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IIT JEE 2009 Test Series 3
CHEMISTRY PART-II

SECTION I

STRAIGHT OBJECTIVE TYPE

This section contains 6 multiple choice questions. Each question has four choices (a), (b), (c) and (d), out of which ONLY ONE is correct. 3 MARKS will be awarded for correct answer. 1 MARK will be deducted for wrong answer.

- $CH_3CH_2CH_2CH_2Cl \xrightarrow{NaBH_4} A$, what is A
 - $CH_3CH_2CH_2CH_3$
 - $CH_3CH_2CH=CH_2$
 - $CH_3CH=CHCH_3$
 - None of these
- When steam condenses to water at $90^\circ C$, the entropy of the system decreases. What must be true if the second law of thermodynamics is to be satisfied?
 - Entropy of the universe also decreases.
 - Entropy of the surroundings also decreases.
 - Entropy of the surroundings increases to the same extent to which entropy of the system decreases.
 - Increase in entropy in the surroundings is greater than decrease in entropy of the system.
- The oxidation of SO_2 by O_2 to SO_3 is an exothermic reaction. The yield of SO_3 will be maximum if
 - Temperature is increased and pressure is kept constant
 - Temperature is reduced and pressure is increased
 - Both temperature and pressure is increased
 - Both temperature and pressure is reduced
- The increasing order of the size of the void is
 - Trigonal < tetrahedral < octahedral < cubic
 - cubic < octahedral < tetrahedral < Trigonal
 - cubic < tetrahedral < octahedral < Trigonal
 - Trigonal < octahedral < tetrahedral < cubic

5. A thermally insulated container initially holds N_0 molecules gas at an absolute temperature T_0 . Molecules escape from the container through a small hole in the wall, and it can be shown that in such a process at a temperature T , the avg kinetic energy of the escaping molecules is $2kT$. How many molecules remain in the container when the temperature has fallen to $T_0/2$?
- $N_0/2$
 - $N_0/4$
 - $N_0/8$
 - $N_0/16$
6. The bond order of a molecule is given by:
- Total number of electrons in bonding and antibonding orbitals
 - The difference between the number of electrons in bonding and antibonding orbitals
 - Twice the difference between the number of electrons in bonding and antibonding orbitals
 - Half the difference between the number of electrons in bonding and antibonding orbitals.
7. The melting point of most of the solid substances increases with the increase of pressure acting on them. However, ice melts at a temperature lower than its usual melting point when the pressure is increased. This is because
- It generates heat
 - Chemical bond breaks under water
 - Ice is less dense than water
 - None of these
8. Preparation of looking mirrors involves the use of
- red lead
 - ammonical silver nitrate
 - ammonical AgNO_3 +red lead
 - ammonical AgNO_3 +red lead+HCHO
- (a) the electric potential increase at first, then decrease and again increase.
9. In IV groups analysis NH_4OH is added before passing H_2S gas because
- The sulphides of IV group are insoluble in NH_4OH
 - The sulphides of other metals are soluble in NH_4OH
 - The concentration of S^{2-} ions is high enough to precipitate the sulphides of IV groups
 - The sulphides of 2nd group are soluble in NH_4OH

SECTION II

ASSERTION-REASON TYPE

This question contains 4 reasoning type questions. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE is correct. 3 MARKS will be awarded for correct answer. 1 MARK will be deducted for wrong answer. NO MARKS WILL BE GIVEN OR DEDUCTED IF A QUESTION IS NOT ANSWERED.

