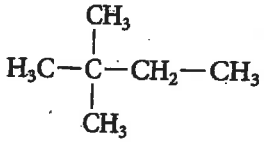
Questions

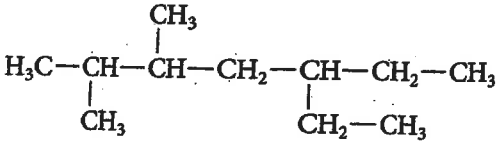
1. Define each of the following terms: K/U
   (a) organic compound
   (b) alkane
   (c) structural isomer
   (d) substituent group
   (e) alkyl group
   (f) alkyl halide

2. Name the following compounds: T/I C

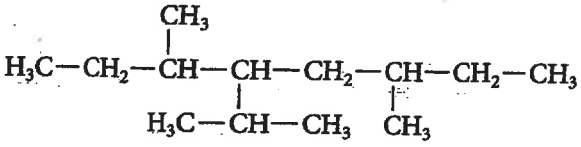
(a)



(b)

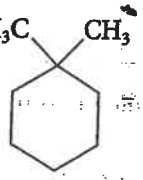


(c)



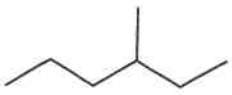
(d)

(e)



(f)

(g)



3. Draw and name five structural isomers that all have the molecular formula C_6H_{14}. K/U T/I C

4. Draw the structural formula and write the molecular formula for each of the following alkanes: T/I C
   (a) 3,4-dimethylheptane
   (b) 2,2-dimethylpentane
   (c) 4-propyl-3,5-diethyloctane
   (d) 1-ethyl-3-propylcyclohexane

5. Draw the structural formula for each of the following compounds: T/I C
   (a) 1,3-dibromocyclopentane
   (b) 4-chloro-1-fluorobutane
   (c) 3-iodo-4-methylnonane

6. (a) Why does water not mix with liquid hydrocarbons?
   (b) Most hydrocarbons are less dense than water. How does this difference in density affect the cleanup of an oil spill on a still lake?
   (c) Some liquid organic halides are denser than water. How might this difference affect the cleanup of an organic halide spill in a river? K/U A

7. 2,2,4-trimethylpentane (isooctane) is used as a reference for octane ratings for gasoline. Draw the structural formula for isooctane. T/I C

8. A methane leak can pose an extreme fire and explosion hazard, especially in an enclosed area. In contrast, a leak of paraffin is typically not a significant hazard. Use your knowledge of the properties of different types of alkanes (including the information in Tables 2 and 3) to explain the differences in danger of these two substances. T/I A

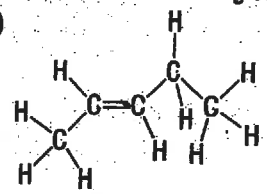
9. A chemist burns samples of ethane, pentane, nonane, and dodecane (which contains 12 carbon atoms per molecule) and measures the volume of carbon dioxide produced during each reaction. If the chemist starts with the same amount (in moles) of each compound, which will produce the largest volume of carbon dioxide? Explain your answer. T/I A

Practice

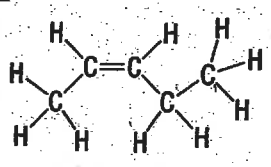
1. Draw the *cis* and *trans* isomers of the following compounds: K/U C
   (a) hex-3-ene
   (b) 1-bromoprop-1-ene

2. Name each of the following compounds: K/U

(a)



(b)

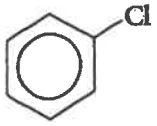


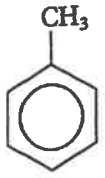
3. Draw the structural formulas and write the names of the two stereoisomers of 2,4-dimethylhex-3-ene. K/U C

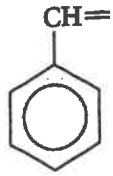
Questions

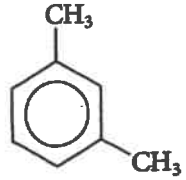
Pg 31

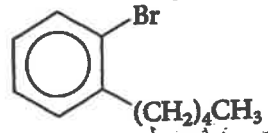
1. Name the compounds represented by the following structural formulas: K/U

(a) 

(b) 

(c) 

(d) 

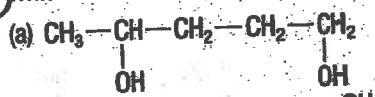
(e) 

