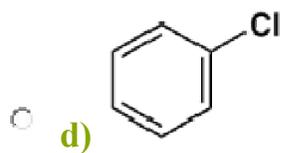
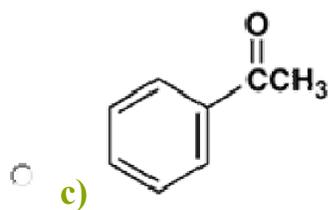
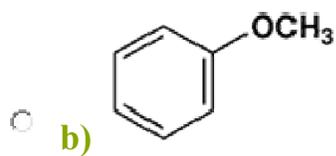
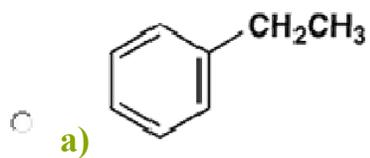


### Question 1

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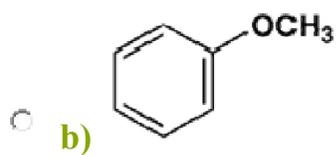
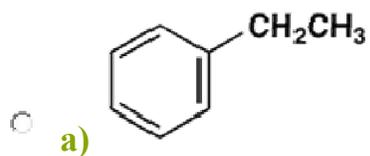
Which is most reactive in electrophilic substitution?

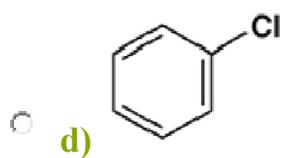
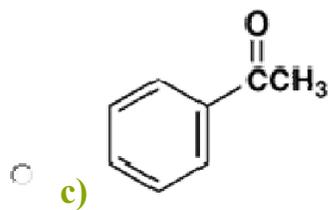


### Question 2

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Which is least reactive in electrophilic substitution?

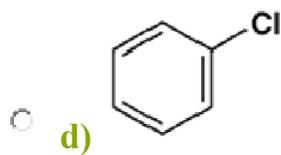
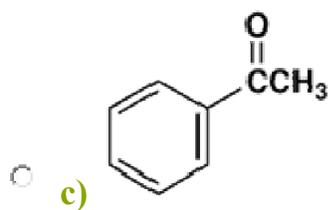
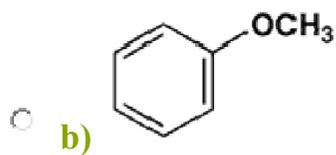
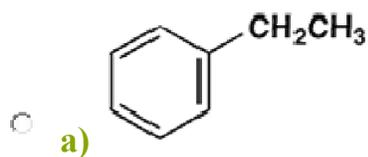




### Question 3

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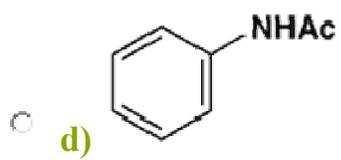
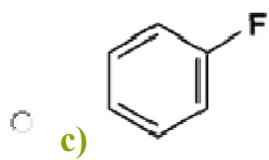
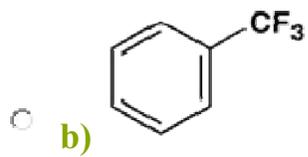
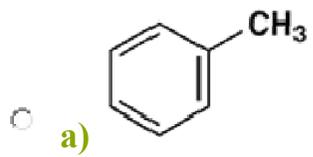
Which gives a *meta* nitro compound as the main product upon nitration with a nitric acid-sulfuric acid mixture?



### Question 4

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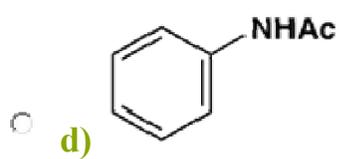
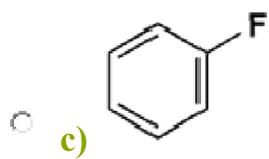
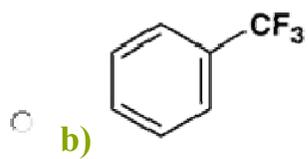
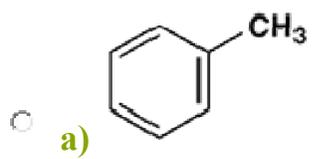
Which is most reactive in electrophilic substitution?



