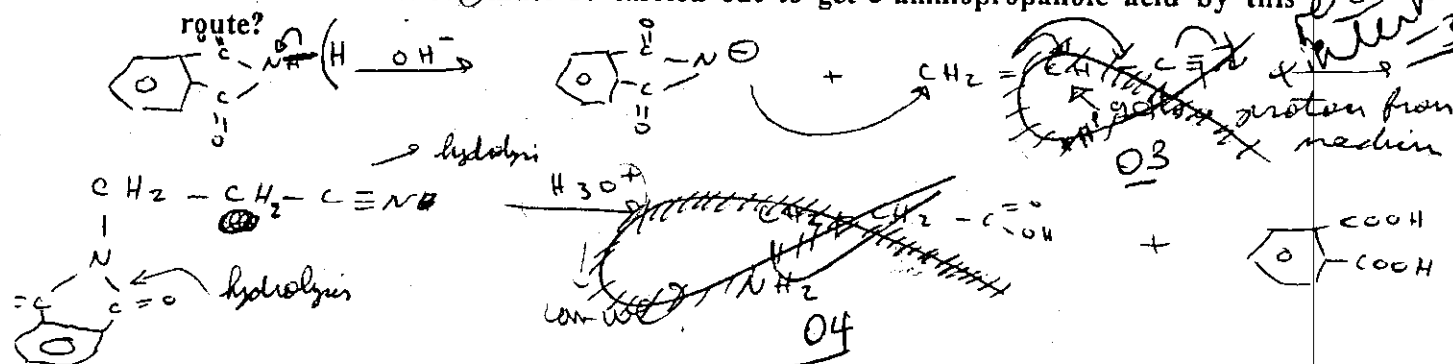
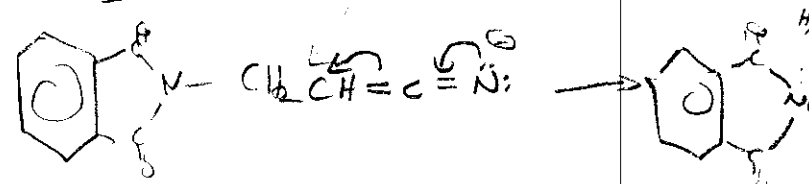




IV (10%) <sup>amine</sup>  $\beta$ -aniline, 3-aminopropanoic acid is prepared by a Gabriel synthesis in which the phthalimide anion is added to propenenitrile  $\text{CH}_2=\text{CH}-\text{C}\equiv\text{N}$  in a Michael-type reaction. Write equations showing the mechanism of this reaction. What other reactions must be carried out to get 3-aminopropanoic acid by this route?



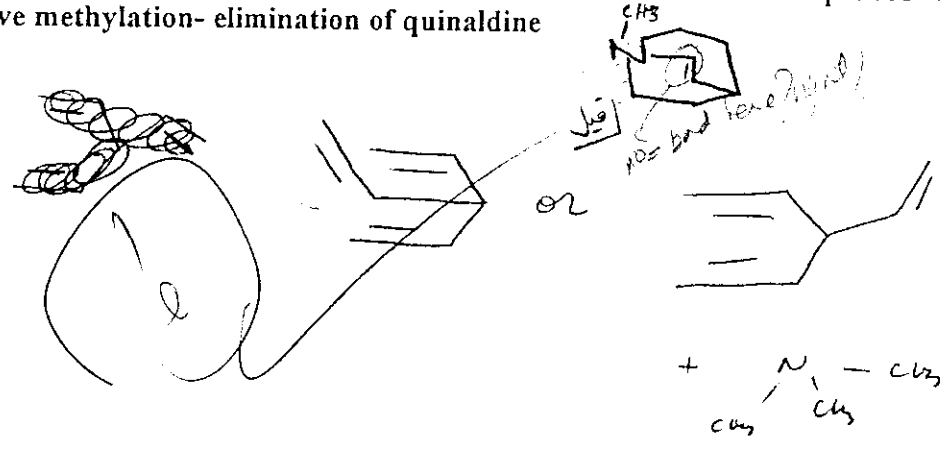
\* other reactions:



V (16%) :

VI

a) Give the structure of the alkene that results from the entire sequence of exhaustive methylation- elimination of quinaldine



b) Benzenediazonium chloride does not couple with anisole whereas 2,4-dinitrobenzenediazonium chloride does. Explain briefly.

\* benzenediazonium chloride is a weak electrophile that reacts only with strong nucleophiles. But the anisole has a weak electron donating group attached to it so it is not ~~electro~~ strong nucleophile so it does not couple; however dinitrobenzenediazonium chloride has strong electron withdrawing groups that increase the electrophilicity of diazonium chloride <sup>it is now a strong electrophile</sup> i.e. dinitro diazonium chloride can react with weak nucleophile anisole, in coupling moderately.

$\text{C}_6\text{H}_5\text{N}_2\text{Cl} + \text{C}_6\text{H}_5\text{OCH}_3 \rightarrow \text{No reaction}$   
 $\text{2,4-DNB-DZ} + \text{C}_6\text{H}_5\text{OCH}_3 \rightarrow \text{Coupling product}$