text{CCl}_4 > \text{NH}_3 > \text{H}_2\text{O}$
- $\text{H}_2\text{O} > \text{NH}_3 > \text{CCl}_4 > \text{BeF}_2$

Question Number : 40 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following has  $sp^3$  hybridization?

Options :



Question Number : 41 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following equation is used for calculation of frequency ( $\nu$ ) associated with the absorption and emission of the photon?

Options :

1. ✗ 
$$\nu = R_H \times h \left[ \frac{1}{n_1^2} - \frac{1}{n_f^2} \right]$$

2. ✗ 
$$\nu = \frac{R_H}{h} \left[ \frac{1}{n_f^2} - \frac{1}{n_1^2} \right]$$

3. ✓ 
$$\nu = \frac{R_H}{h} \left[ \frac{1}{n_1^2} - \frac{1}{n_f^2} \right]$$

4. ✗ 
$$\nu = R_H \times h \left[ \frac{1}{n_f^2} - \frac{1}{n_1^2} \right]$$

Question Number : 42 Question Type : MCQ

Correct : 2 Wrong : 0

The orbital with quantum number  $n = 5$  and  $l = 3$  is:

Options :

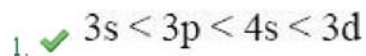


Question Number : 43 Question Type : MCQ

Correct : 2 Wrong : 0

Correct order of orbitals with increasing energy is :

Options :



2. ✘  $4s < 3d < 3p < 3s$

3. ✘  $3s < 3p < 3d < 4d$

4. ✘  $3d < 3p < 3s < 4s$

Question Number : 44 Question Type : MCQ

Correct : 2 Wrong : 0

Heisenberg uncertainty principle is represented by:

Options :

1. ✘  $\Delta p \Delta x = \frac{1}{8} \left( \frac{h}{2\pi} \right)$

2. ✘  $\Delta p \Delta x = \frac{1}{4} \left( \frac{2\pi}{h} \right)$

3. ✘  $\Delta p \Delta x \geq \frac{1}{4} \left( \frac{h}{2\pi} \right)$

4. ✔  $\Delta p \Delta x \geq \frac{1}{2} \left( \frac{h}{2\pi} \right)$

Question Number : 45 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the assumption is wrong for Born-oppenheimer approximation?

Options :

1. ✔ Molecular nuclei move fast

2. ✘ Molecular nuclei move slowly

3. ✘ Molecular nuclei may be treated as stationery

4. ✘ Electrons move in their field

Question Number : 46 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is wrong for time independent perturbation theory?

Options :

1. ✘ All the terms in the denominator are negative

2. ✘ All the terms in the numerator are positive

3. ✘ Stronger the perturbation, the greater the lowering of the ground state energy

Weaker the perturbation, the greater the lowering of the ground state energy

4. ✓

Question Number : 47 Question Type : MCQ

Correct : 2 Wrong : 0

The quantum numbers of four electrons named as A, B, C & D are given below

A.  $n = 3, \ell = 1, m_\ell = -1, m_s = +1/2$

B.  $n = 3, \ell = 2, m_\ell = 0, m_s = +1/2$

C.  $n = 4, \ell = 1, m_\ell = 0, m_s = +1/2$

D.  $n = 4, \ell = 2, m_\ell = -2, m_s = -1/2$

The correct order of their increasing energy is:

Options :

1. ✓  $A < B < C < D$

2. ✗  $B < A < C < D$

3. ✗  $D < C < B < A$

4. ✗  $C < D < B < A$

Question Number : 48 Question Type : MCQ

Correct : 2 Wrong : 0

The electronic configuration of  $[\text{Ar}] 4s^1 3d^{10}$  belongs to which element ?

Options :

1. ✗ Chromium

2. ✗ Iron

3. ✓ Copper

4. ✗ Zinc

Question Number : 49 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is not correct for Raman scattering?

Options :

The molecule returns to a different energy level after interaction with the light

1. ✗

2. ✘ The scattered photon has a longer wavelength than the incident photon
3. ✘ The polarisability of the molecule changes with the vibrations
4. ✔ Raman scattering is not detected by shining light of one wavelength on the sample

Question Number : 50 Question Type : MCQ

Correct : 2 Wrong : 0

The spin quantum numbers  $m_z$  are related to the magnetic moment along z- axis,  $\mu_z$  by which of the following?