### Question 5

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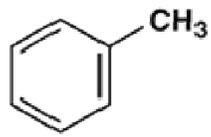
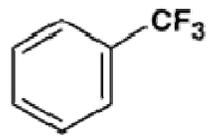
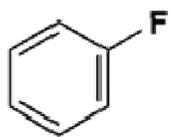
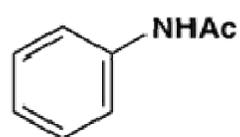
Which is least reactive in electrophilic substitution?



### Question 6

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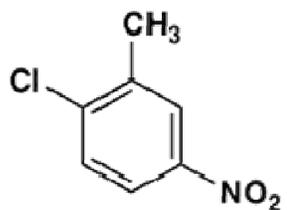
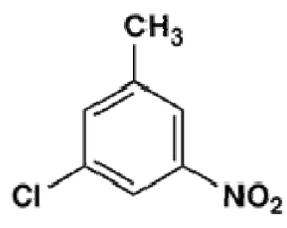
Which gives a *meta* nitro compound as the main product upon nitration with a nitric acid-sulfuric acid mixture?

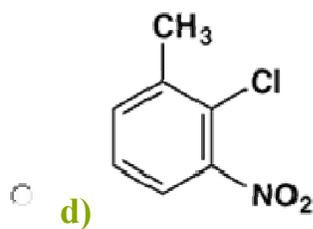
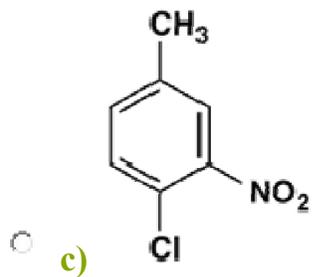
- a) 
- b) 
- c) 
- d) 

### Question 7

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Which will be the main product upon chlorination of *m*-nitrotoluene with  $\text{Cl}_2/\text{AlCl}_3$ ?

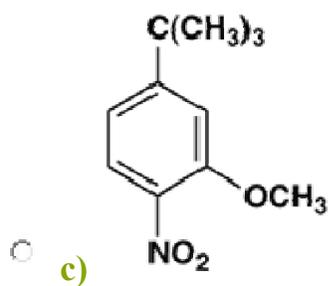
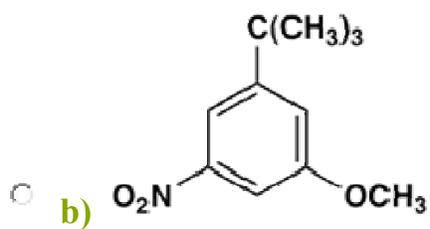
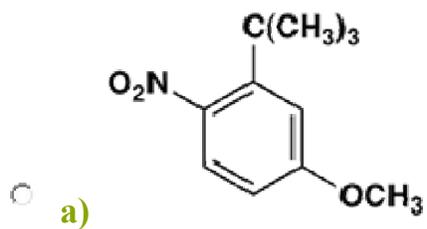
- a) 
- b) 

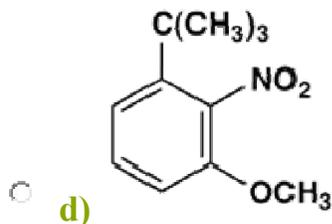


### Question 8

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Which is obtained as the main mononitration product upon reaction of *m-t*-butylanisole (1-*t*-butyl-3-methoxybenzene) with HNO<sub>3</sub>-H<sub>2</sub>SO<sub>4</sub>?





### Question 9

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Which of the following statements regarding Friedel-Crafts reactions is wrong?

