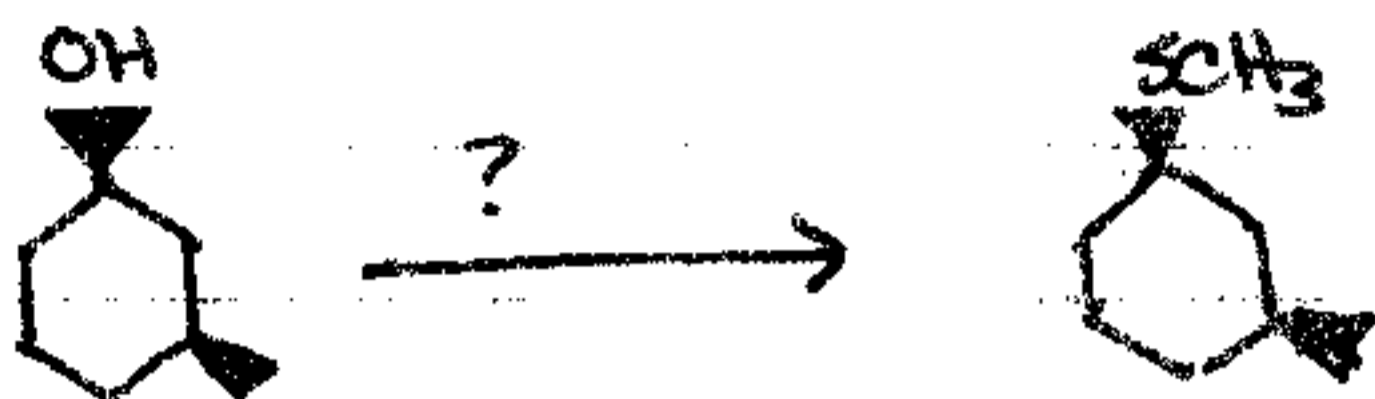


① Which of the following rxn sequences or condition will yield desired product in

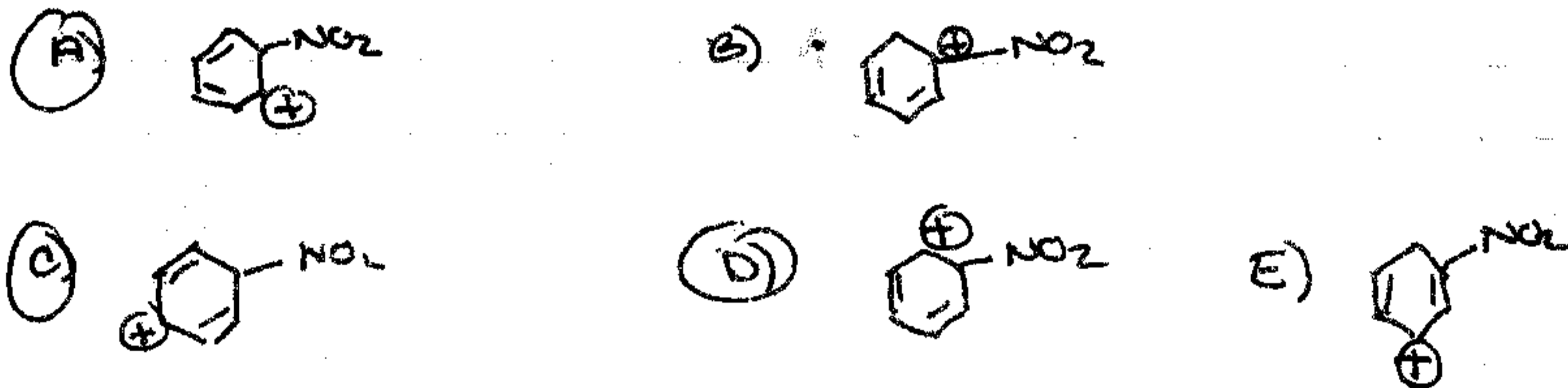


- (A) NaSCH<sub>3</sub>, DMSO
- (B) i) CH<sub>3</sub>SO<sub>2</sub>Cl    ii) NaSCH<sub>3</sub>, DMSO
- (C) i) HBr            ii) NaSCH<sub>3</sub>, DMSO
- (D) i) SOCl<sub>2</sub>, pyr    ii) NaSCH<sub>3</sub>, DMSO

② What is 1<sup>st</sup> step in conversion of ethanol into bromoethane using PBr<sub>3</sub>?