Options :

1. ✔  $\mu_z = \gamma \frac{h}{2\pi} m_z$
2. ✘  $\mu_z = h \frac{r}{2\pi} m_z$
3. ✘  $\mu_z = h \frac{r}{4\pi} m_z$
4. ✘  $\mu_z = \gamma \frac{h}{4\pi} m_z$

Question Number : 51 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is not correct for thermodynamics?

Options :

1. ✘ Thermodynamics deals with energy transformation
2. ✘ Thermodynamics deals with energy changes of macroscopic systems
3. ✔ Thermodynamics deals with energy changes of microscopic systems
4. ✘ Thermodynamics is not concerned about rate of energy transformations

Question Number : 52 Question Type : MCQ

Correct : 2 Wrong : 0

The enthalpy of combustion of methane, graphite and dihydrogen at 298K are  $-890.3 \text{ kJ mol}^{-1}$ ,  $-393.5 \text{ kJ mol}^{-1}$ , and  $-285.8 \text{ kJ mol}^{-1}$  respectively. Enthalpy of formation of  $\text{CH}_4$  (g) will be:

Options :

1. ✔  $-74.8 \text{ kJ mol}^{-1}$

2. ✘  $- 52.27 \text{ kJ mol}^{-1}$

3. ✘  $+ 74.8 \text{ kJ mol}^{-1}$

4. ✘  $+ 52.48 \text{ kJ mol}^{-1}$

Question Number : 53 Question Type : MCQ

Correct : 2 Wrong : 0

The correct form of Gibb's Helmholtz equation is :

Options :

1. ✔  $\frac{\partial}{\partial T} \left( \frac{G}{T} \right) = \frac{-H}{T^2}$

2. ✘  $\frac{\partial}{\partial T} \left( \frac{T}{G} \right) = + \frac{H}{T^2}$

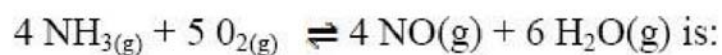
3. ✘  $\frac{\partial}{\partial T} \left( \frac{T}{G} \right) = \frac{-H}{T^2}$

4. ✘  $\frac{\partial}{\partial T} \left( \frac{G}{T} \right) = \frac{-T^2}{H}$

Question Number : 54 Question Type : MCQ

Correct : 2 Wrong : 0

The equilibrium constant for a gas reaction



Options :

1. ✘  $\frac{[4 \text{ NH}_3][5 \text{ O}_2]}{[4 \text{ NO}][6 \text{ H}_2\text{O}]}$

2. ✘  $\frac{[\text{NH}_3]^4[\text{O}_2]^5}{[\text{NO}]^4[\text{H}_2\text{O}]^6}$

3. ✔  $\frac{[\text{NO}]^4[\text{H}_2\text{O}]^6}{[\text{NH}_3]^4[\text{O}_2]^5}$

4. ✘  $\frac{[\text{NH}_3]^4[\text{O}_2]^5}{[4 \text{ NO}][6 \text{ H}_2\text{O}]}$

Question Number : 55 Question Type : MCQ

Correct : 2 Wrong : 0



27.6 g of  $N_2O_4$  was placed in a one litre reaction vessel at 400K and allowed to attain equilibrium  $N_2O_{4(g)} \rightleftharpoons 2NO_2(g)$ . Using the gas equation  $Pv = nRT$ , the value of P is:

Options :

- ✗ 4.98 bar
- ✓ 9.96 bar
- ✗ 2.49 bar
- ✗ 1.285 bar

Question Number : 56 Question Type : MCQ

Correct : 2 Wrong : 0

The correct form of Debye- Hückel limiting law for very dilute aqueous solution is :

Options :

- ✓  $\log \gamma_{\pm} = -|z_+z_-| AI^{1/2}$
- ✗  $\log \gamma_{\pm} = -|z_+z_-| AI^2$
- ✗  $\log \gamma_{\pm} = -|z_+z_-| AI^{1/4}$
- ✗  $\log \gamma_{\pm} = -|z_+z_-| AI^8$

Question Number : 57 Question Type : MCQ

Correct : 2 Wrong : 0

For a general electrochemical reaction of the type:  $aA + bB \xrightarrow{ne^-} cC + dD$ , the correct form of Nernst equation is :