- a) Alkylation of benzene with an alkyl chloride requires only a catalytic amount of a Lewis acid such as aluminum chloride.
- b) Alkylation of benzene with an alcohol requires only a catalytic amount of a Brønsted acid such as phosphoric acid.
- c) Acetylation of benzene with acetyl chloride requires only a catalytic amount of a Lewis acid.
- d) Acetylation of benzene with acetic anhydride requires more than one equivalent of a Lewis acid.

### Question 10

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Which of the following statements regarding electrophilic aromatic substitution is wrong?

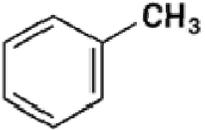
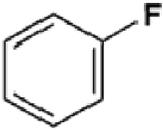
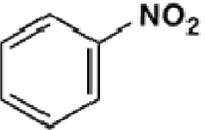
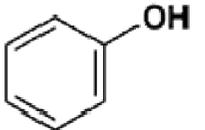
- a) Acetyl and cyano substituents are both deactivating and *m*-directing.
- b) Alkyl groups are activating and *o,p*-directing.
- c) Ammonio groups are *m*-directing but amino groups are *o,p*-directing.

- d) Chloro and methoxy substituents are both deactivating and *o,p*-directing.

### Question 11

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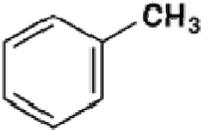
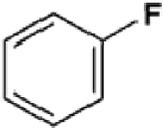
Which is most reactive in electrophilic substitution?

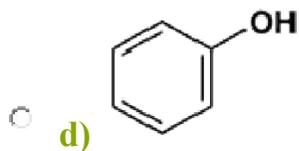
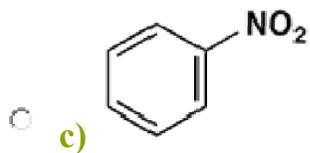
- a) 
- b) 
- c) 
- d) 

### Question 12

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Which is least reactive in electrophilic substitution?

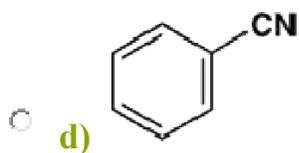
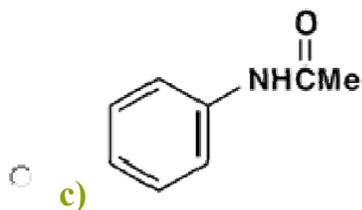
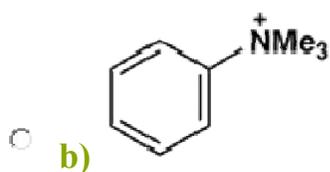
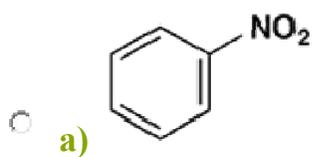
- a) 
- b) 



### Question 13

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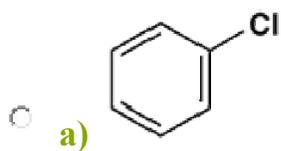
Which gives a *para* nitro compound as the main product upon nitration with a nitric acid-sulfuric acid mixture?

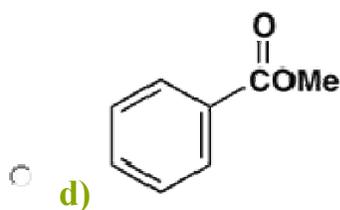
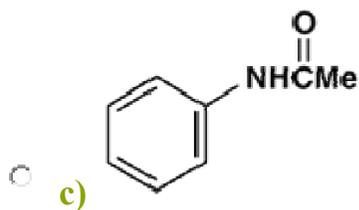
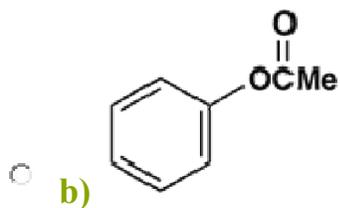


### Question 14

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Which gives a *meta* nitro compound as the main product upon nitration with a nitric acid-sulfuric acid mixture?





### Question 15

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Which of (a)-(d) does **not** give isopropylbenzene as a product upon reaction with benzene?

