

Answer on Question #51351 – Chemistry - Organic Chemistry

Question

Arrange according to decreasing order of their stability

- A) $\text{CH}_3\text{—CH}^+\text{—CH}_3$
- B) $\text{CH}_3\text{—CH}^+\text{—OCH}_3$
- C) $\text{CH}_3\text{—CH}^+\text{—COCH}_3$

Answer

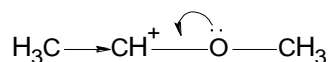
- B) $\text{CH}_3\text{—CH}^+\text{—OCH}_3$ – most stable
- A) $\text{CH}_3\text{—CH}^+\text{—CH}_3$
- C) $\text{CH}_3\text{—CH}^+\text{—COCH}_3$ – least stable

Brief explanation

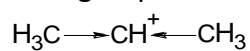
When electron density is shifted to positively charged carbon atom due to +I or +M effect a carbocation is stabilized. +M effect has greater impact on the cation stability compared to +I effect.

When electron density is drawn from the charged carbon atom due to –I or –M effect a carbocation is destabilized.

For B) there are 1 stabilizing +I effect of CH_3 -group and 1 stabilizing +M effect (p-p conjugation) of lone pair of electrons on O atom of ethoxy-group:



For A) there are 2 stabilizing +I effects of CH_3 -groups:



For C) there are 1 stabilizing +I effect of CH_3 -group and 1 destabilizing -M effect (p- π conjugation) of carbonyl group:

