

Organic Structure, Naming, and Functional Groups

Student Worksheet | g10_u07_w25

I can: use condensed structural formulas to identify a limited set of carbon-chain patterns and functional groups, then make bounded introductory names.

Scope card: This introduction uses only the patterns printed below: alkane, alkene, alkyne, alcohol, aldehyde, carboxylic acid, ester, and amine. A condensed formula is a model of connectivity; it does not give an exact 3-D shape, reaction mechanism, hazard, health effect, or pharmaceutical use. Analyze paper/data cards only—no chemical samples, odor tests, ingestion, or handling.

formula card	signal in this scope	introductory label
CH ₃ CH ₃	C–C only	alkane
CH ₂ =CH ₂	C=C	alkene
HC≡CH	C≡C	alkyne
CH ₃ CH ₂ CH ₂ OH	–OH on chain	alcohol
CH ₃ CHO	–C(=O)H	aldehyde
CH ₃ COOH	–C(=O)OH	carboxylic acid
CH ₃ COOCH ₃	–C(=O)O– between carbon groups	ester
CH ₃ CH ₂ NH ₂	–NH ₂ on chain	amine

1. Count the carbon atoms in CH₃CH₂CH₂OH.

2. Which formula card shows an alkane? Cite its bond signal.

3. Which formula card shows an alkene? Cite its bond signal.

4. Which formula card shows an alkyne? Cite its bond signal.

5. Identify the functional-group signal for an alcohol in this scope.

6. Identify the functional-group signal for an aldehyde in this scope.

7. Identify the functional-group signal for a carboxylic acid in this scope.

8. Identify the functional-group signal for an ester in this scope.

9. Identify the functional-group signal for an amine in this scope.

10. Classify $\text{CH}_3\text{CH}_2\text{NH}_2$ using the card.

11. Classify CH_3COOH using the card.

12. Give the introductory name of CH_3CH_3 using the two-carbon root.

13. Give the introductory name of $\text{CH}_3\text{CH}_2\text{CH}_3$ using the three-carbon root.

14. Give the introductory name of $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$, locating the alcohol from the nearest end.

15. Why is the $-\text{OH}$ in CH_3COOH not classified as an alcohol by this card?

16. A molecular formula is $\text{C}_3\text{H}_8\text{O}$. Explain why formula alone does not uniquely determine the functional group or connectivity.

17. What can a condensed structural formula show, and what exact 3-D feature can it not show by itself?

18. Classify $\text{CH}_3\text{CH}_2\text{COOCH}_3$ and count its total carbon atoms.

19. Critique: “Once a functional group is identified, the formula proves a substance’s hazard, health effect, or use.”

20. Write a cautious CER statement using one structural signal and one naming/classification result. Include a limit of this introductory model.