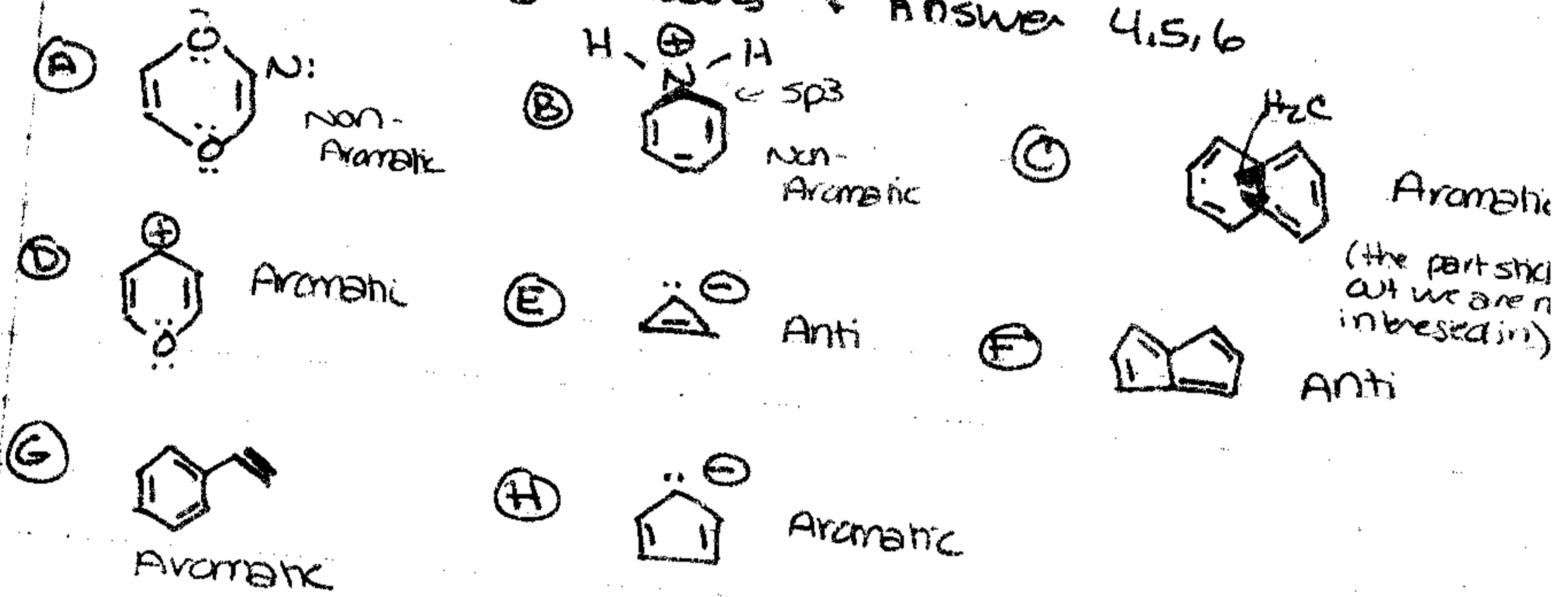
- a) Br ion attacks the alcoholic c, displacing OH
- b) The alcohol hydroxide group leaves, forming a carbocation
- (C) The alcohol oxygen attacks phosphorus, driving out bromide ion
- d) One PBr Br attacks ...

③ Which of following structures corresponds to the arenium ion intermediate formed in the RDS for the nitration of benzene?