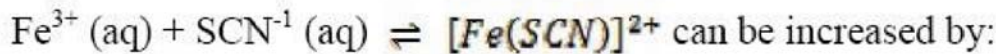
Options :

- ✗ - 0.036
- ✗ - 0.092
- ✓ 0.92
- ✗ 1.92

Question Number : 58 Question Type : MCQ

Correct : 2 Wrong : 0

The colour intensity of the solution in the equilibrium



Options :

1. ✘ adding oxalic acid
2. ✘ adding aq.  $\text{HgCl}_2$
3. ✔ adding potassium thiocyanate
4. ✘ adding  $[\text{Fe}(\text{SCN})]^{2+}$

Question Number : 59 Question Type : MCQ

Correct : 2 Wrong : 0

59. For a general electrochemical reaction of the type:  $aA + bB \xrightarrow{ne^-} cC + dD$ , the correct form of Nernst equation is :

Options :

1. ✔  $E_{\text{cell}} = E^{\ominus}_{\text{cell}} - \frac{RT}{nF} \ln \frac{[c]^c [d]^d}{[A]^a [B]^b}$
2. ✘  $E_{\text{cell}} = E^{\ominus}_{\text{cell}} + \frac{RT}{nF} \ln \frac{[c]^c [d]^d}{[A]^a [B]^b}$
3. ✘  $E^{\ominus}_{\text{cell}} = E_{\text{cell}} - \frac{RT}{nF} \ln \frac{[c]^c [d]^d}{[A]^a [B]^b}$
4. ✘  $E_{\text{cell}} = E^{\ominus}_{\text{cell}} - \frac{RT}{nF} \ln \frac{[A]^a [B]^b}{[c]^c [d]^d}$

Question Number : 60 Question Type : MCQ

Correct : 2 Wrong : 0

The electricity required in terms of Faraday to produce 20 g of Ca from molten  $\text{CaCl}_2$  is:

Options :

1. ✘ 4F
2. ✘ 2F
3. ✘  $\frac{1}{2}$  F
4. ✔ 1 F

Question Number : 61 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following processes does not contain interface?

Options :

1. ✘ Crystallization of potash alum
2. ✘ Rusting of iron
3. ✔ Dissolution of  $H_2$  in  $O_2$
4. ✘ Dissolution of sugar in water

Question Number : 62 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is the example of sorption?

Options :

1. ✔ Dipping of a chalk stick in blue ink
2. ✘ Exposure of anhydrous  $CaCl_2$  to moisture
3. ✘ Exposure of silica gel bottle to moisture
4. ✘ Passing of aqueous solution of raw sugar over a bed of animal charcoal

Question Number : 63 Question Type : MCQ

Correct : 2 Wrong : 0

The substance used in photographic films is :

Options :

1. ✘  $KBr$
2. ✘  $AlBr_3$
3. ✘  $AgCl$
4. ✔  $AgBr$

Question Number : 64 Question Type : MCQ

Correct : 2 Wrong : 0

The technique used for studying the surface state of heterogeneous catalysts is:

Options :

1. ✔ ESCA
2. ✘ NMR
3. ✘ X-ray
4. ✘ u.v.

Question Number : 65 Question Type : MCQ

Correct : 2 Wrong : 0

The value of P in Fermi-Dirac distribution is :

Options :

1. ✓ 0.5
2. ✗ 2.0
3. ✗ 1.0
4. ✗ 0.25

Question Number : 66 Question Type : MCQ

Correct : 2 Wrong : 0

According to Maxwell- Boltzman distribution of velocities, the correct relationship between  $(u)$ ,  $(u^2)^{1/2}$  and  $(u^3)^{1/3}$  is :

Options :

1. ✗  $u > (u^2)^{1/2} > (u^3)^{1/3}$
2. ✗  $u > (u^3)^{1/3} > (u^2)^{1/2}$
3. ✓  $(u^3)^{1/3} > (u^2)^{1/2} > u$
4. ✗  $(u^2)^{1/2} > u > (u^3)^{1/3}$

Question Number : 67 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is the correct form of Gibb's free energy equation?

