

Ozonolysis Problems

Here are the answers and explanations for the 15 ozonolysis problems:

Basic Problems

1. **2-butene** ($\text{CH}_3\text{-CH=CH-CH}_3$)
Products: 2 molecules of **ethanal** (CH_3CHO)
 2. **1-pentene** ($\text{CH}_2\text{=CH-CH}_2\text{-CH}_2\text{-CH}_3$)
Products: **formaldehyde** (HCHO) and **butanal** ($\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CHO}$)
 3. **Product is only formaldehyde**
Alkene: **ethylene** ($\text{CH}_2\text{=CH}_2$)
 4. **Ethanal** (CH_3CHO) and **propanal** ($\text{CH}_3\text{-CH}_2\text{-CHO}$)
Alkene: **pent-2-ene** ($\text{CH}_3\text{-CH=CH-CH}_2\text{-CH}_3$)
 5. **Acetic acid** (CH_3COOH) and **CO₂**
Alkyne: **propyne** ($\text{CH}_3\text{-C}\equiv\text{CH}$)
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Moderate Problems

6. **C₆H₁₀ gives one product**
Alkene: **cyclohexene**
Product: **adipic dialdehyde**
 7. **Benzaldehyde and ethanal**
Alkene: **1-phenylpropene** (Ph-CH=CH-CH_3)
 8. **Cyclohexene**
Product: **1,6-hexanedial** ($\text{OHC-(CH}_2\text{)}_4\text{-CHO}$)
 9. **Styrene** ($\text{C}_6\text{H}_5\text{-CH=CH}_2$)
Products: **benzaldehyde** ($\text{C}_6\text{H}_5\text{CHO}$) and **formaldehyde** (HCHO)
 10. **2 moles of acetone** (CH_3COCH_3)
Alkene: **2,3-dimethyl-2-butene** ($\text{CH}_3\text{)}_2\text{C=C(CH}_3\text{)}_2$
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Advanced Problems

11. **Oxalic acid** (HOOC-COOH) and **acetic acid** (CH_3COOH)
Alkene: $\text{CH}_2\text{=C(COOH)-CH}_3$
12. **C₇H₁₂ gives one ketone**
Alkene: **3-heptene** ($\text{CH}_3\text{CH}_2\text{CH=CHCH}_2\text{CH}_2\text{CH}_3$)
Product: 2 molecules of **butanone** ($\text{CH}_3\text{COCH}_2\text{CH}_3$)
13. **1,3-butadiene** ($\text{CH}_2\text{=CH-CH=CH}_2$)
Products: 2 moles of **glyoxal** (OHC-CHO)

14. **cis- and trans-2-butene** ozonolysis both give **2 ethanal**

Difference: Physical properties (cis: liquid, trans: gas), ozonide formation and cleavage can distinguish.

15. **Glyoxal (OHC-CHO)** and **formaldehyde (HCHO)**

Alkene: vinyl aldehyde (CH₂=CH-CHO)