- a) A only
- (B) A, C, D

3. Analyze the following molecules + answer 4, 5, 6



4. Which is Aromatic

- A) ABCDHIJ
- B) CDGHI
- C) BH
- D) BCDHIJ
- E) ACDHI

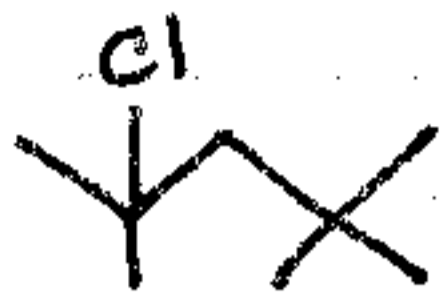
5. Which is non-aromatic

- A) ~~ABCDHIJ~~ ABJ
- B) ~~CDGHI~~ EF
- C)
- D)

6. Which is Anti-aromatic

- A)
- B) EF
- C) AG
- D) AFJ
- E)

7) How many sets of equivalent protons do we have



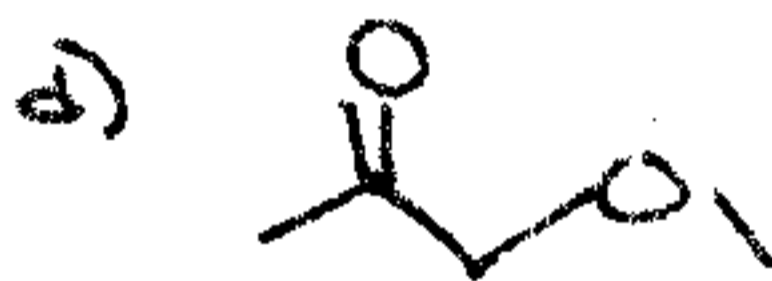
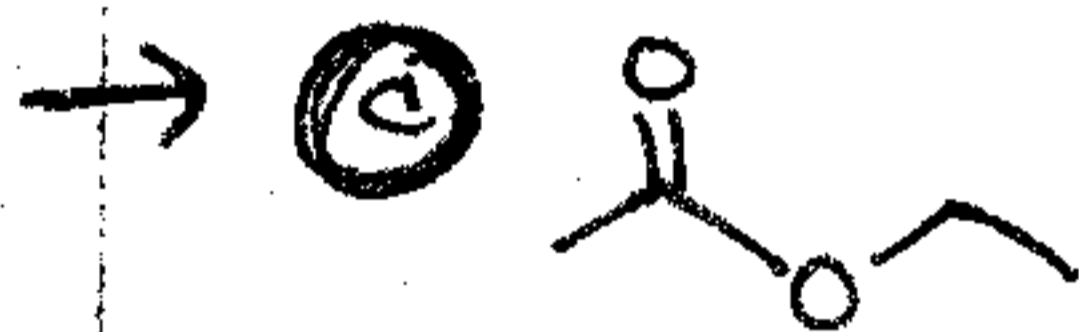
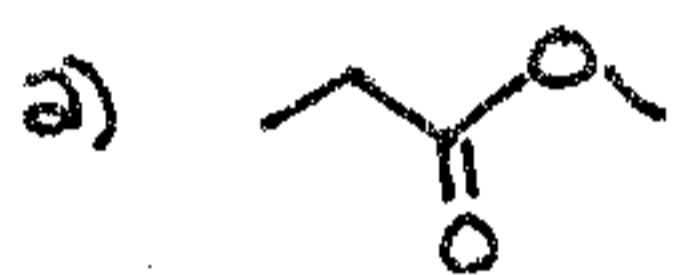
- 
- a) 2
  - b) 3
  - c) 4
  - d) 5
  - e) 6

8) which compound fits NMR data

Triplet  $\delta$  1.22 (3H)

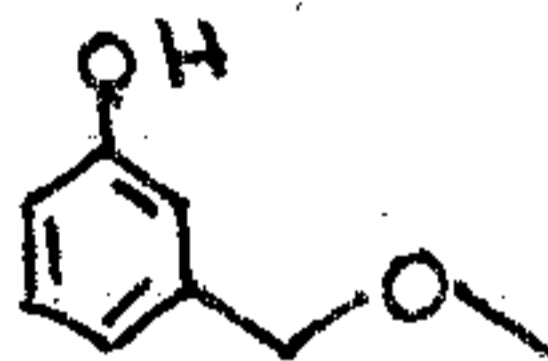
Singlet  $\delta$  1.98 (3H)