Options :

1. ✗  $\Delta H = \Delta G - T\Delta S$
2. ✓  $\Delta G = \Delta H - T\Delta S$
3. ✗  $\Delta S = \Delta G - T\Delta H$
4. ✗  $\Delta G = \Delta H + T\Delta S$

Question Number : 68 Question Type : MCQ

Correct : 2 Wrong : 0

For the reaction  $\text{Hg} (l) + \text{Cl}_2 (g) \rightarrow \text{Hg Cl}_2(s)$ , the correct way of representation of rate of reaction is :

Options :

$$\text{Rate of reaction} = \frac{\Delta[\text{Hg}]}{\Delta t}$$

1. ✗

2. ✘ Rate of reaction =  $\frac{[\Delta\text{Cl}_2]}{\Delta t}$

3. ✔ Rate of reaction =  $\frac{\Delta[\text{HgCl}_2]}{\Delta t}$

4. ✘ Rate of reaction =  $\frac{-\Delta[\text{HgCl}_2]}{\Delta t}$

Question Number : 69 Question Type : MCQ

Correct : 2 Wrong : 0

According Michaelis -Menton kinetics, which of the following relationship is correct, where  $[E]$ ,  $[E]_0$  and  $[ES]$  carry their usual meanings ?

Options :

1. ✘  $[E] = [E]_0 + [ES]$

2. ✔  $[E_0] = [E] + [ES]$

3. ✘  $[ES] = [E] + [E_0]$

4. ✘  $[ES] = [E] - [E_0]$

Question Number : 70 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following statement is correct for flash photolysis?

Options :

1. ✘ It is used to study rusting of iron

2. ✘ It is used to study hydrolysis of ethyl acetate

3. ✔ It is used to study rate of neutralization reactions

4. ✘ It is used to study rate of burning of a candle

Question Number : 71 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is not the example of amorphous solid?

Options :

1. ✘ PTFE (Polytetrafluoroethylene)

2. ✘ PAN (Polyacrylonitrile)

3. ✘ Polyisoprene

## Sodium chloride

4. ✓

Question Number : 72 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is wrong for Frankel defect?

Options :

1. ✗ Frankel defect is shown by ionic solids
2. ✗ Due to Frankel defect, a vacancy defect is created
3. ✗ Frankel defect is also known as dislocation defect
4. ✓ Density of the solid is changed due to Frankel defect

Question Number : 73 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is paramagnetic?

Options :

1. ✓  $\text{Cr}^{3+}$
2. ✗ MnO
3. ✗ NaCl
4. ✗  $\text{C}_6\text{H}_6$

Question Number : 74 Question Type : MCQ

Correct : 2 Wrong : 0

The daughter element obtained by emission of one alpha and two beta particles from  ${}_{92}^{238}\text{U}$  is:

Options :

1. ✗  ${}_{92}^{236}\text{U}$
2. ✓  ${}_{92}^{234}\text{U}$
3. ✗  ${}_{91}^{234}\text{Pa}$
4. ✗  ${}_{90}^{234}\text{Th}$

Question Number : 75 Question Type : MCQ



Correct : 2 Wrong : 0

The neutron proton ratio after emission of two alpha particles from  ${}_{90}^{234}\text{Th}$  will be :

Options :

1. ✗ 1.70
2. ✗ 1.56
3. ✓ 1.50
4. ✗ 1.60

Question Number : 76 Question Type : MCQ

Correct : 2 Wrong : 0

Number of alpha ( $\alpha$ ) and Beta ( $\beta$ ) particles emitted during radioactive decay of  ${}_{92}^{238}\text{U}$  to  ${}_{82}^{206}\text{Pb}$  are:

Options :

1. ✗ 10  $\beta$  and 8  $\alpha$
2. ✓ 8  $\alpha$  and 6  $\beta$
3. ✗ 6  $\alpha$  and 8  $\beta$
4. ✗ 4  $\alpha$  and 10  $\beta$

Question Number : 77 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is not correct pair of isomorphous substances?

Options :

1. ✗  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$  and  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$
2. ✗  $\text{K}_2\text{SO}_4 \cdot (\text{Cr}_2\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$  and  $\text{K}_2\text{SO}_4 \cdot (\text{Al}_2\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$
3. ✗  $\frac{1}{2} [\text{K}_2\text{SO}_4 \cdot (\text{Cr}_2\text{SO}_4)_3] \cdot 12\text{H}_2\text{O}$  and  $\frac{1}{2} [\text{K}_2\text{SO}_4 \cdot (\text{Al}_2\text{SO}_4)_3] \cdot 12\text{H}_2\text{O}$
4. ✓  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  and  $\text{Fe}(\text{SO}_4)_3 \cdot 7\text{H}_2\text{O}$

Question Number : 78 Question Type : MCQ

Correct : 2 Wrong : 0

Sulphur molecules are best represented as:

Options :

1. ✗  $\text{S}_2$

2. ✘  $S_4$

3. ✔  $S_8$

4. ✘  $S$

Question Number : 79 Question Type : MCQ

Correct : 2 Wrong : 0

Out of  $MgCl_2$ ,  $CaCl_2$ ,  $SrCl_2$ , and  $BaCl_2$ , which has got the highest tendency for hydrate formation?

