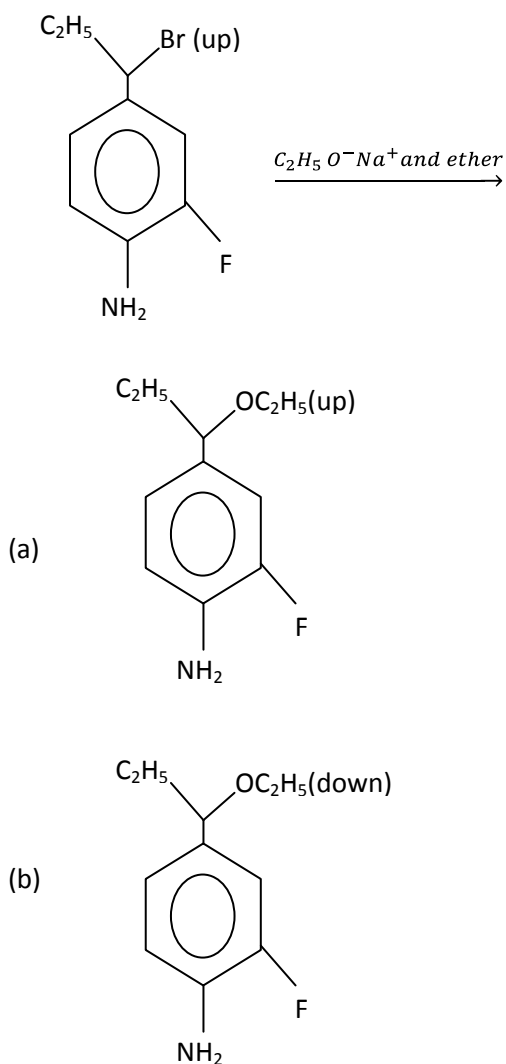


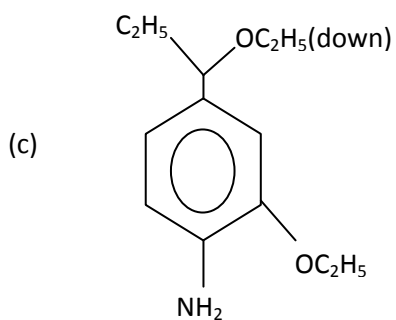
IIT JEE 2009 Test Series 4 CHEMISTRY PART-II

SECTION I STRAIGHT OBJECTIVE TYPE

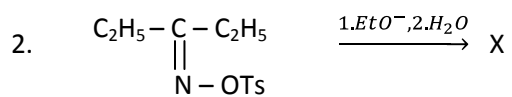
This section contains 9 multiple choice questions. Each question has four choices (a), (b), (c) and (d), out of which ONLY ONE is correct. 3 MARKS will be awarded for correct answer. 1 MARK will be deducted for wrong answer.

1. The following reaction gives the major products

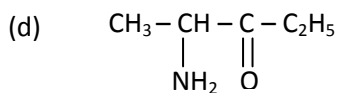
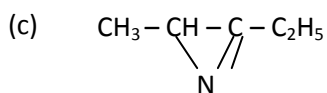
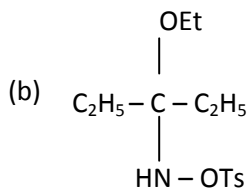
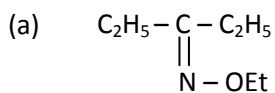


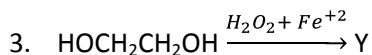


(d) Both a and b



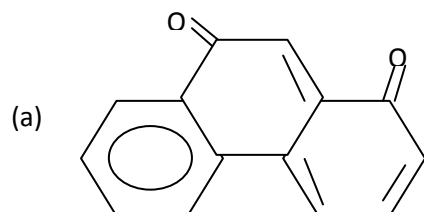
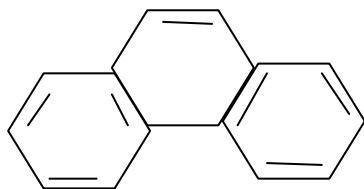
The compound X is

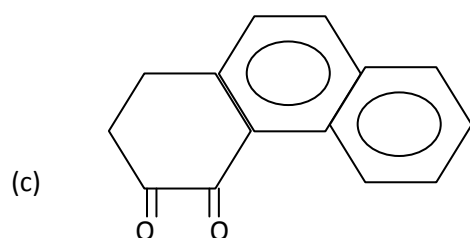
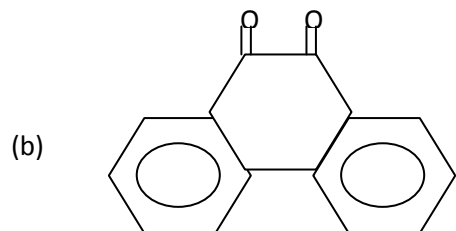




The compound Y is

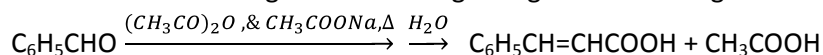
- (a) HOCH_2CHO
 (b) HOCH_2COOH
 (c) HCOCHO
 (d) No reaction
4. What are the signs of ΔH and ΔS for this reaction
- | | ΔH | ΔS |
|-----|------------|------------|
| (a) | - | - |
| (b) | - | + |
| (c) | + | - |
| (d) | + | + |
5. How many different tripeptides can be formed from the amino acids glycine, alanine and valine is each is used only one in each tripeptide?
- (a) 3
 (b) 4
 (c) 5
 (d) 6
6. Which of the following diketone is obtained when the following compound is strong oxidized with $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$?





(e) No oxidation

7. Consider the following statements regarding the reactions given below:



1. The reaction is a representative example of perkin reaction.
2. The anhydride having at least one $\alpha - H$, provides an enolate ion for the reaction.
3. The acetate deprotonates the anhydride to form the nucleophile needed for the reaction.

Which of the above statements are correct?

- (a) 1,2 and 3
 - (b) 2 and 3
 - (c) 1 and 3
 - (d) 1 and 2
8. A solution of urea in water has a boiling point of 100.28°C . calculate the freezing point of the same solution. Molal constant for water K_f and K_b are 1.86 and 0.512 respectively.
- (a) 1.0172
 - (b) -1.0172
 - (c) 0.0771
 - (d) -0.0771

9. Calculate ΔH at 358K for the reaction
 $\text{Fe}_2\text{O}_3(\text{s}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{Fe}(\text{s}) + 3\text{H}_2\text{O}(\text{l})$
Given $\Delta H_{298} = -33.29$ KJ/mole
 C_p for $\text{Fe}_2\text{O}_3(\text{s})$, $\text{Fe}(\text{s})$, $\text{H}_2\text{O}(\text{l})$ and $\text{H}_2(\text{g})$ are 103.8, 25.1, 75.3 and 28.8 J/K mole respectively
- (a) -22.95228 KJ/mole
(b) -35.222 KJ/mole
(c) -.136 KJ/mole
(d) +22.952 KJ/mole

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: the water pouch of instant cold pack for treating athletic injuries breaks when squeezed and NH_4NO_3 dissolves lowering the temperature.
Statement-2: addition of non-volatile solute into solvent results into depression of freezing point of solvent
- (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: in highly polar solvent Solvent, SN_1 and SN_1' products percentage almost become equal for a particular substrate.
Statement-2: highly polar solvent permits formation of completely free carbocation.
- (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: in place of acetoacetic ester synthesis to prepare various ketones, direct alkylation of methyl ketones can be accomplished.
Statement-2: such alkylation would require stronger base and may lead to aldol product formation.
- 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: if the potential difference applied to an electron is made 4 times, the de Broglie wavelength is halved.
Statement-2: on making potential difference 4 times, velocity is doubled and hence λ is halved.
- 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.

