13) The functional group illustrated by R—OH is an

A) alkyl.

B) alcohol.

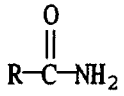
C) ether.

D) ester.

E) aldehyde.

Answer: B
Diff: 1 *Type: MC*

14) The functional group illustrated below is an



A) alcohol.

B) amide.

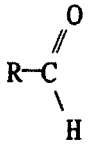
C) ether.

D) ester.

E) amine.

Answer: B
Diff: 1 *Type: MC*

15) The functional group illustrated below is an



A) alkyl.

B) alcohol.

C) ether.

D) ester.

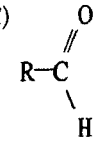
E) aldehyde.

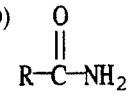
Answer: E
Diff: 1 *Type: MC*

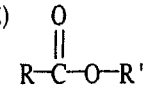
16) The functional group which illustrates an ester is _____.

A) R–C≡C–R'

B) R–C–NH_2

C)


D)


E)


Answer: E
Diff: 1 *Type: MC*

17) Which of the following statements about alkyl functional groups is **incorrect**?

A) An alkyl group with four carbon atoms would include butyl in its name.

B) $-C_2H_5$ is an example.

C) In naming, they are used as prefixes and have a "yl" ending.

D) They are derived from alkenes.

E) none of the above

Answer: D
Diff: 1 *Type: MC*

18) Which list includes all the elements that would be found in an alkane with an amine group?

A) C, H

B) C, H, O

C) C, H, N

D) C, H, O, H

E) H, N

Answer: C
Diff: 2 *Type: MC*

19) The family of organic compounds with functional groups that do not consist only of hydrocarbons is

A) aldehydes.

B) alkanes.

C) alkenes.

D) alkynes.

E) arenes.

Answer: A
Diff: 1 *Type: MC*

Match the name of the functional group with the molecule which correctly illustrates it.

21) amine
Diff: 2 *Type: MA*

22) carboxylic acid
Diff: 2 *Type: MA*

23) alkyl halide
Diff: 2 *Type: MA*

24) ketone
Diff: 2 *Type: MA*

25) alcohol
Diff: 2 *Type: MA*

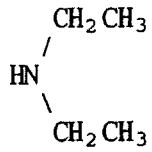
26) ester
Diff: 2 *Type: MA*

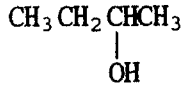
27) arene (aromatic)
Diff: 2 *Type: MA*

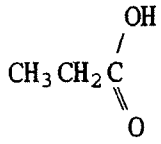
28) aldehyde
Diff: 2 *Type: MA*

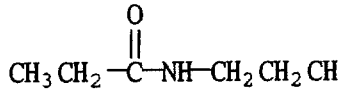
29) amide
Diff: 2 *Type: MA*

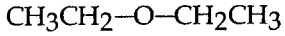
30) ether
Diff: 2 *Type: MA*

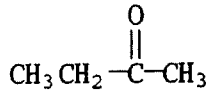
A) 

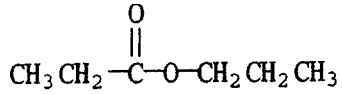
B) 

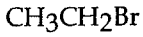
C) 

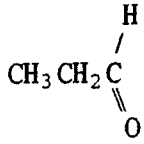
D) 

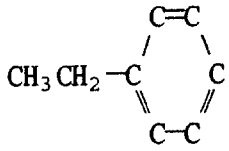
E) 

F) 

G) 

H) 

I) 

J) 

21) A 22) C 23) H 24) F 25) B 26) G
27) J 28) I 29) D 30) E

31) Two or more compounds with the same molecular formula but with the atoms connected differently are referred to as

A) normal alkanes.

B) branched alkanes.

C) functional groups.

D) constitutional isomers.

E) conformations.

Answer: D
Diff: 1 *Type: MC*

32) In straight-chain alkanes, the carbon atoms on each end of the molecule always form bonds with _____ atoms of hydrogen; the carbons within the molecule always form bonds with _____ hydrogen atoms.

