SNS COLLEGE OF PHARMACY AND HEALTHSCIENCES

Question Bank - Unit II

PHARMACEUTICAL ORGANIC CHEMISTRY-I (BP202T)

Long Answer Questions (10 Marks)

1. **Discuss the nucleophilic substitution reactions of alkyl halides**, focusing on the differences between SN1 and SN2 mechanisms in terms of kinetics, stereochemistry, and transition states. Illustrate with examples using ethyl bromide (SN2) and tert-butyl chloride (SN1), showing detailed mechanisms.
2. **Explain the E1 and E2 elimination reactions** of alkyl halides, including their mechanisms, stereochemistry, and factors favoring one over the other (e.g., base strength, substrate type). Provide examples of alkene formation from 2-bromopropane under E1 and E2 conditions.
3. **Describe the classification and preparation of alcohols**. Discuss the acid-catalyzed dehydration of alcohols to form alkenes, including the mechanism for a secondary alcohol and the role of carbocation stability in product formation.
4. **Compare the reactivity of alkyl halides and aryl halides** in nucleophilic substitution reactions. Explain the mechanism of nucleophilic aromatic substitution via the elimination-addition (benzyne) pathway, using chlorobenzene as an example.
5. **Elaborate on the chemical reactions of alcohols** relevant to pharmaceutical synthesis, focusing on oxidation and esterification. Provide detailed mechanisms for the oxidation of a primary alcohol to an aldehyde and the formation of an ester from ethanol and acetic acid.

Long Answer Questions (5 Marks)

1. Explain the preparation of alkyl halides from alkenes via electrophilic addition, including the mechanism for the addition of HBr to propene.
2. Discuss the effect of alkyl halide structure (primary, secondary, tertiary) on the rate of SN1 reactions, with an example.
3. Describe the role of a strong, bulky base in promoting E2 elimination over substitution in alkyl halides, with an example.
4. Explain why aryl halides require harsh conditions for nucleophilic substitution, and describe the role of electron-withdrawing groups in facilitating such reactions.
5. Outline the synthesis of alcohols via the hydration of alkenes, including the mechanism and Markovnikov's rule.
6. Discuss the Lucas test for distinguishing between primary, secondary, and tertiary alcohols, including the chemical basis of the test.

7. Explain the physical properties of alcohols, focusing on how hydrogen bonding affects their boiling points compared to alkyl halides.

Short Answer Questions (2 Marks)

1. What is Hofmann's rule, and how does it differ from Saytzeff's rule in elimination reactions?
2. Define hyperconjugation and its role in stabilizing carbocations in SN1 reactions.
3. Write the IUPAC name for (CH3)2CHCH2Br.
4. Why do primary alkyl halides favor SN2 reactions over SN1?
5. What is the product of the dehydration of 2-propanol under acidic conditions?
6. Write the reaction for the conversion of bromobenzene to phenol via nucleophilic aromatic substitution.
7. What is the role of a catalyst in the esterification of alcohols?
8. Why are tertiary alcohols resistant to oxidation?
9. Draw the structure of benzyl alcohol and classify it as a primary, secondary, or tertiary alcohol.
10. What is the significance of the leaving group ability in alkyl halides during substitution reactions?