- a)**  $(\text{CH}_3)_2\text{CHCl}/\text{AlCl}_3$
- b)**  $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}/\text{AlCl}_3$
- c)**  $\text{CH}_3\text{CH}=\text{CH}_2/\text{H}_3\text{PO}_4$
- d)**  $(\text{CH}_3)_2\text{C}=\text{CH}_2/\text{H}_3\text{PO}_4$

### Question 16

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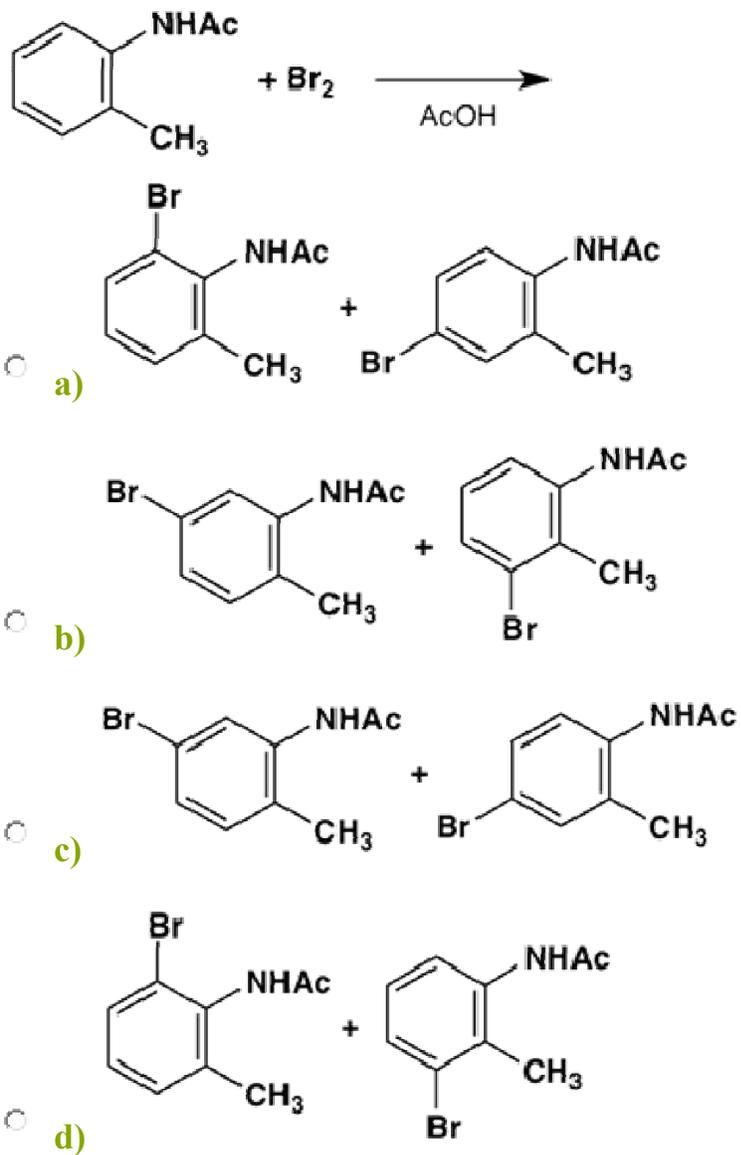
Which combination of reagents used in the indicated order with benzene will give *m*-nitropropylbenzene?

- a)** 1)  $\text{HNO}_3/\text{H}_2\text{SO}_4$ , 2)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}/\text{AlCl}_3$
- b)** 1)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}/\text{AlCl}_3$ , 2)  $\text{HNO}_3/\text{H}_2\text{SO}_4$

- c) 1)  $\text{CH}_3\text{CH}_2\text{COCl}/\text{AlCl}_3$ , 2)  $\text{HNO}_3/\text{H}_2\text{SO}_4$ , 3)  $\text{H}_2\text{NNH}_2/\text{NaOH}$
- d) 1)  $\text{HNO}_3/\text{H}_2\text{SO}_4$ , 2)  $\text{CH}_3\text{CH}_2\text{COCl}/\text{AlCl}_3$ , 3)  $\text{H}_2\text{NNH}_2/\text{NaOH}$