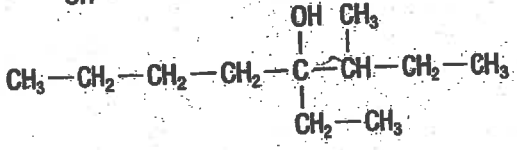
2. Draw the structural formula for each of the following compounds: K/U C
   (a) 1,3-dichloro-4-ethylbenzene
   (b) 1-bromo-3-phenylhept-5-yne
3. (a) Draw the chemical equation for the reaction between benzene and bromine, Br_2. Is this reaction likely to occur? Explain why or why not.
   (b) How would your answer to (a) be different if the organic reactant were cyclohexene instead of benzene? T/I
4. Draw structural formulas representing the reaction that produces iodobenzene. Label the reactants and classify the reaction as addition or substitution. K/U T/I C
5. Mothballs are small lumps of pesticide that discourage moths from damaging woollen clothing. The main component of mothballs is paradichlorobenzene. K/U C A
   (a) What is the proper IUPAC name for this compound? (See the Learning Tip on page 29.)
   (b) Draw the structure of paradichlorobenzene.
   (c) When you order this chemical from a company, the label says "paradichlorobenzene" even though that is not the correct IUPAC name. Why do you think the compound is labelled this way? Do you think it is a good idea, or should all products be labelled with their IUPAC name? Explain your reasoning.
6. (a) Predict the products of reactions involving the following reactants:
   (i) cyclohexene and hydrogen bromide
   (ii) benzene and chloroethane
   (b) Explain how these two reactions are different, and the reason for the differences. K/U T/I
7. One aromatic compound that has been the subject of many studies is bisphenol-A. This chemical was used as a hardener in many plastics, but studies have uncovered a possible link to adverse health effects. As a result, Canada has now banned some products, including baby bottles, containing bisphenol-A. Find out more about this substance and the decision to restrict its use. Create a graphic organizer showing the pros and cons of banning products containing bisphenol-A. T/I C A
8. Benzene has, in the past, been used as a solvent in the dry-cleaning industry. Research this use, discover why its use is being phased out, and find out what "greener" alternatives are now used for dry cleaning. Present your findings in an attention-grabbing format for your stated target audience. T/I C A

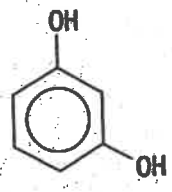
Practice

Pg 34

1. Write the name for each of the following compounds: K/U

(a) 

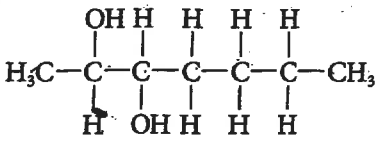
(b) 

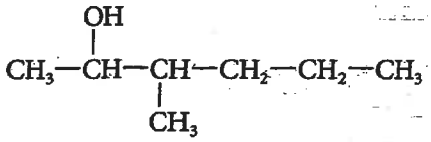
(c) 

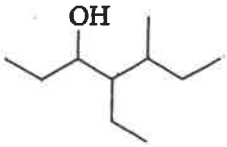
2. Draw the structural formula for each of the following alcohols: K/U C
   (a) 2-chloro-2,5-dimethylheptan-3-ol
   (b) propane-1,3-diol
   (c) phenol
   (d) pent-2-ene-1,4-diol

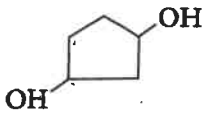
Questions

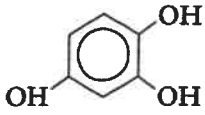
1. Write the name of each of the following compounds: K/U

(a) 

(b) 

(c) 

(d) 

(e) 

(f) $H_3C-CH_2-CH_2-CH_2-O-CH_2-CH_2-CH_3$

(g) 

(h) H_3C-CH_2-SH

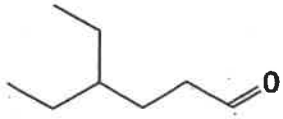
2. Draw the structural formula for each of the following compounds: K/U C
   (a) 5-bromohexan-3-ol
   (b) 2-methylpentan-3-ol
   (c) 3,5-dichloropentan-2-ol
   (d) cyclobutane-1,2-dithiol
   (e) 2-methoxyheptane
   (f) cyclohex-4-ene-1,3-diol
3. If you were given two samples and told that one was ethanol and one was heptan-2-ol, describe two tests that you could run on the samples to identify them. T/I
4. Predict the product(s) of each of the following chemical reactions: T/I
   (a) hept-1-ene + water
   (b) butan-1-ol with sulfuric acid catalyst
   (c) propan-1-ol + ethanol
5. Write the chemical equation for the complete combustion of methanol. T/I
6. A chemist needs to synthesize 1-ethoxypentane. She has the following substances available: ethene, pent-1-ene, and water. Describe how the chemist could synthesize 1-ethoxypentane. (Assume that the chemist can use reaction conditions that allow her to overcome Markovnikov's rule.) T/I A
7. Rotten eggs have a distinct odour. Based on your reading in this section, what type(s) of compounds do you think are present in rotten eggs? Conduct research to check your reasoning. A

Practice

1. Name each of the following aldehydes: K/U

(a) $CH_3CH_2CH_2CH_2CHO$

(c) $HCCH_2CH_2CHClCH_3$

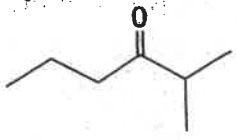
(b) 

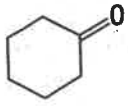
2. Draw the structure of each of the following aldehydes: K/U C
   (a) butanal
   (b) 4-methylpentanal
   (c) 2-hydroxybutanal

