PREVIOUS YEAR JEE PROBLEMS:-

Q1:

2-hexyne gives *trans*-2-hexene on treatment with (2004, 1M)

(a) Li/NH₃

(b) Pd/BaSO₄

(c) LiAlH₄

(d) Pt/H₂

Q2:

Give the chemical test to distinguish between 2-butyne and 1-butyne. (1985, 1M)

Q3:

..... is most acidic. (Ethane, Ethene, Ethyne)

(1981, 1M)

Q4:

When propyne is treated with aqueous H₂SO₄ in the presence of HgSO₄, the major product is (1983, 1M)

(a) propanal

(b) propyl hydrogen sulphate

(c) acetone

(d) propanol

Q5:

The number of structural and configurational isomers of a bromo compound, C₅H₀Br, formed by the addition of HBr to 2-pentyne respectively, are (1988, 1M)

(a) 1 and 2

(b) 2 and 4

(c) 4 and 2 (d) 2 and 1

SOLUTION:

(1).

Alkynes on treatment with alkali metals in liquid ammonia gives trans hydrogenation product:

$$CH_{3}-C \equiv C-CH_{2}-CH_{2}-CH_{3} \xrightarrow{\text{Li/NH}_{3}}$$

$$2-\text{hexyne}$$

$$H_{3}C \longrightarrow C \xrightarrow{\text{CH}_{2}CH_{2}CH_{3}}$$

$$C=C \xrightarrow{\text{CH}_{2}CH_{2}CH_{3}}$$

$$trans-2-\text{hexene}$$

(2)

1-butyne (terminal) can be distinguished from 2-butyne (internal) by either Tollen's test or through Fehling's test.

$$\begin{array}{c} \xrightarrow{AgNO_3} CH_3 - CH_2 - C \equiv CAg \downarrow \\ CH_3 - CH_2 - C \equiv C - H & White ppt. \\ \hline \\ CuCl_2 \\ NH_3(aq) & CH_3 - CH_2 - C \equiv CCu \downarrow \\ Red ppt. \end{array}$$

(3)

Terminal alkyne (ethyne) is most acidic among these.

(4)

Alkynes undergo Markownikoff's addition of water in the presence of H₂SO₄ / HgSO₄:

$$CH_{3}-C \equiv C-H+H_{2}SO_{4} \xrightarrow{HgSO_{4}} \begin{bmatrix} OH \\ CH_{3}-C = CH_{2} \end{bmatrix}$$

$$Unstable \ enol \ CH_{3}-C-CH_{3}$$

$$CH_{3}-C-CH_{3}$$

$$Acetone$$

(5)

$$CH_{3}-C \equiv C-CH_{2}CH_{3} + HBr \longrightarrow$$

$$H_{3}C$$

$$E = C + H$$

$$E = C +$$

Therefore, two structural and four configurational isomers.