Quartet  $\delta$  4.07 (2H)

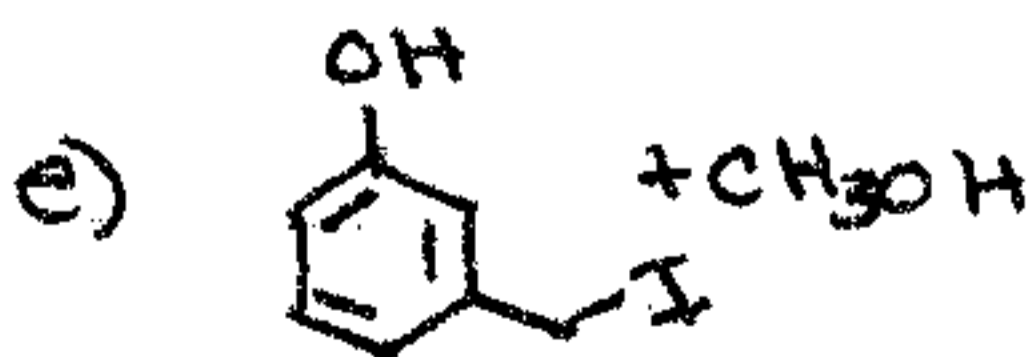
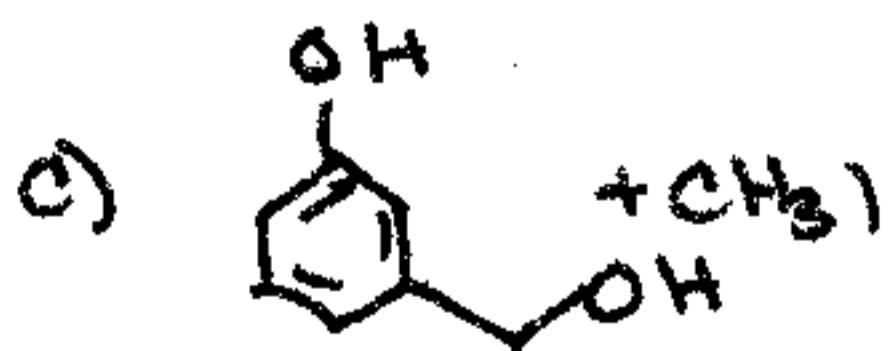
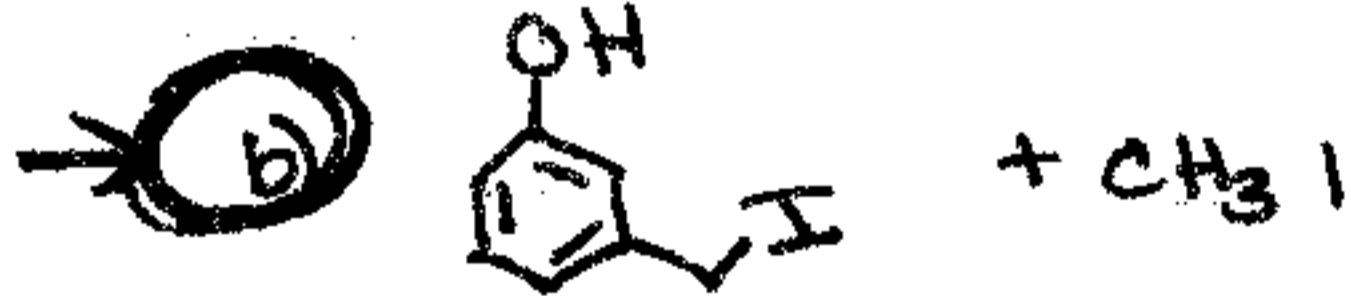