Practice

1. Name the following ketones: K/U

(a) $CH_3CH_2CCH_3$

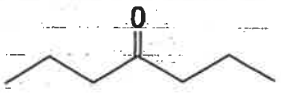
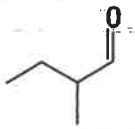
(b) 

(c) 

2. Draw the structures for the following ketone:
   (a) 4-methylheptan-3-one
   (b) 1,3-dichlorobutan-2-one
   (c) heptane-3,5-dione
   (d) cyclobutanone
   (e) 4-hydroxypentan-2-one

Pg 46 #1

Table 1

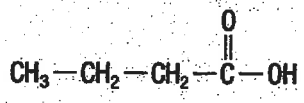
Name	Condensed structure	Line diagram or structural formula	Type of compound
	$CH_3CH_2CH_2CH_2CH_2CH_2CHO$		
			
	$CH_3CH_2COCH_2CH_3$		
1-chlorobutan-2-one			
3-methylpentanal			
			

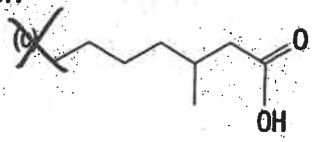
Practice

Pg 48

1. Name each of the following carboxylic acids: K/U

(a) $CH_3CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2COOH$

(b) 

(c) 

2. Draw the structure of each of the following carboxylic acids: K/U C

(a) octanoic acid

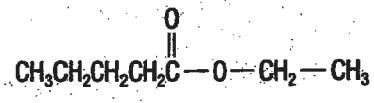
(b) 3-methylpentanoic acid

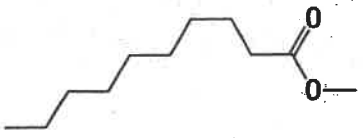
(c) ethanedioic acid

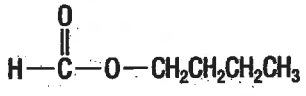
Practice

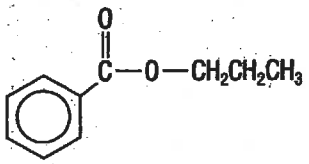
Pg 50

1. Name each of the following esters: K/U

(a) 

(b) 

(c) 

(d) 

2. Draw the structure of each of the following esters: K/U C

(a) methyl hexanoate

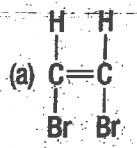
(b) methyl benzoate

5

Practice

Pg 87

1. Draw and name the polymers that would be produced from each of the following monomers. Circle the repeating unit. K/U C



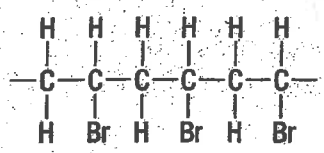
(a)

(b) $CH_3—CH_2—CH=CH—CH_2—CH_3$

(c) $CHCl=CH—CH_3$

2. Draw a section of the addition polymer polyacrylonitrile, showing 3 monomers. (See Table 1). K/U C

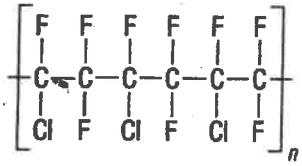
3. Draw and name the monomer used to produce the following polymer: K/U C



Questions

Pg 93

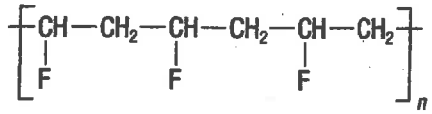
1. Kel-F is a polymer with the structure



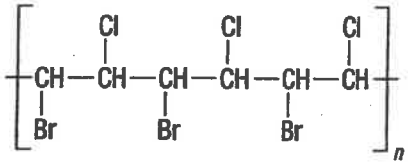
Name and draw the monomer for Kel-F. K/U C

2. Write the name and formula of the monomer that could be used to produce each of the following polymers: K/U C

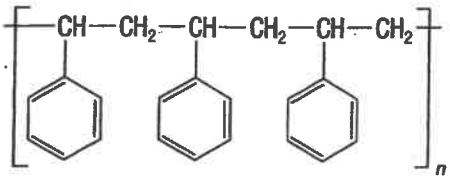
(a)



(b)



(c)



4. Explain how cross-linking occurs and what effects it has on the properties of a polymer. K/U T/I

5. Polystyrene can be made more rigid by copolymerizing styrene with p-divinylbenzene. K/U C
   (a) Draw the structure, and write the IUPAC name, of p-divinylbenzene.
   (b) How does p-divinylbenzene make the copolymer more rigid?

6. Scientists have developed polymers that can "heal" from scratches, much as skin heals. Research how these polymers repair themselves and where they might be used. Prepare an illustrated presentation or blog post to share your information with salespeople in the plastics industry. T/I C A

7. Recycling programs are in place in most parts of Ontario, but not all types of plastic can be recycled. T/I C A
   (a) What are the different classes of plastic? Summarize your findings in a table.
   (b) Find out what types of plastic cannot be recycled in your region, and why.
   (c) How long does it take for plastic garbage bags to decompose in a landfill site?
   (d) What can you do, personally, to reduce the environmental impact of plastics?