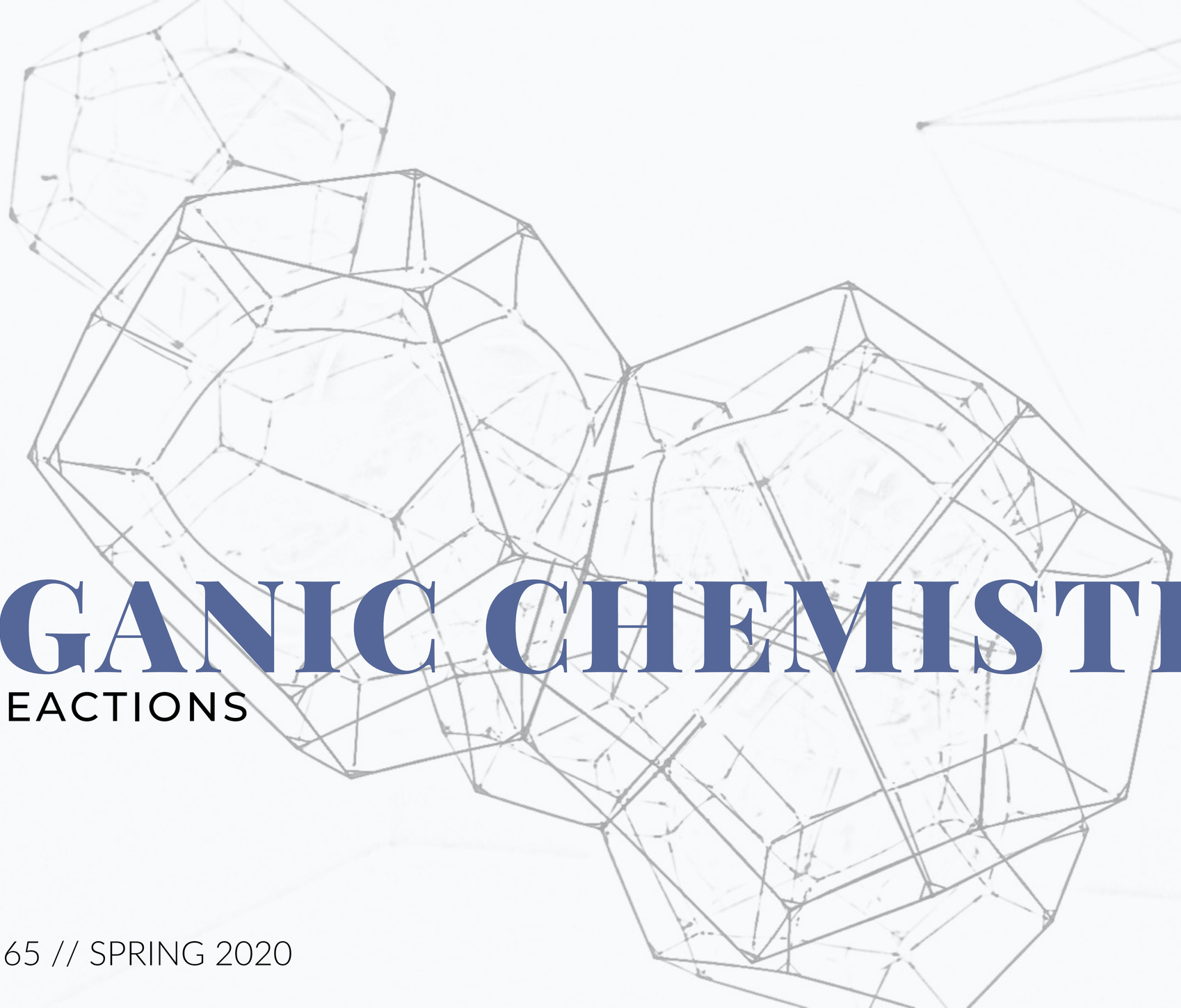


ORGANIC CHEMISTRY

REDOX REACTIONS

CHEMISTRY 165 // SPRING 2020

DR. MIOY T. HUYNH | 2020

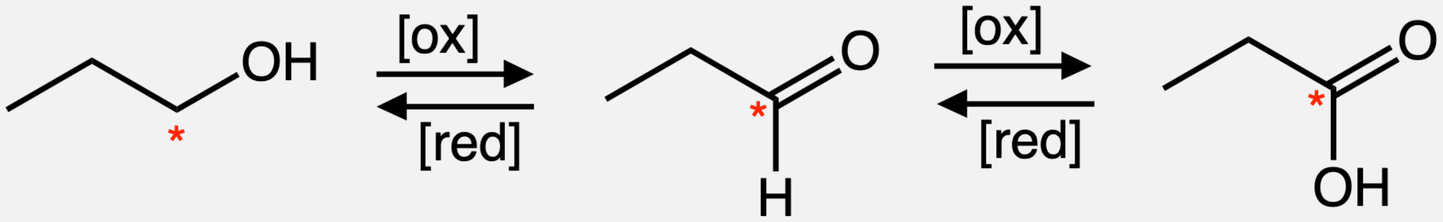
Organic redox reactions

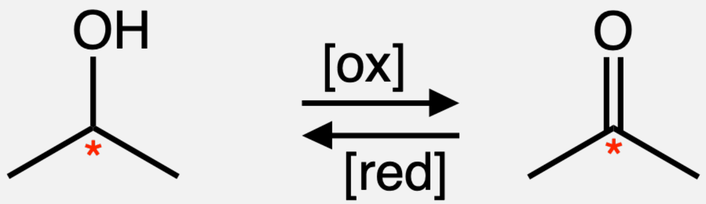
We have a slightly different mechanism by which reductions and oxidations (redox) occur in organic chemistry. Electrons are still being gained or lost.

Oxidation: Carbon atom (*) loses electrons by losing C–H bonds.

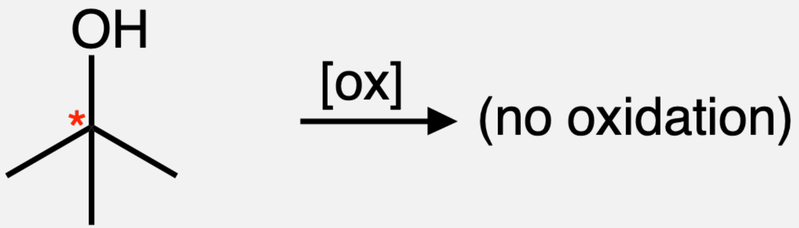