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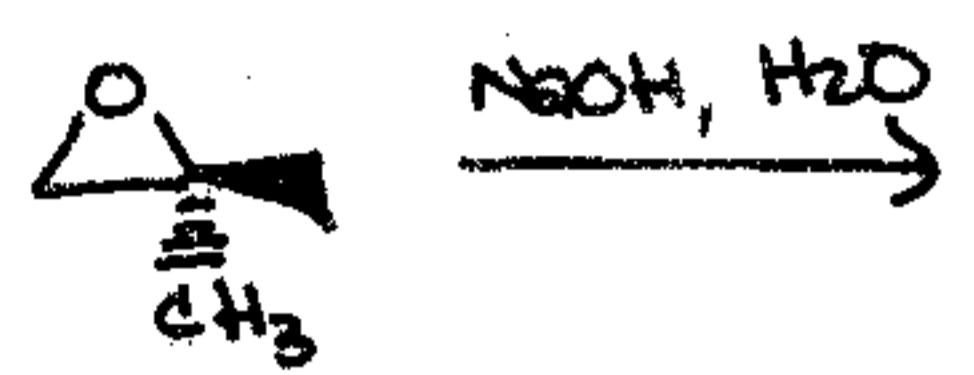
9) what are the products of the rxn below?



$\xrightarrow[\text{heat}]{\text{HI (excess)}}$



10) What is the product of the following rxn?



- A) (S)-1,2-propanediol
- B) (R)-1,2-propanediol
- C) racemic mixture of 1,2-propanediol
- D) 1,3-propanediol

11) What is final product of following rxn sequence

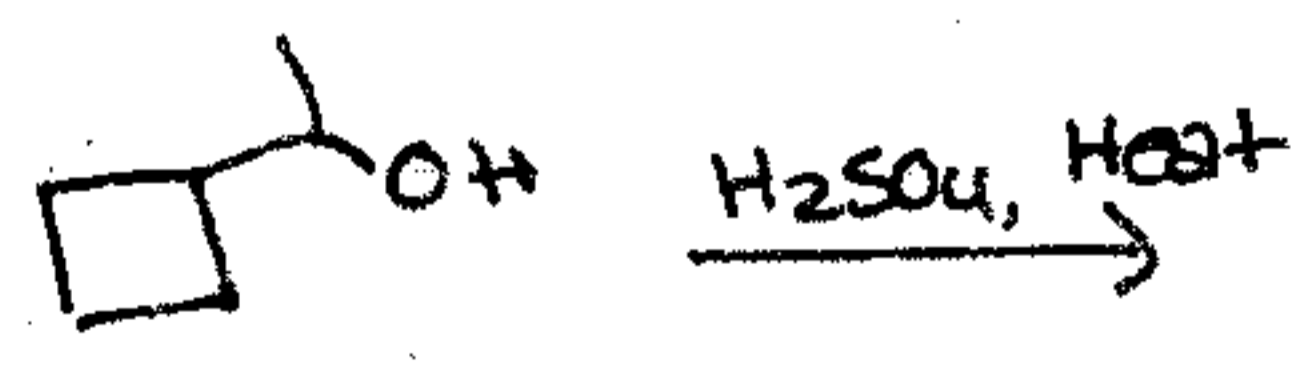


- A)
- B)
- C)
- D)

C

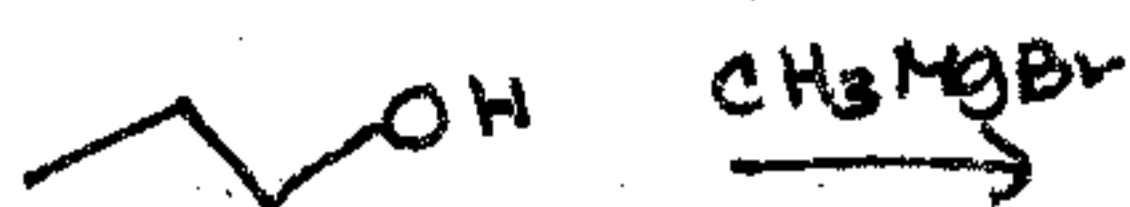
\*

12) What is the major product of the following alcohol dehydration



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

13) What is the product of the following rxn?



