Organic Reactions Practice

Write an equation for each of the following reactions. Use molecular and structural formulas and classify the reaction as combustion, addition, substitution, hydrogenation, or hydration.

(a) Octane burns with oxygen gas. $C_8H_{18} + O_2 \rightarrow CO_2 + H_2O$

(b) 2-methyl-1-pentene reacts with hydrogen. $\cdots C{=}C\cdots + H_2 \rightarrow \cdots C-C\cdots$

(c) Ethyne (Acetylene) and oxygen react. $C{\equiv}C + O_2 \rightarrow CO_2 + H_2O$

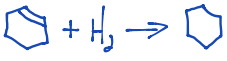
(d) 3-methyl-1-butyne reacts with excess hydrogen. $-C{\equiv}C- + 2H_2 \rightarrow -C-C$

(e) Chlorine reacts with ethane. $C-C + Cl_2 \rightarrow C-\underset{Cl}{C} + HCl$

(f) Water and ethene are placed in dilute sulfuric acid with a catalyst. $C{=}C + H_2O \rightarrow \overset{H}{C}-\overset{OH}{C}$

(g) Bromine combines with benzene.  $+ Br_2 \rightarrow$ $+ HBr$

(h) Propene and HBr combine. $C{=}C-C + HBr \rightarrow C-\overset{Br}{C}-C$

(i) Cyclohexene reacts with hydrogen gas. 

(j) Acetylene reacts with excess hydrogen chloride. $C{\equiv}C + 2HCl \rightarrow C-\overset{Cl}{C}-Cl$

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1. Propane reacts with fluorine. $C-C-C + F_2 \rightarrow C-C-C-F + HF$

2. Chloroethane reacts with dilute hydroxide ions. $\overset{Cl}{C}-C + OH^- \rightarrow \overset{OH}{C}-C + Cl^-$

3. Ethanol, present in gasohol, burns in an automobile engine. $C-C-OH + O_2 \rightarrow CO_2 + H_2O$

4. 1-butanol reacts in the presence of concentrated sulfuric acid. $HO-C-C-C-C \xrightarrow{H_2SO_4} H_2O + C{=}C-C-C$

6. Bromine and ethene react to form an alkyl halide. $C{=}C + Br_2 \rightarrow \overset{Br}{C}-\overset{Br}{C}$

7. Hydrogen chloride and propene react to produce an alkyl halide. $C{=}C-C + HCl \rightarrow C-\overset{Cl}{C}-C$

Write an equation using structural diagrams to show the production of each of the following alcohols from an appropriate alkene:

a. 2-butanol 1-butene $+ H_2O$

b. 2-methyl-2-propanol $C-\overset{OH}{\overset{|}{C}}-C \leftarrow H_2O + C{=}C-C$

Draw structural diagrams and write IUPAC names to illustrate the controlled oxidation of the following alcohols. Is the product an aldehyde or a ketone?

(a) 2-pentanol $C-C-C-\overset{O}{\overset{\|}{C}}-C$ ketone

(b) 1-hexanol $C-C-C-C-C-C{=}O$ aldehyde

Name the following esters, and the acids and alcohols from which they could be prepared.

(a) $CH_3CH_2COOCH_2CH_3$ ethanol + propanoic acid

(b) $CH_3CH_2CH_2COOCH_3$

methanol + butanoic acid

For each, write a structural formula and an equation or a series of equations for a method of synthesis from the suggested reactants.

synthesis of a carboxylic acid from the controlled oxidation of 1-propanol Oxidize x 2

N-methyl ethanamide from methane, ethanol, and inorganic compounds of your choice. Meth Halide → meth amino
ethanol → ethanal → ethanoic acid

2-pentyl butanoate from 1-pentene and butanal $\rightarrow H_2O$ $\rightarrow [O]$

Butyl 2-methylpropanoate from 1-butanol and an appropriate alcohol

4-heptanone from an alcohol 2 methyl propanal 4-heptanol

ethyl ethanoate from ethane $\rightarrow +Cl_2 \rightarrow OH \rightarrow [O] \rightarrow [O]$

pentyl ethanoate from ethene and an alcohol $\rightarrow H_2O \rightarrow [O]$ → 1 pentanol

Propyl ethanoate from an alkene and an alcohol ethene + $H_2O \rightarrow [O]$ → 1 propanol

3-octanone from a simpler compound → 3 octanol

methyl benzoate from two alcohols → methanol → phenol → [O]

sodium salt of butanoic acid from an ester → something butanoate Hydrolysis → react with NaOH

trimethylamine from ammonia and alkanes

N-ethylethanamide from an alkane and ammonia → methane + $I_2 \rightarrow C-I \; 3NH_3 \rightarrow NH_2CH_3$ + C-I + C-I

→ ethane → $Cl_2 \rightarrow OH^- \; [O] \; [O]$ → ethanoic acid

→ NH_3 → amine ethane