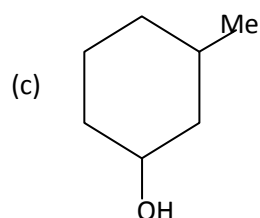
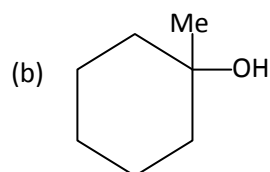
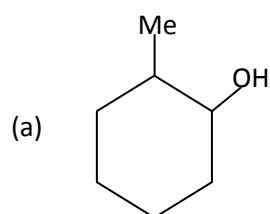
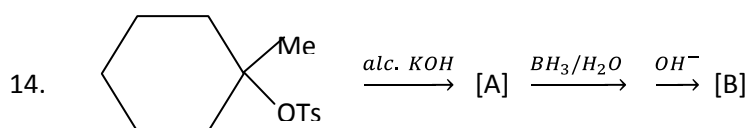
Paragraph for Questions numbers 14 to 16

The reaction of BH_3 with an alkene begins with the Lewis acid chelation of the alkene pi electron system by the boron. This complex then rearranges in a more or less concerted manner to produce the alkyl borane. The reaction seems to be dominated by steric effects and the boron attaches to the least hindered carbon. All three equivalents of the boron hydrides can be utilized in separate reactions to give a trialkyl borane. The organoborane, which is formed, can be oxidized by alkaline peroxide to form the alcohol. The overall stereochemistry of the addition reaction is syn (cis) and regiochemistry of the product is generally anti-Markovnikov, due to the

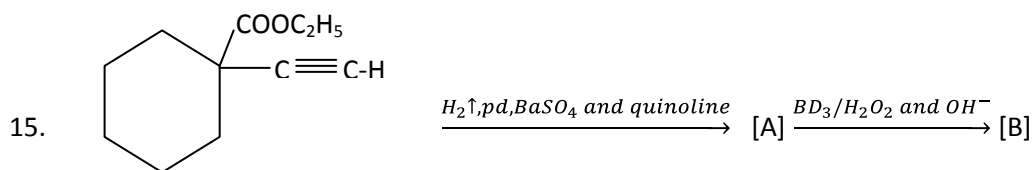
IIT JEE 4th Test Series, Chemistry Paper 2

preference of the boron for the least hindered site (the carbon with the most hydrogens ultimately gets the hydroxyl group).

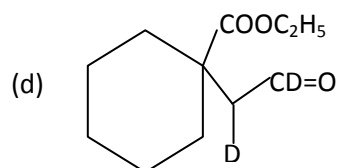
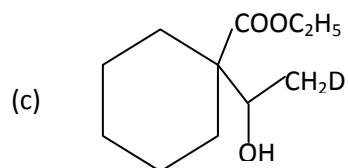
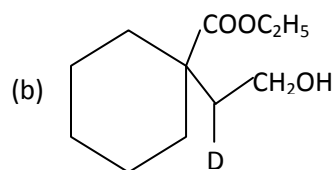
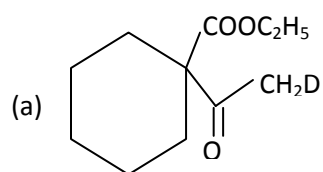
Now attempt the following question.



(d) none of these

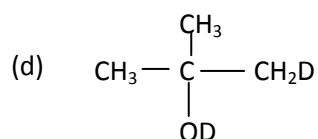
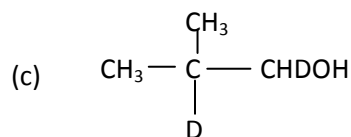
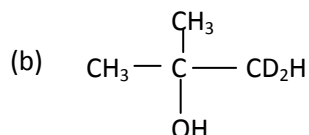
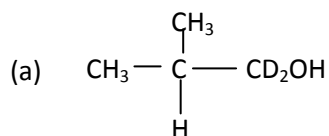
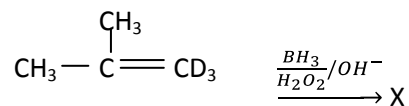