- a) CCC      b) CCOC  
→  c) CH4      d) CC      e) C=C

14) Which product is obtained when (R)-2-butanol is treated w/ p-toluenesulfonyl chloride (TsCl) in pyridine?

- a) (R)-2-butyl tosylate

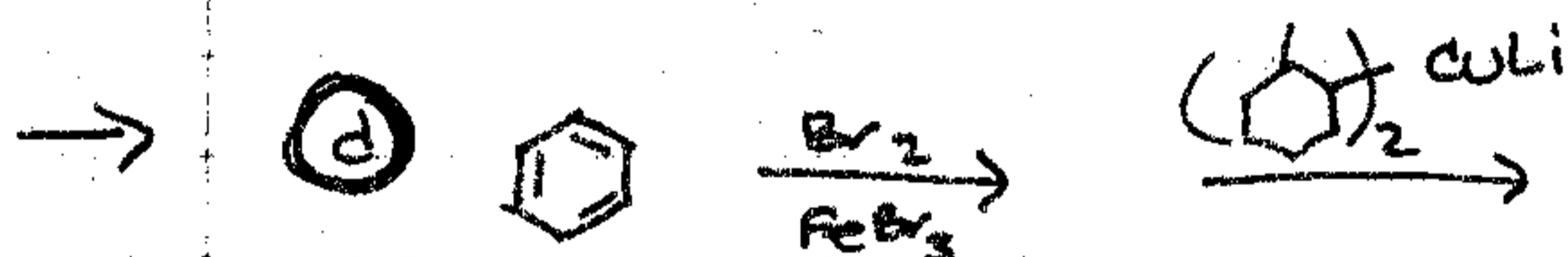
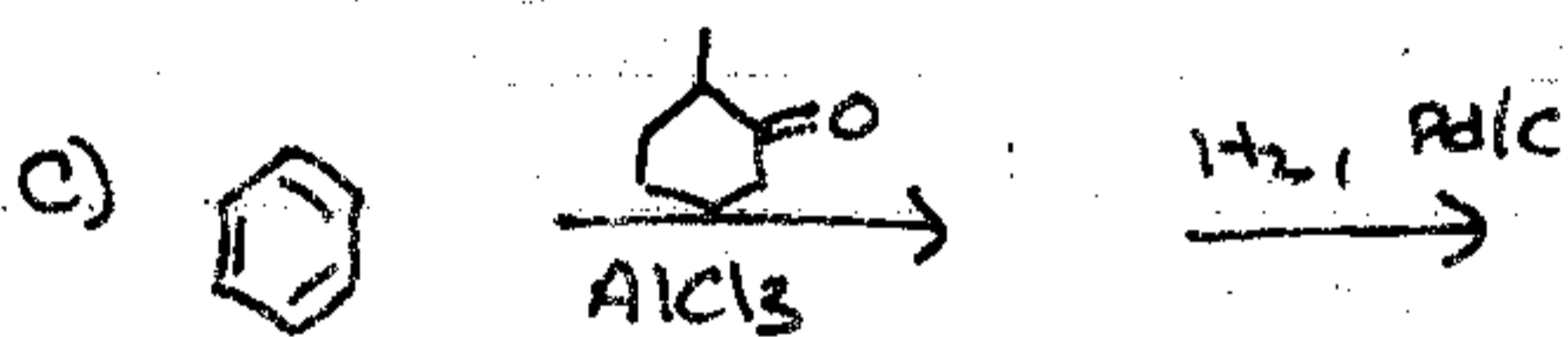
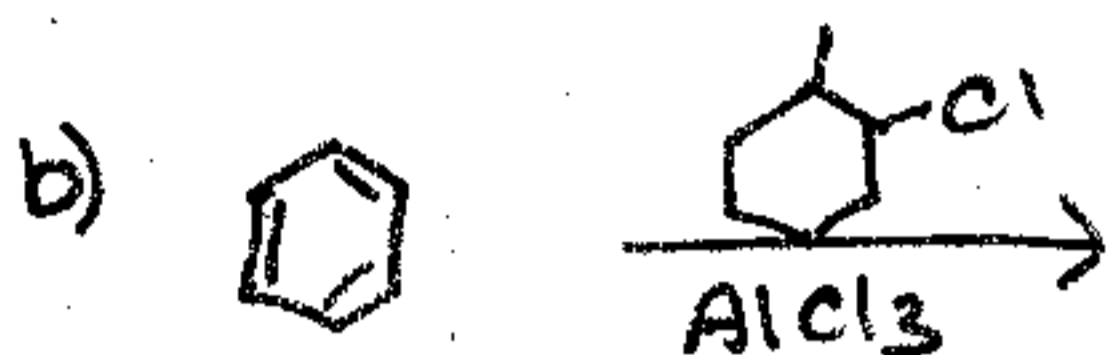
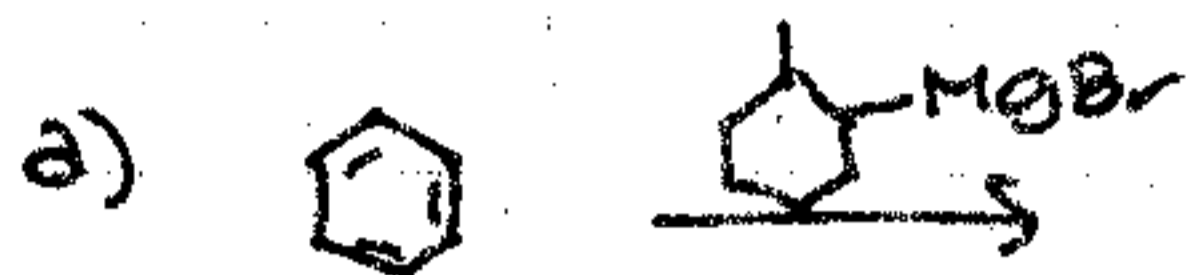
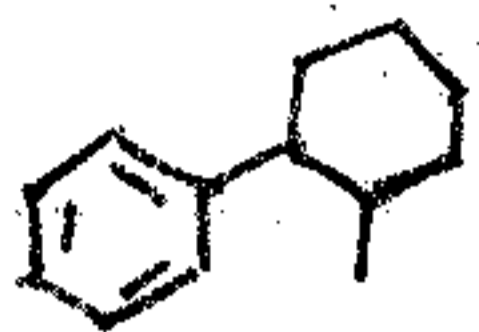
15) How can you achieve the following transformation. List reagents in correct (forward) synthesis order.