A) 4; 4

B) 4; 2

C) 3; 3

D) 3; 2

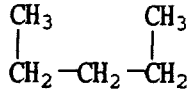
E) 2; 2

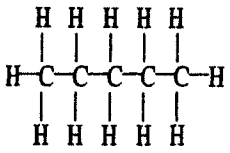
Answer: D
Diff: 2 *Type: MC*

33) All of the choices listed are representations of the same molecule **except**

A) C_5H_{12}.

B) $CH_3CH_2CH_2CH_2CH_3$.

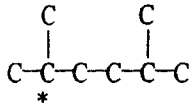
C)


D)


E) $(CH_3)_2CHCH_2CH_3$.

Answer: E
Diff: 2 *Type: MC*

34) The carbon skeleton of an alkane is shown below. How many hydrogen atoms are bonded to the carbon marked with a *?



A) 0

B) 1

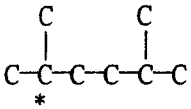
C) 2

D) 3

E) 4

Answer: B
Diff: 2 *Type: MC*

35) The carbon atom marked with * is a _____ carbon atom.



A) primary

B) secondary

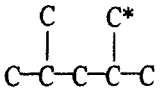
C) tertiary

D) quaternary

E) none of these

Answer: C
Diff: 2 *Type: MC*

36) The carbon skeleton of an alkane is shown below. How many hydrogen atoms are bonded to the carbon marked with a *?



A) 0

B) 1

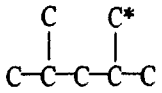
C) 2

D) 3

E) 4

Answer: D
Diff: 2 *Type: MC*

37) The carbon atom marked with * is a _____ carbon atom.



A) primary

B) secondary

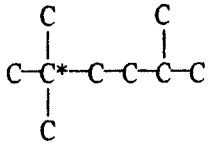
C) tertiary

D) quaternary

E) none of these

Answer: A
Diff: 2 *Type: MC*

38) The carbon skeleton of an alkane is shown below. How many hydrogen atoms are bonded to the carbon marked with a *?



A) 0

B) 1

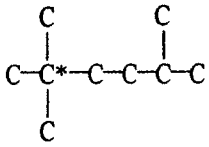
C) 2

D) 3

E) 4

Answer: A
Diff: 2 *Type: MC*

39) The carbon atom marked with * is a _____ carbon atom.



A) primary

B) secondary

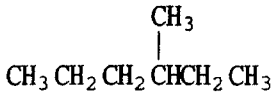
C) tertiary

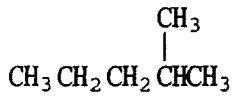
D) quaternary

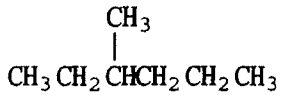
E) none of these

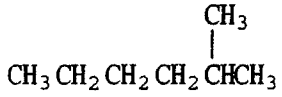
Answer: D
Diff: 2 *Type: MC*

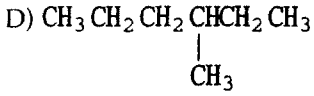
40) Which molecule is an isomer of the molecule shown?



A) 

B) 

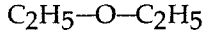
C) 

D) 

E) $CH_3(CH_2)_4CH_3$

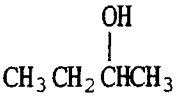
Answer: C
Diff: 3 *Type: MC*

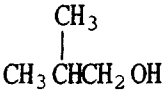
41) Which molecule is **not** an isomer of the molecule shown?

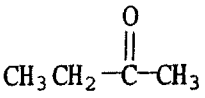


A) 

B) C_4H_9OH

C) 

D) 

E) 

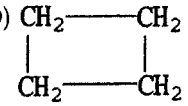
Answer: E
Diff: 3 *Type: MC*

42) All of the following are representations of the same molecule **except** _____.

A) C_4H_8

B) cyclobutane

C) $CH_2CH_2CH_2CH_2$

D) 

Answer: C
Diff: 2 *Type: MC*

43) How many carbon atoms are there in the longest continuous chain of the molecule shown?

$(CH_3)_3C–(CH_2)_3–CH_3$

A) 8

B) 6

C) 4

D) 3

E) cannot be determined without additional information

Answer: B
Diff: 1 *Type: MC*

44) How many carbon atoms are there in the longest continuous chain of the molecule shown?