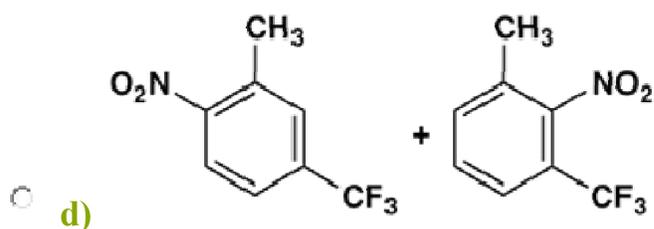
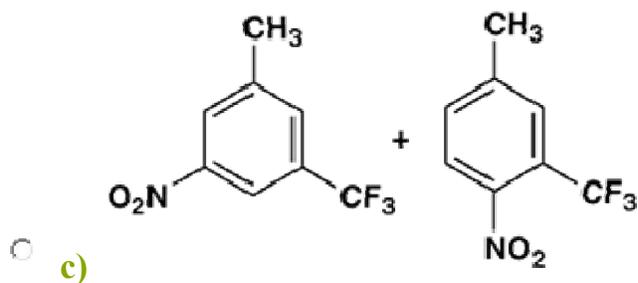
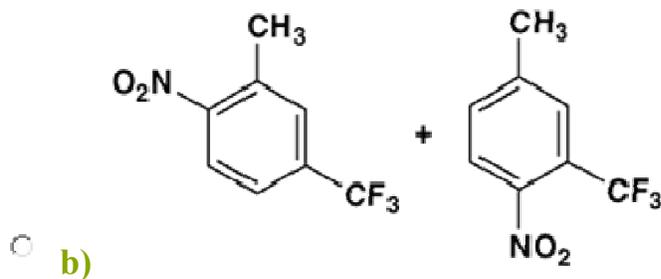
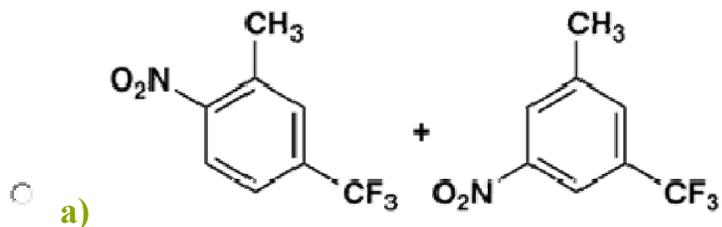
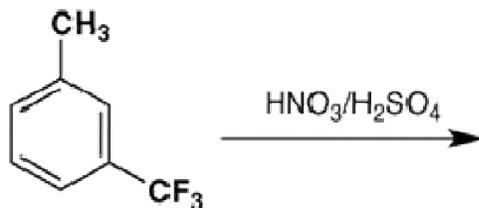
### Question 17

Which pair of compounds are the most probable main products of the following reaction?



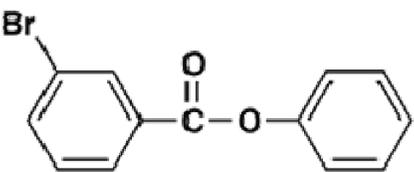
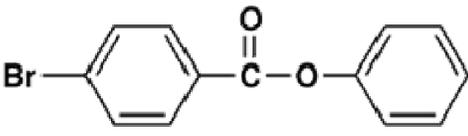
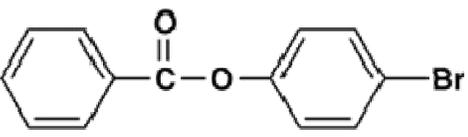
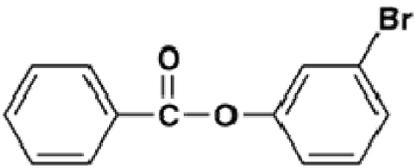
### Question 18

Which pair of compounds are the most probable main products of the following reaction?