- A) CH3MgBr      a) BFED  
B) H3O+      b) EDG  
C) PBr3      →  c) ABG  
D) (CH3)2CuLi      d) EAF  
E) HBr      e) DCF  
F) H2SO4, heat  
G) POCl3

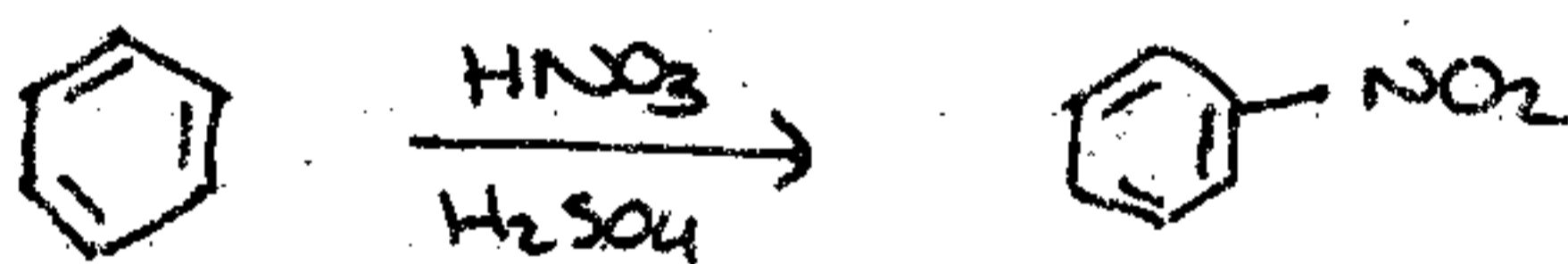
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16) Which is the best method to make the following molecule?



