

## CHAPTER 2 BLM ANSWER KEY

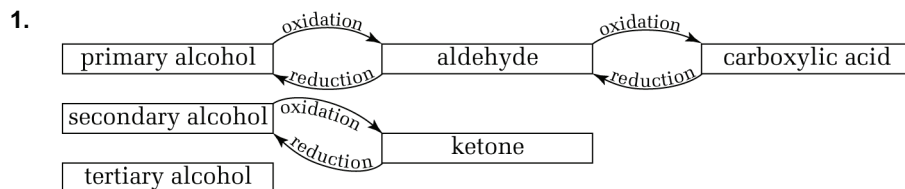
### BLM 2-1: Identifying Organic Reactions

#### Answers

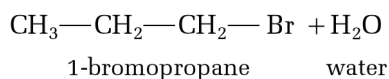
|            | <b>Addition:</b> Does the organic product have fewer double or triple bonds than the reactant? | <b>Elimination:</b> Does the organic product have more double or triple bonds than the reactant? | <b>Substitution:</b> Has an atom or group of atoms been substituted with a different atom or group of atoms? | <b>Oxidation:</b> Does the product have fewer bonds to hydrogen and more bonds to oxygen? | <b>Reduction:</b> Does the product have more bonds to hydrogen and fewer bonds to oxygen? | <b>Condensation:</b> Do two organic molecules combine to form a large organic molecule such as an ester or amide? | <b>Hydrolysis:</b> Does a large organic molecule such as an ester or amide split in half to form two smaller organic molecules? | Type of reaction            |
|------------|--|--|--|---|---|---|---|-----------------------------|
| Reaction 1 | yes  | no   | no   | no  | no  | no  | no  | addition                    |
| Reaction 2 | no   | yes  | no   | yes   | no  | no  | no  | oxidation                   |
| Reaction 3 | yes  | no   | no   | no  | no  | no  | no  | addition                    |
| Reaction 4 | no   | yes  | no   | no  | no  | no  | no  | elimination                 |
| Reaction 5 | no   | no   | yes  | no  | no  | no  | yes   | hydrolysis (substitution)   |
| Reaction 6 | yes  | no   | no   | no  | yes   | no  | no  | reduction                   |
| Reaction 7 | no   | no   | yes  | no  | no  | yes   | no  | condensation (substitution) |
| Reaction 8 | no   | no   | yes  | no  | no  | no  | no  | substitution                |

### BLM 2-2: Practice with Organic Reactions

#### Answers

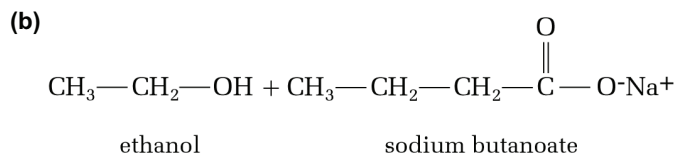
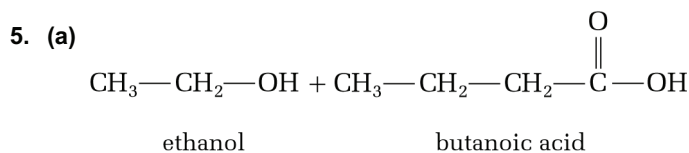
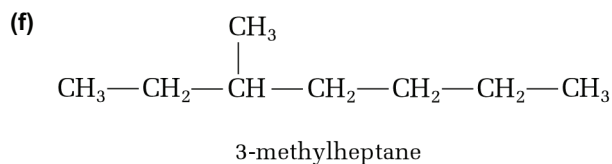
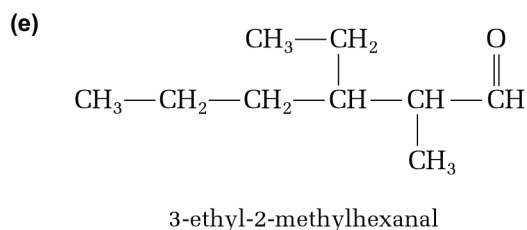
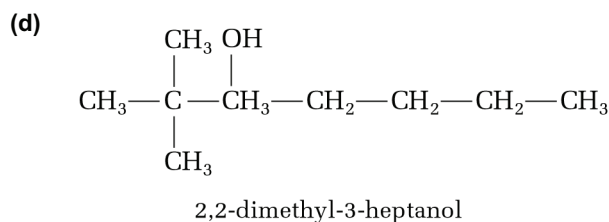
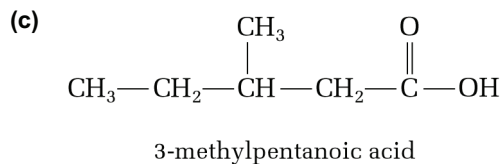
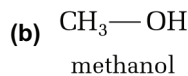
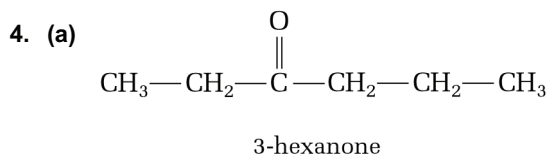


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3. (a) addition (b) addition (c) substitution  
 (d) substitution (e) condensation (f) addition  
 (g) hydrolysis



6. A polymer is a substance whose molecules are made up of many small molecules called monomers linked together in long continuous chains.
7. Addition polymers are formed from monomers with double or triple bonds. These polymers are formed by addition reactions. An example of an addition polymer is polyethene. Condensation polymers form when monomers with two functional groups react to form ester or amide bonds. This type of polymerization involves the elimination of a small molecule, such as water, H<sub>2</sub>O. An example of a condensation polymer is Dacron.
8. Natural polymers are polymers that occur freely in nature. They include classes of compounds such as proteins, carbohydrates, and nucleic acids such as DNA and RNA. Synthetic polymers are polymers produced industrially. These polymers include compounds such as nylon, Dacron, polyethene, polypropene, and many other plastics.
9. The simplest carbohydrate molecules are simple sugars, or monosaccharides. Examples are glucose and fructose. Sugars formed by two monosaccharides linked together are classified as disaccharides. Sucrose is a disaccharide. Ten or more monosaccharides linked together produce a polysaccharide. Examples include starch, glycogen, and cellulose.
10. Lipids are biological compounds that are insoluble in water. These compounds include fats, oils, and waxes. Lipids will dissolve in organic solvents. Since many lipids are hydrocarbons or contain large hydrocarbon portions, they burn readily and are good fuels.
11. DNA is a molecule that consists of two strands entwined in a helical configuration. Each strand is a polymer made from multiple nucleotide molecules. Each nucleotide is composed of a five-carbon sugar, a phosphate group, and one of four nitrogen-containing bases: adenine (A), guanine (G), thymine (T), and cytosine (C). The four nitrogenous bases of DNA are arranged along the sugar-phosphate backbone in a particular order (the DNA sequence), encoding all genetic instructions for an organism. The two DNA strands are held together by hydrogen bonds between the bases. Adenine (A) pairs with thymine (T), while cytosine (C) pairs with guanine (G).
12. Possible benefits include pharmaceutical drugs, synthetic fabrics, and plastic. Possible risks include water pollution from organic compounds, the addition of harmful organic compounds as preservatives in foods, and harm to animals and fish from the bioaccumulation of toxic organic compounds.