### Question 19

Which will be the main product upon bromination of phenyl benzoate with  $\text{Br}_2/\text{AlBr}_3$ ?

- a) 
- b) 
- c) 
- d) 

### Question 20

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Which of the following statements regarding electrophilic aromatic substitution is wrong?

- a) Sulfonation of toluene is reversible.
- b) Friedel-Crafts alkylation of benzene can be reversible.
- c) Friedel-Crafts alkylation with primary alkyl chloride may involve rearrangement.
- d) Friedel-Crafts acylation of nitrobenzene readily gives a *meta* substitution product.

## Questions and Answers – Cycloalkanes and Cycloalkenes

1. Cycloalkanes are associated with the general formula

- a)  $C_nH_{2n+2}$
- b)  $C_nH_{2(n+2)}$
- c)  $C_nH_{2n+1-r}$
- d)  $C_nH_{2(n+1-r)}$

Answer: d

Explanation: It is almost the same as that in the case of alkanes. Here the difference is that 2 is replaced by  $1-r$  where  $r$  represents the number of rings in them.

2. Cycloalkanes have the same melting and boiling points as their corresponding alkanes. State true or false

- a) True
- b) False

Answer: b

Explanation: The melting and boiling points of the cycloalkanes are much more than the corresponding alkanes.

3. Identify the incorrect statement regarding cycloalkanes

- a) These have  $sp^3$  hybridized carbons
- b) These have tetrahedral bond angles
- c) Stability of the cycloalkanes varies directly with their respective size
- d) These undergo nucleophilic substitution reactions

Answer: b

Explanation: Cycloalkane compounds do not have a perfect tetrahedral bond angle, instead they show a minor deviation from it which leads to destabilizing effect.

4. Identify the compound with the highest ring strain

- a) Cyclomethane
- b) Cyclopropane
- c) Cyclobutane
- d) Cyclopentane

Answer: b

Explanation: Cyclopropane is the compound with the highest ring strain. This is because the carbon atoms are arranged in the shape of a triangle thus forming C-C-C.

5. Which among the following compounds explodes on contact with oxygen

- a) Cyclopropane
- b) Cyclobutane
- c) Cyclopentane
- d) Cyclohexane

Answer: a

Explanation: Cyclopropane reacts very aggressively at ordinary temperatures and hence it explodes when comes in contact with oxygen.

6. Identify the incorrect statement regarding cyclobutane

- a) The carbon atoms in the cyclobutane are non-coplanar
- b) These exist in nature as colourless gas
- c) Cyclobutane is a commercially important compound
- d) These compounds often show butterfly conformation

Answer: c

Explanation: Cyclobutane is a compound which has no commercial and medicinal importance but the complex derivative forms of them are used for a variety of purposes.

7. Identify the alicyclic hydrocarbon which is highly flammable

- a) Cycloheptane
- b) Cyclopentane
- c) Cyclopropane
- d) Cyclooctane

Answer: b

Explanation: cyclopentane is a hydrocarbon with 5 carbon atoms and they are highly flammable.

8. Identify the incorrect statement regarding cyclohexane:

- a) It is non-polar
- b) It serves as an organic solvent
- c) It is a hydrophilic hydrocarbon
- d) It is commercially used for variety of applications

Answer: c

Explanation: This compound is a hydrophobic hydrocarbon as it is non-polar by nature.

9. Identify the incorrect statement regarding cycloalkenes

- a) The bonds in them are fewer compared to those in alkenes
- b) They occur in gaseous form in nature
- c) These undergo polymerization
- d) The conjugated double bonds in them increase their stability

Answer: b

Explanation: Cycloalkenes mostly appear in liquid state but sometimes they are even found in solid state.

10. Cycloalkene exhibits aromatic character. State true or false

- a) True
- b) False

Answer: b

Explanation: Cycloalkene is a compound which has carbon atoms arranged in a closed ring but they do not exhibit aromatic character.