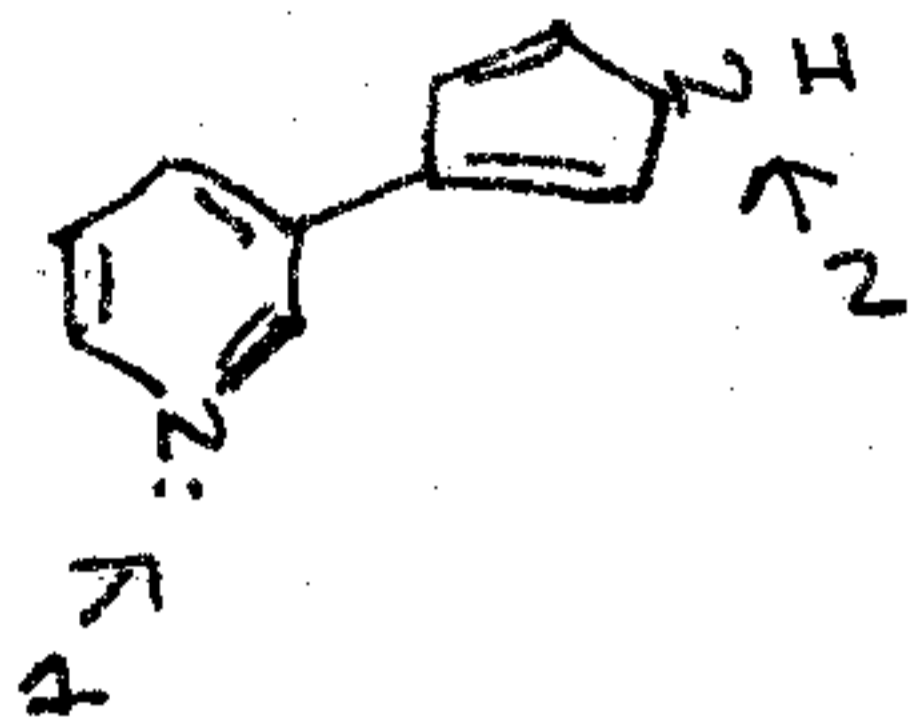
\*

17) In the reaction below, nitric acid plays the role of



- $\rightarrow$  a) Acid  
**b) base**  
c) carbocation  
d) leaving group

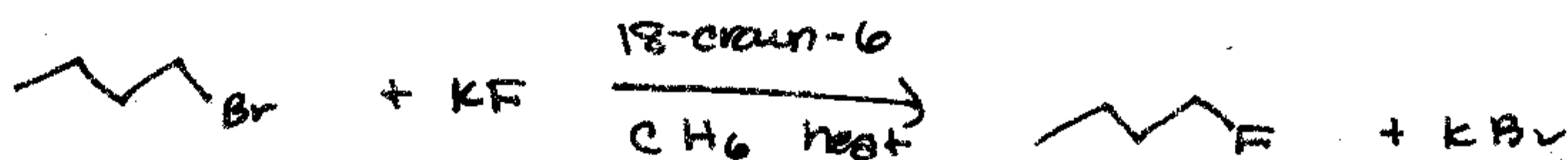
18) Identify the site of protonation when 1 equivalent of HCl is added to the following molecule.



- 
- a) Nitrogen 1
  - b) Nitrogen 2
  - c) both nitrogens
  - d) neither, the compound

\*

19) The role of 18-crown-6 in the rxn below is to



- 
- a) complex  $\text{K}^+$  by ion-dipole attraction increasing the solubility of KF and the nucleophilicity of  $\text{F}^-$

20 - 22 are NMR