$(CH_3)_2CH–(CH_2)_5–CH_3$

A) 9

B) 8

C) 7

D) 5

E) cannot be determined without additional information

Answer: B
Diff: 2 *Type: MC*

45) The name of the hydrocarbon with three carbon atoms and having only single bonds between carbon atoms is

A) decane.

B) butane.

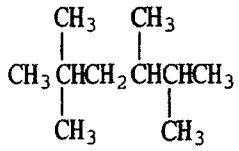
C) propane.

D) ethane.

E) methane.

Answer: C
Diff: 1 *Type: MC*

46) The molecule shown is named as a substituted _____ because _____.



A) decane; it contains 10 atoms of carbon.

B) hexane; it contains six atoms of carbon in its longest chain.

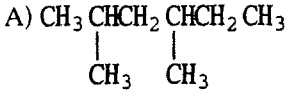
C) tetramethane; it contains four methyl groups as branches.

D) hexamethane; it contains six methyl groups altogether.

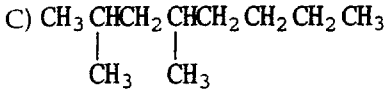
E) butane; four carbons are substituted onto the chain.

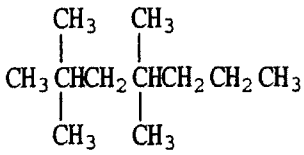
Answer: B
Diff: 3 *Type: MC*

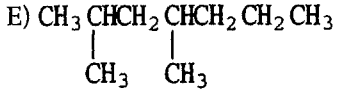
47) The condensed structure of 2,4–dimethyl–heptane is

A) 

B) $CH_3CH_3CH_2CH_3CH_2CH_2CH_2CH_3$

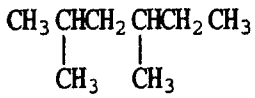
C) 

D) 

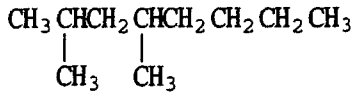
E) 

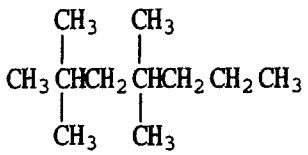
Answer: E
Diff: 2 *Type: MC*

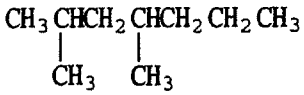
48) The condensed structure of 2,4–dimethyl–hexane is

A) 

B) $CH_3CH_3CH_2CH_3CH_2CH_2CH_2CH_3$

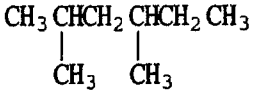
C) 

D) 

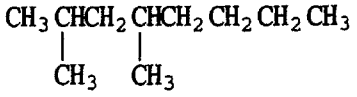
E) 

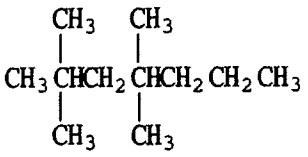
Answer: A
Diff: 2 *Type: MC*

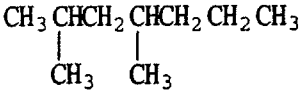
49) The condensed structure of 2,4–dimethyl–octtane is

A) 

B) $CH_3CH_3CH_2CH_3CH_2CH_2CH_2CH_3$

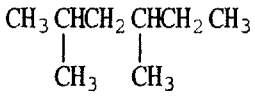
C) 

D) 

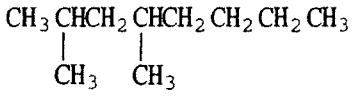
E) 

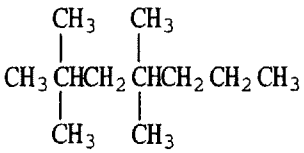
Answer: C
Diff: 2 *Type: MC*

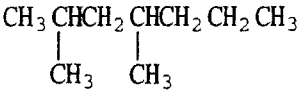
50) The condensed structure of n-octane is

A) 

B) $CH_3CH_3CH_2CH_3CH_2CH_2CH_2CH_3$

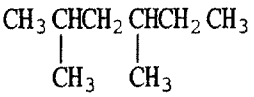
C) 

D) 

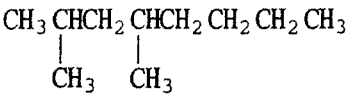
E) 