Compound B in the given reaction is



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16. Compound X in the given reaction is



Paragraph for Questions numbers 17 to 19

Renowned statesman Benjamin Franklin was also an inventor and a scientist. He is more known for his demonstration that lightning is electricity. Very less number of people know he also conducted an experiment for the simple estimation of molecular size and Avogadro's number through oil spread on water. He fetched out one table spoon (5 ml) of oil of density 0.95 g cm^{-3} on the water of a large pond. He saw it spread itself with surprising swiftness upon the surface. Such a small quantity of oil produced an instant calm over an area of $2 \times 10^7 \text{ cm}^2$ making it as smooth as a looking glass. The calculation may go like this:

Avogadro's number is the number of molecules in a mole. So, if we can estimate both the number of molecules and the number of moles of Franklin's teaspoon of oil, we can calculate Avogadro's number.

In calculation he assumed that the oil molecules are tiny cubes that one molecule thick and the molar mass to be 240 g mol^{-1} .

17. Number of moles of oil spread out in the oil film are
- 9.18×10^{-2}
 - 1.98×10^{-2}
 - 8.91×10^{-1}
 - 9.56×10^{-3}
18. What is the volume of single oil molecule?
- $1.56 \times 10^{-20} \text{ cm}^3$
 - $2.56 \times 10^{-17} \text{ cm}^3$
 - $5.62 \times 10^{-19} \text{ cm}^3$
 - $6.23 \times 10^{-18} \text{ cm}^3$
19. The result in the above calculation for Avogadro's number is not very accurate. Which of the following assumptions do you think can't be the main source of error in calculating the Avogadro's number by spreading oil in the water of the pond?
- the oil molecule are tiny cubes
 - the oil layer is one molecule thick
 - the molecular mass is 240 g mol^{-1}
 - the formula used for calculating mole is wrong.

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 :

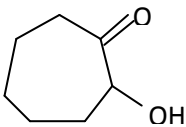
	p	q	r	s
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B	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>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

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20. Match column I with column II.

Column-I	Column-II
(a) $H_3PO_2 \xrightarrow{(i)415K (ii)435K}$	(p) One of the products acts as reducing agent.
(b) $PCl_3 + H_2O \xrightarrow{435K}$	(q) One of the products is tribasic and non reducing.
(c) $NO_2 + H_2O \rightarrow$	(r) Dehydration
(d) $HNO_3 + P_4O_{10} \xrightarrow{\Delta}$	(s) in one of the products the central atom is +5 oxidation state.

21. Match column I with column II.

Column-I	Column-II
(a) $[H_2C]_5 \begin{matrix} \diagup CH_2COOC_2H_5 \\ \diagdown CH_2COOC_2H_5 \end{matrix} \xrightarrow{Na, H_2O}$	(p) Enolate participates
(b) $H_3C-C(=O)-CH_2-CH_2-CH_2-CH_2-C(=O)-H \xrightarrow{base}$	(q) 
(c) $H_3C-C(=O)-CH(COC_2H_5)-CH_2-CH_2-CH_2-Br \xrightarrow{EtONa, H_3O^+}$	(r) An aldol condensation reaction
(d) $PhCH_2-C(=O)-CH_2-Ph + Ph-C(=O)-C(=O)-Ph \xrightarrow{base}$	(s) A five membered ring may be formed

22. Match column I with column II.

Column-I	Column-II
(a) $\text{CaCO}_3(s) \rightarrow \text{CaO}(s) + \text{CO}_2(g)$	(p) Small, ΔS is impossible to predict
(b) $\text{N}_2(g) + \text{O}_2(g) \rightarrow 2\text{NO}(g)$	(q) Negative
(c) $\text{HCl}(g) + \text{NH}_3(g) \rightarrow \text{NH}_4\text{Cl}(s)$	(r) Negative
(d) Cooling of $\text{N}_2(g)$ from 20°C to -50°C	(s) Positive

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