

Unit 1 Issue Analysis

Current Issues Related to Organic Chemistry

Student Textbook pages 110–111

This performance task provides an excellent opportunity for students to examine the economic and social issues surrounding organic chemistry. Several of the issues listed are current, and students may be able to find relevant information in newspapers and magazines. You may also want to direct the class towards issues involving organic chemistry that are important in your community.

When researching information on the Internet, warn students to watch out for web sites containing information that is slanted very strongly towards a certain point of view. Many of these web sites contain inaccurate and incorrect information. Encourage students to form their own opinions using books and web sites that are produced by reputable organizations, and that contain balanced viewpoints.

Assessment and Evaluation

Performance Task	Curriculum Expectations	Assessment Tools/Techniques	Achievement Chart Categories	Learning Skills
Unit 1 Issue: Current Issues Related to Organic Chemistry	<ul style="list-style-type: none">■ [OC 3.02] describe the variety and importance of organic compounds in our lives■ [OC 3.03] analyze the risks and benefits of the development and application of synthetic products■ [OC 3.04] provide examples of the use of organic chemistry to improve technical solutions to existing or newly identified health, safety, and environmental problems	<ul style="list-style-type: none">■ Rubric for Unit 1 Issue (see Assessment Rubrics in the Teacher's Resource CD-ROM)	<ul style="list-style-type: none">■ Making Connections	<ul style="list-style-type: none">■ Teamwork■ Initiative■ Organization

Unit 1 Review Answers

Student Textbook, pages 112–115

Answers to Knowledge/Understanding Questions

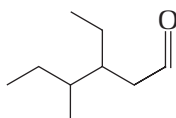
Multiple Choice

- | | | | |
|--------|--------|---------|---------|
| 1. (d) | 5. (d) | 9. (a) | 13. (b) |
| 2. (c) | 6. (c) | 10. (c) | 14. (c) |
| 3. (a) | 7. (d) | 11. (d) | 15. (d) |
| 4. (a) | 8. (e) | 12. (e) | 16. (c) |

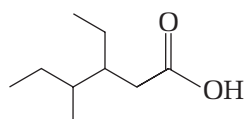
Short Answer

- The term “chemical” does not necessarily mean “harmful chemical,” as implied by this statement. Many healthy foods contain harmless and beneficial additives. In any case, food itself is composed of chemicals.
- An amide contains a C=O group joined to a nitrogen atom, while an amine contains only the nitrogen atom. Examples of the two include ethanamide, CH_2CONH_2 , and ethanamine, $\text{CH}_2\text{CH}_2\text{NH}_2$.
- The double bond in an alkene, the triple bond in an alkyne, and the benzene group in an aromatic hydrocarbon are functional groups.

20. The boiling point of a carboxylic acid will be higher than the boiling point of a similarly sized alcohol, due to the particularly strong hydrogen bonding between carboxylic acid molecules.
21. A primary amine has two N—H bonds, while a tertiary amine has none. To form hydrogen bonds, a compound must have an N—H, O—H, or F—H bond.
22. No reaction occurs when an oxidizing agent is added to a tertiary alcohol. Tertiary alcohols do not have a C—H bond to be broken at the oxidizing site.
23. When an oxidizing agent is added to a secondary alcohol, the alcohol is oxidized to form a ketone.
24. Ethanol is also called grain alcohol.
25. The IUPAC name for acetic acid is ethanoic acid.
26. The carbonyl group of an aldehyde is always located on the first carbon atom of the chain, so no position number is necessary.
27. The first product is 3-ethyl-4-methylhexanal, and the second is 3-ethyl-4-methyl hexanoic acid.



3-ethyl-4-methylhexanal



3-ethyl-4-methylhexanoic acid

Answers to Inquiry Questions

28. (a) butanoic acid
 (b) methanol
 (c) methyl pentanoate
 (d) 2-butanone
 (e) N-methylethanamine
 (f) 4,5-dimethylheptanal
29. (a) wood alcohol
 (b) rubbing alcohol
 (c) diethyl ether
30. (a) 3-ethyl-4-methyl-1-hexene
 (b) methoxypropane
 (c) 3-methyl-1-pentanamine
 (d) 5-ethyl-3,7,9-trimethyl-2-decanol
 (e) butyl propanoate
31. (a) 5-methyloctanoic acid
 (b) N-ethyl-1-butanamine
- (c) 6-ethyl-5-methyl-2-octyne
 (d) butanamide
 (e) 6-ethyl-7-methyl-4-decanone
 (f) 2-ethyl-3-methylcyclohexanol
 (g) 4,4,6,6-tetramethyl-1-heptanal
 (h) 4-ethyl-3,5-dimethyl-1-cyclopentene
 (i) N-ethyl-N-methylethanamide
 (j) 3,6,7-trimethylcyclononane
32. (a) The correct name is 4-methyl-2-heptanone.
- (b) The correct name is 3,3-dimethylhexane.
- (c) The correct name is 2,5-octanediol.
33. The finger dipped into the 2-propanol (rubbing alcohol) will feel cooler. Both 2-propanol and water form hydrogen bonds. A water molecule has two O—H bonds, while a 2-propanol molecule has one. Therefore, 2-propanol has weaker hydrogen bonding and a lower boiling point than water, and will evaporate faster, making your finger feel cooler.
34. The 1-pentanol will undergo an oxidation reaction with acidified potassium permanganate, but the pentanoic acid will not. Also, the boiling point of pentanoic acid will be higher than that of 1-pentanol.
34. Ethanol is miscible with water, while the other two are non-polar and will not dissolve. Use this fact to identify the ethanol. Next, react the two hydrocarbons with bromine. 2,4-hexadiene will react with the bromine, so that the bromine colour disappears. Benzene requires a catalyst to react.
36. (a) 2,3-diiodopentane, $\text{CH}_3\text{CH}_2\text{CH}(\text{I})\text{CH}(\text{I})\text{CH}_3$
 (b) 1-chloropropane, $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$ + water, H_2O
 (c) 2-methylpropanoic acid, $\text{CH}_3\text{CH}(\text{CH}_3)\text{COOH}$
 (d) propyl methanoate, $\text{HCOOCH}_2\text{CH}_2\text{CH}_3$ + water, H_2O
 (e) 1-heptene, $\text{CH}_2=\text{CHCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ + water, H_2O
37. (a) 2-propanol (major), $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ + 1-propanol (minor), $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
 (b) 1-propanol, $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ + decanoic acid, $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$
 (c) 3-methyl-1-butanol, $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{OH}$ + hydrobromic acid, HBr