Options :

1. ✔  $MgCl_2$

2. ✘  $CaCl_2$

3. ✘  $SrCl_2$

4. ✘  $BaCl_2$

Question Number : 80 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is dibasic acid?

Options :

1. ✘  $H_3PO_4$

2. ✔  $H_3PO_3$

3. ✘  $H_3PO_5$

4. ✘  $(HPO_3)_n$

Question Number : 81 Question Type : MCQ

Correct : 2 Wrong : 0

Out of  $ClO^-$ ,  $ClO_2^-$ ,  $ClO_3^-$  and  $ClO_4^-$  which has tetrahedral shape?

Options :

1. ✘  $ClO_2^-$

2. ✔  $ClO_4^-$

3. ✘  $ClO^-$

4. ✘  $ClO_3^-$

Question Number : 82 Question Type : MCQ

Correct : 2 Wrong : 0

Hydrolysis product of borazole is:

Options :

1.   $C_2H_5OH$
2.   $C_6H_5OH$
3.   $C_2H_5NH_2$
4.   $H_3BO_3$

Question Number : 83 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is obtained by distilling concentrated Nitric acid over phosphorus Pentoxide?

Options :

1.   $N_2O$
2.   $N_2O_3$
3.   $N_2O_5$
4.   $NO_2$

Question Number : 84 Question Type : MCQ

Correct : 2 Wrong : 0

The correct order of increasing  $pK_b$  value of KOH, NaOH & LiOH is :

Options :

1.   $KOH < NaOH < LiOH$
2.   $KOH > NaOH > LiOH$
3.   $LiOH < NaOH < KOH$
4.   $NaOH < KOH < LiOH$

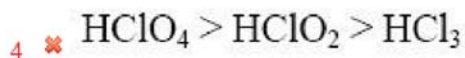
Question Number : 85 Question Type : MCQ

Correct : 2 Wrong : 0

The decreasing order of  $pK_a$  value of  $HClO_4$ ,  $HClO_3$  and  $HClO_2$  is:

Options :

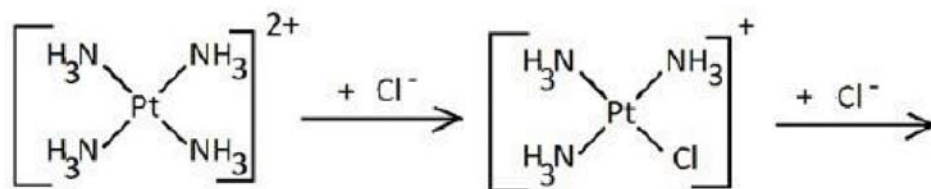
1.   $HClO_4 > HClO_3 > HClO_2$
2.   $HClO_2 > HClO_3 > HClO_4$



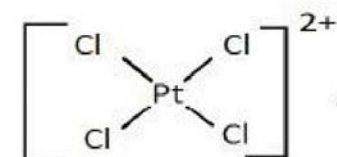
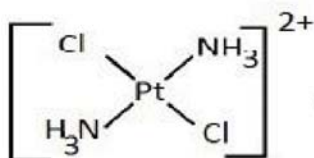
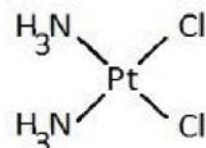
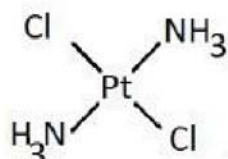
Question Number : 86 Question Type : MCQ

Correct : 2 Wrong : 0

The exclusive product formed in the reaction given below is :



Options :



Question Number : 87 Question Type : MCQ

Correct : 2 Wrong : 0

The highest magnetic moment ( $\mu$ ) is of:

Options :



Question Number : 88 Question Type : MCQ

Correct : 2 Wrong : 0

The maximum number of oxidation states are shown by:

Options :

1. ✘ Cu

2. ✔ Mn

3. ✘ Cr

4. ✘ Ni

Question Number : 89 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following ions is coloured?

