

Name:

## Chapter 12 Review Quiz

### Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ☐ 1. Esters are formed from the reaction between:
- an amine and a carboxylic acid.
  - an alkene and an alcohol.
  - an alcohol and a carboxylic acid.
  - an alcohol and an aldehyde.
- ☐ 2. Butanoic acid is added to ethanol to form the ester:
- ethanol butanoic acid.
  - butyl ethanoate.
  - ethyl butanoate.
  - ethanol butanoate.
- ☐ 3. Which of the following lists contains only isomers of ethyl butanoate?
- butyl ethanoate, hexanoic acid, propyl propanoate
  - hexanoic acid, propyl propanoate, methyl hexanoate
  - propyl propanoate, hexyl methanoate, hexanoic acid
  - pentanoic acid, butyl ethanoate, propyl propanoate
- ☐ 4. Esterification, or the formation of an ester, is an example of which type of reaction?
- hydrogenation
  - substitution
  - addition
  - condensation
- ☐ 5. Esterification requires the process of reflux, which is best defined as:
- separation of immiscible liquids using a separating funnel.
  - extended heating of a mixture without any loss of reactants or products.
  - extended heating to raise the rate of reaction.
  - separation of liquids of different boiling points.
- ☐ 6. Which of the following conditions is not required for esterification?
- reflux
  - addition of concentrated sulfuric acid
  - addition of one reagent in excess
  - addition of a metal catalyst
- ☐ 7. Purification of an ester requires three steps. Which option shows these three steps in the correct order?
- Washing to remove water soluble substances → addition of sodium carbonate → repeat washing
  - Washing to remove water soluble substances → addition of sodium carbonate → distillation
  - Addition of sodium carbonate → washing to remove water soluble substances → distillation
  - Addition of sodium carbonate → distillation → washing to remove water soluble substances
- ☐ 8. Examples of organic acids and organic bases include:

- a. Acids: aldehydes and ketones      Bases: amines
- b. Acids: carboxylic acids      Bases: hydroxides and oxides
- c. Acids: carboxylic acids      Bases: amines
- d. Acids: sulfuric and nitric acids      Bases: amines

- ▼ 9. Organic acids tend not to have very low pH values because:
- a. they are weak acids that only partially ionise.
  - b. their large size means they only partially ionise.
  - c. most organic acids are unreactive.
  - d. they behave differently to other acids and do not donate protons.
- ▼ 10. Which of the following shows a balanced equation for the reaction between ethanoic acid and magnesium hydroxide?
- a.  $\text{CH}_3\text{COOH}(\text{aq}) + \text{Mg}(\text{OH})_2(\text{aq}) \rightarrow \text{Mg}^{2+}(\text{aq}) + \text{CH}_3\text{COO}^-(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
  - b.  $2\text{CH}_3\text{COOH}(\text{aq}) + \text{Mg}(\text{OH})_2(\text{aq}) \rightarrow \text{Mg}^{2+}(\text{aq}) + 2\text{CH}_3\text{COO}^-(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
  - c.  $\text{CH}_3\text{COOH}(\text{aq}) + \text{MgOH}(\text{aq}) \rightarrow \text{Mg}^{2+}(\text{aq}) + \text{CH}_3\text{COO}^-(\text{aq}) + \text{H}_2\text{O}(\text{l})$
  - d.  $2\text{CH}_3\text{COOH}(\text{aq}) + \text{Mg}(\text{OH})_2(\text{aq}) \rightarrow \text{Mg}^{2+}(\text{aq}) + 2\text{CH}_3\text{CO}^-(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
- ▼ 11. Hydrochloric acid is added to methanamine. The organic product of this reaction is:
- a. methyl aminechloride.
  - b. ammonium chloride.
  - c. methylammonium chloride.
  - d. methanamine chloride.
- ▼ 12. Which of the following is not a use of detergents?
- a. break down grease and oil
  - b. increase the wettability of a liquid
  - c. act as an emulsifier
  - d. act as a surfactant to remove grease and oil
- ▼ 13. Which of the following correctly describes the structure of a soap/detergent molecule?
- a. a hydrophilic hydrocarbon tail with a polar head.
  - b. a hydrophobic hydrocarbon tail with a non-polar hydrophobic head.
  - c. a hydrophobic hydrocarbon tail with a hydrophilic polar or ionic head.
  - d. a hydrophilic hydrocarbon tail with a hydrophilic polar or ionic head.
- ▼ 14. A saponification reaction involves:
- a. the hydrolysis of fatty acids to fatty acid anions.
  - b. the addition of glycerol to fatty acids.
  - c. the formation of fats and oils from fatty acids.
  - d. the hydrolysis of fats to fatty acid anions.
- ▼ 15. The operation of soaps can be broken into several steps shown below in the wrong order. What is the correct order of the steps below?
1. Soap molecules surround the grease forming a micelle.
  2. Agitation causes the grease to lift off a surface.
  3. Hydrophobic head of the soap ion forms ion-dipole bonds with water molecules.
  4. Micelles repel each other and are washed away.
  5. Hydrophobic tail of the soap ion forms dispersion forces with grease.
- a. 4, 1, 2, 3, 5
  - b. 5, 3, 2, 1, 4
  - c. 5, 2, 3, 1, 4
  - d. 2, 3, 5, 4, 1
- ▼ 16. Hard water:
- a. contains high levels of calcium and manganese ions.
  - b. contains high levels of sodium and magnesium ions.
  - c. contains high levels of calcium and magnesium ions.
  - d. contains high levels of sodium and potassium ions.

- ▼ 17. Which of the following equations correctly represents the action of hard water on soap ions?
- $2\text{RCOO}^-(\text{s}) + \text{Ca}^{2+}(\text{aq}) \rightarrow (\text{RCOO})_2\text{Ca}(\text{s})$
  - $\text{RCOO}^-(\text{aq}) + \text{Ca}^{2+}(\text{aq}) \rightarrow \text{RCOOCa}(\text{s})$
  - $2\text{RCOO}^-(\text{aq}) + \text{Ca}^{2+}(\text{aq}) \rightarrow (\text{RCOO})_2\text{Ca}(\text{s})$
  - $2\text{RCOO}^-(\text{aq}) + \text{Ca}^{2+}(\text{aq}) \rightarrow (\text{RCOO})_2\text{Ca}(\text{aq})$
- ▼ 18. Which of the tests below will return a positive for only one type of functional group studied?
- oxidation with dichromate ions
  - addition of bromine
  - addition of sodium carbonate
  - addition of water
- ▼ 19. Which of the following shows an example of a multistep synthesis of an organic compound?
- ethene added to water to produce ethanol that is added to water to produce a dilute solution
  - ethene added to water to produce ethanol that is oxidised to produce ethanoic acid
  - ethene added to water to produce ethanol that is distilled to purify the ethanol
  - ethene added to water to produce ethanol by fermentation
- ▼ 20. Flow charts:
- show steps in the production of a chemical and how the chemicals move through a chemical process.
  - only show the chemical reactions that occur in production of a particular chemical.
  - does not need to include information about energy or special conditions.
  - involve only chemistry and do not provide information about equipment or process.