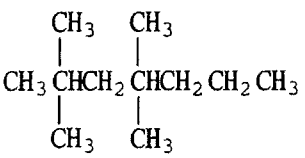
Answer: B
Diff: 2 *Type: MC*

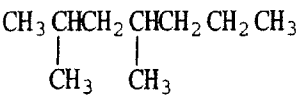
51) The condensed structure of 2,2,4,4-tetramethyl-heptane is

A) 

B) $CH_3CH_3CH_2CH_3CH_2CH_2CH_2CH_3$

C) 

D) 

E) 

Answer: D
Diff: 2 *Type: MC*

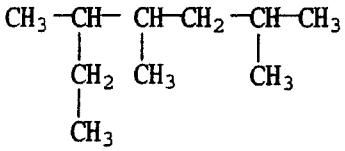
52) What is the IUPAC name of the compound shown?

$(CH_3)_3{-}C{-}CH_2{-}CH_2{-}CH_3$

A) 1,1,1-trimethylbutane
B) 2,2-dimethylpentane
C) 2-dimethylpentane
D) 2-ethylhexane
E) heptane

Answer: B
Diff: 2 *Type: MC*

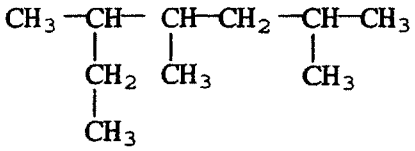
53) What is the IUPAC name of the compound shown?



A) 2-ethyl-3,5-dimethylhexane
B) 3,5-dimethyl-2-ethylhexane
C) 2,4,5-trimethylheptane
D) 3,4,6-trimethylheptane
E) 5-ethyl-2,4-dimethylhexane

Answer: C
Diff: 2 *Type: MC*

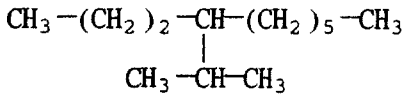
54) What is the IUPAC name of the compound shown?



A) 2-ethyl-4-methylheptane
B) 4-methyl-2-ethylheptane
C) 4,6-dimethyloctane
D) 3,5-dimethyloctane
E) 6-ethyl-4-methylheptane

Answer: D
Diff: 2 *Type: MC*

55) What is the IUPAC name of the compound shown?



A) 4-propyldecane

B) 4-isopropyldecane

C) 3-hexyl-2-methylhexane

D) 4-isobutyldecane

E) 4-sec-butyldecane

Answer: B
Diff: 2 *Type: MC*

56) In the molecule 3,3-dimethylhexane, carbon number two is

A) primary.

B) secondary.

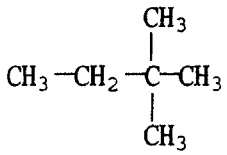
C) tertiary.

D) quaternary.

E) none of the above

Answer: B
Diff: 3 *Type: MC*

57) What is the IUPAC name of the compound shown?



A) hexane

B) isohexane

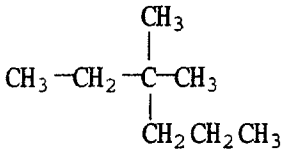
C) ethylmethylpropane

D) dimethylbutane

E) 2,2-dimethylbutane

Answer: E
Diff: 2 *Type: MC*

58) What is the IUPAC name of the compound shown?



A) 2-methyl-2-propylbutane

B) 2-ethyl-2-methylpentane

C) 2,2-ethyl-methylpentane

D) 3,3-dimethylhexane

E) isooctane

Answer: D
Diff: 2 *Type: MC*

59) Which group is the best description of the properties of alkanes?

A) flammable, reactive, water soluble

B) non-flammable, non-polar, water soluble

C) flammable, non-reactive, insoluble in water

D) non-flammable, polar, reactive

E) none of the above

Answer: C
Diff: 1 *Type: MC*

60) Which of the following properties is **not** characteristic of alkanes?

A) Their melting points increase with molecular weight.

B) They are generally less dense than water.

C) They are tasteless and colorless.

D) They are nontoxic.

E) They form strong hydrogen bonds.

Answer: E
Diff: 2 *Type: MC*

61) Which substance is not reactive with respect to alkanes?

A) H_2

B) Cl_2

C) O_2

D) Br_2

E) none of the above

Answer: A
Diff: 1 *Type: MC*