Options :

1. ✔  $V^{4+}$

2. ✘  $Sc^{3+}$

3. ✘  $Ti^{4+}$

4. ✘  $Zn^{2+}$

Question Number : 90 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following has tetrahedral geometry?

Options :

1. ✘  $PtCl_4^{2-}$

2. ✘  $CoF_6^{3-}$

3. ✔  $NiCl_4^{2-}$

4. ✘  $Co(NH_3)_6^{3+}$

Question Number : 91 Question Type : MCQ

Correct : 2 Wrong : 0

The paramagnetic moment ( $\mu$ ) for lanthanide complexes can be calculated by which of the following, where symbols carry their usual meanings?

Options :

1. ✔  $\mu = g[J(J + 1)]^{\frac{1}{2}}$

2. ✘  $\mu = g[J(J - 1)]^{\frac{1}{2}}$

3. ✘  $\mu = g[J(J + 1)]^2$

4. ✘  $\mu = g[J(J - 1)]^2$

Question Number : 92 Question Type : MCQ

Correct : 2 Wrong : 0

Atomic number of lanthanoid element with electronic configuration  $[\text{Xe}]4f^{11}6s^2$  is :

Options :

1. ✘ 49

2. ✔ 67

3. ✘ 69

4. ✘ 99

Question Number : 93 Question Type : MCQ

Correct : 2 Wrong : 0

IUPAC name of the compound obtained by reaction of  $\text{C}_2\text{H}_5 - \text{MgBr}$  and propanone in dry ether solvent followed by hydrolysis is :

Options :

1. ✘ 2 - Butanol

2. ✘ 2 - Ethyl - 2- Propanol

3. ✔ 2 - Methyl - 2 - butanol

4. ✘ 3 - Methyl - 2 - pentanol

Question Number : 94 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following does not exist as a dimer?

Options :

1. ✔  $\text{SO}_2$

2. ✘  $\text{AlCl}_3$

3. ✘  $\text{P}_2\text{O}_5$

4. ✘  $\text{Mn}(\text{CO})_5$



Question Number : 95 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is not associated with nitrogen fixation?

Options :

1. ✘ Vivo nitrogen fixation
2. ✘ Vitro nitrogen fixation
3. ✔ Carbo nitrogen fixation
4. ✘ Nitrogenase enzyme

Question Number : 96 Question Type : MCQ

Correct : 2 Wrong : 0

The order of stability of complexes of porphyrins with +2 metal ions is:

Options :

1. ✔  $Ni^{2+} > Cu^{2+} > Fe^{2+} > Zn^{2+}$
2. ✘  $Zn^{2+} > Fe^{2+} > Cu^{2+} > Ni^{2+}$
3. ✘  $Cu^{2+} > Fe^{2+} > Zn^{2+} > Ni^{2+}$
4. ✘  $Fe^{2+} > Zn^{2+} > Cu^{2+} > Ni^{2+}$

Question Number : 97 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is not correct for cytochromes?

Options :

1. ✘ They are heme proteins
2. ✘ They act as electron carriers
3. ✘ They are enzymes
4. ✔ They can convert n - hexane into benzene

Question Number : 98 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is not associated with solvent extraction?

Options :

1. ✘ Continuous boiling with solvent

2. ✘ Used for extraction of essential oils from plants
3. ✔ Used for petroleum refining
4. ✘ Slow but continuous process

Question Number : 99 Question Type : MCQ

Correct : 2 Wrong : 0

Which of the following is not used as a dehydrating reagent?

Options :

1. ✘  $\text{KHSO}_4$
2. ✘ Anhyd  $\text{ZnCl}_2$
3. ✘ Conc.  $\text{H}_2\text{SO}_4$
4. ✔ Liquid bromine

Question Number : 100 Question Type : MCQ

Correct : 2 Wrong : 0

The reagent used in Clemmenson reduction is :

Options :

1. ✘  $\text{LiAlH}_4$
2. ✘  $\text{Na/Hg} + \text{C}_2\text{H}_5\text{OH}$
3. ✔  $\text{Zn/Hg} + \text{Conc. HCl}$
4. ✘  $(\text{Me}_2\text{CHO})_3\text{Al}$