

Quadrant II – Transcript and Related Materials

Programme: F. Y. B. Sc

Subject: Chemistry

Course Code: CHC 101

Course Title: Inorganic and Organic Chemistry (Section B)

Unit: 3

Module Name: Alkynes (Upto 5 carbons) Preparation: By Dehalogenation of tetrahalides and dehydrohalogenation of vicinal dihalides.

Module No: 48

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Notes

1. Dehalogenation of tetrahalides:

When 1,1,2,2-tetrahalides are heated with zinc dust in alcohol, the tetrahalides give alkynes.

2. Dehydrohalogenation of vicinal dihalides:

Alkynes can be prepared by a double dehydrohalogenation of dihaloalkanes.

The dihalide may be a geminal dihalide, one in which both halogens are on the same carbon, or it may be vicinal dihalide, one in which the halogens are on adjacent carbons.

Dehydrohalogenation of vicinal dihalides is particularly useful since the dihalides themselves are readily obtained from the corresponding alkenes by addition of halogen. This amounts to conversion, by several steps, of a double bond into a triple bond.

Alkynes can be prepared by elimination of HX from alkyl halides in much the same manner as alkenes. Treatment of a 1,2-dihalide (a vicinal dihalide) with excess strong base such as KOH or NaNH_2 results in a twofold elimination of HX and formation of an alkyne.

Dehydrohalogenation can generally be carried out in two steps. Carried through only the first stage, it is a valuable method for preparing unsaturated halides. The halides thus obtained, with halogen attached directly to double-carbon, known as vinylic dihalides, are very unreactive. Under mild conditions, therefore, dehydrohalogenation stops at the vinylic halide stage; more vigorous conditions, use of a stronger base, are required for alkyne formation.

The most frequent application of the dehydrohalogenation of vicinal dihalides lie in the preparation of terminal alkynes. Because the terminal alkyne product is acidic enough to transfer a proton to amide anion, one equivalent of base in addition to the two equivalents

required for double dehydrohalogenation is needed. Adding water or acid after the reaction is complete converts the sodium salt to the corresponding alkyne.
