MAD ORG CHEM "MIN" # 19

Propose a mechanism for the following transformations. Remember to use curved arrows to represent electron flow and to show all intermediates and formal charges.

1.

$CH_2CH_2CHCH=CH_2$ with CH_3 substituent, phenyl ring

$\xrightarrow{HCl}$ indane with CH_3 and CH_2CH_3

Intermediate structures showing:

$CH_2CH_2\overset{CH_3}{\underset{H}{C}}-\overset{\oplus}{C}H-CH_3$

$CH_2CH_2\overset{CH_3}{C}^{\oplus}-CH_2CH_3$

ring structures with CH_3, CH_2CH_3 and $Cl^{\ominus}$

2.

Structure with Br, H, and ^+N with O^- and O (nitro group)

$\xrightarrow[\text{heat}]{CH_3O^- \ Na^+}$ product with OCH_3 and nitro group

meta deactivator does NOT support addition/elimination

benzyne intermediate with NO_2; $CH_3O^{\ominus}$; OCH_3 with NO_2 and CH_3O-H

elim / add

3.

Structure with Br, $^+N-O^-$, O (nitro)

$\xrightarrow[\text{heat}]{CH_3O^- \ Na^+}$ product with OCH_3 and $^+N-O^-$, O

intermediate with Br, OCH_3, $^{\ominus}N$

addition / elimination