10. Statement-1: calcium fluoride is more ionic than CaI_2 .
Statement-2: the size of I^- is bigger than F^- ions.
- (a) Statement-1 is True, Statement -2 is true; Statement -2 is a correct explanation for Statement 1
(b) Statement -1 is True, Statement -2 is true; Statement -2 is NOT a correct explanation for Statement -1
(c) Statement -1 is True, Statement -2 is False
(d) Statement -1 is False, Statement -2 is true
11. Statement-1: $(\text{SiH}_3)_3\text{N}$ is a Stronger base than $(\text{CH}_3)_3\text{N}$
Statement-2: In $(\text{SiH}_3)_3\text{N}$, the lone pair of electrons on nitrogen is used up in $P\pi - d\pi$ back bonding.
- (a) Statement-1 is True, Statement -2 is true; Statement -2 is a correct explanation for Statement 1
(b) Statement -1 is True, Statement -2 is true; Statement -2 is NOT a correct explanation for Statement -1
(c) Statement -1 is True, Statement -2 is False
(d) Statement -1 is False, Statement -2 is true
12. Statement-1: $[\text{CoF}_6]^{3-}$ is paramagnetic but $[\text{Co}(\text{CN})_6]^{3-}$ is diamagnetic.
Statement-2: In $[\text{CoF}_6]^{3-}$, Co^{3+} undergoes d^2sp^3 hybridization but in $[\text{Co}(\text{CN})_6]^{3-}$, Co^{3+} undergoes sp^3d^2 hybridization.
- (a) Statement-1 is True, Statement -2 is true; Statement -2 is a correct explanation for Statement 1
(b) Statement -1 is True, Statement -2 is true; Statement -2 is NOT a correct explanation for Statement -1
(c) Statement -1 is True, Statement -2 is False
(d) Statement -1 is False, Statement -2 is true

13. Statement-1: o-Cyanoaniline is a much weaker base than aniline.

Statement-2: -NH₂ group is not an electron withdrawing group.

- (a) Statement-1 is True, Statement -2 is true; Statement -2 is a correct explanation for Statement 1
- (b) Statement -1 is True, Statement -2 is true; Statement -2 is NOT a correct explanation for Statement -1
- (c) Statement -1 is True, Statement -2 is False
- (d) Statement -1 is False, Statement -2 is true

SECTION III

LINKED COMPREHENSION TYPE

This section contains 2 paragraphs. Based upon each paragraph, 3 multiple choice questions have to be answered. Each question has four choices (a), (b), (c) and (d), out of which ONLY ONE is correct. 4 MARKS will be awarded for correct answer. 1 MARK will be deducted for wrong answer. NO MARKS WILL BE GIVEN OR DEDUCTED IF A QUESTION IS NOT ANSWERED.

Paragraph for Questions numbers 14 to 16

In hexagonal systems of crystals, a frequently encountered arrangement of atoms is described as a hexagonal prism. Here, the top and bottom of the cell are regular hexagons and three atoms are sandwiched in between them. A space-filling model of this structure, called hexagonal close-packed (HCP), is constituted of a sphere on a flat surface surrounded in the same plane by six identical spheres as closely as possible. Three spheres are then placed over the first layer so that they touch each other and represent the second layer. Each one of these three spheres touches three spheres of the bottom layer. Finally, the second layer is covered with a third layer that is identical to the bottom layer in relative position. Assume radius of every sphere to be 'r'.

14. Which type of pattern is in this HCP

- (a) ABCABC
- (b) ABABAB
- (c) Both
- (d) None of these

IIT JEE 3rd Test Series, Chemistry Paper2

15. The volume of the HCP unit cell is

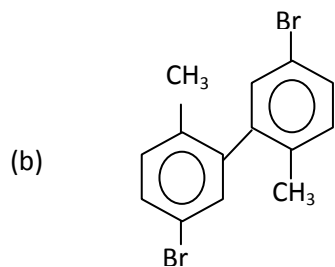
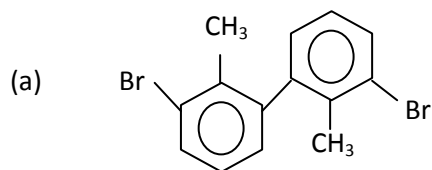
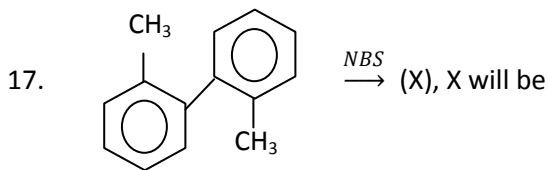
- (a) $24\sqrt{2} r^3$
- (b) $16\sqrt{2} r^3$
- (c) $12\sqrt{2} r^3$
- (d) $\frac{64}{3\sqrt{3}} r^3$

16. The empty space in this unit cell is

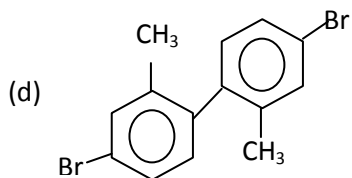
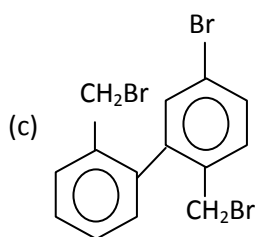
- (a) 74%
- (b) 47.6%
- (c) 32%
- (d) 26%

Paragraph for Questions numbers 17 to 19

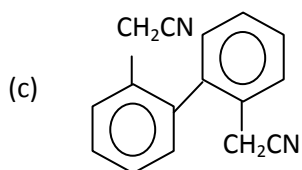
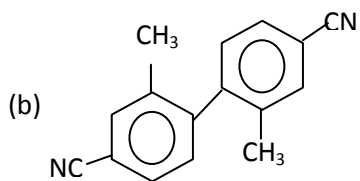
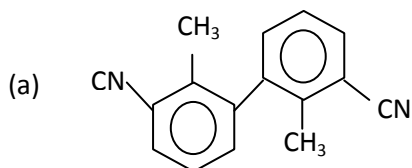
N-bromosuccinamide (NBS) is a reagent which substitute allylic hydrogen very effectively, because allylic free radical get resonance stabilized, therefore substitution takes place only on allylic C. Now attempt the following problem.



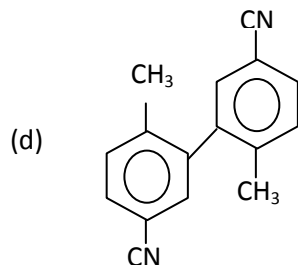
IIT JEE 3rd Test Series, Chemistry Paper2



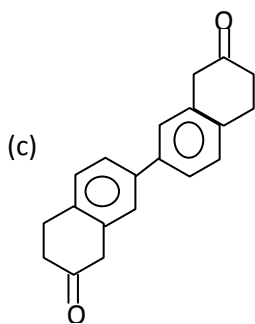
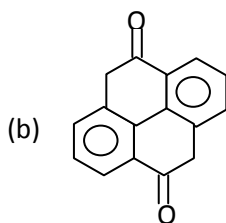
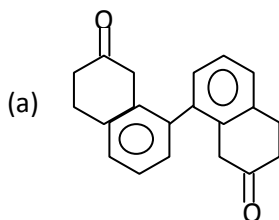
18. $X \xrightarrow{NaCN} Y$; Y will be



IIT JEE 3rd Test Series, Chemistry Paper 2



19. Y $\xrightarrow{(i)H_2O, HCl; (ii)SO_2Cl_2; (iii)AlCl_3}$ Z; Z will be



(d) None of these

SECTION-IV

Matrix Match Type

This section contains 3 questions. Each question contains statements given in two columns which have to be matched. Statements in **Column I** are labelled as A, B, C and D whereas statements in **Column II** are labelled as p, q, r and s. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

If the correct matches are A-q, A-r, B-p, B-s, C-r, C-s and D-q, then the correctly bubbled matrix will look like the following :

	p	q	r	s
A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. Match the following:

(a) Sulphide ore	(p) Silver
(b) Mond's process	(q) Iron
(c) Cupellation	(r) Nickel
(d) pyrometallurgy	(s) Forth floatation process

21. Match the following:

(a) Nitrolim	(p) Barium salts
(b) Green flame	(q) $\text{CaMg}_3(\text{SiO}_4)_4$
(c) Brick red flame	(r) $\text{CaCN}_2 + \text{C}$
(d) Asbestors	(s) Calcium salts

22. Match the following:

(a) Corrosive sublimate	(p) impure zinc
(b) vermilion	(q) HgCl_2
(c) calomel	(r) Red form of HgS
(d) spelter	(s) Hg_2Cl_2

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