Reduction: Carbon atom (*) gains electrons by gaining C–H bonds.

Note: Tertiary (3°) alcohols, where –OH is attached to 3 substituents or groups, cannot be oxidized because there are no C–H bonds (electrons) to lose.





Carbon atom being reduced/oxidized marked with * symbol



[ox] = oxidizing agent

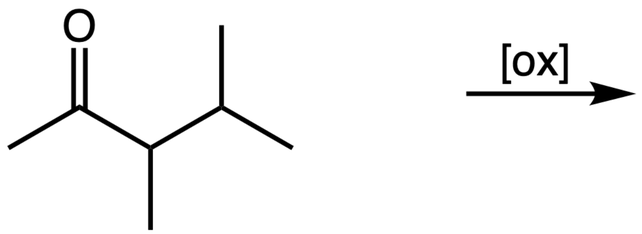
[red] = reducing agent

PRACTICE PROBLEM 1

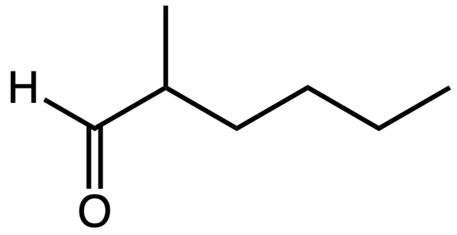
What are the products of the following oxidations?

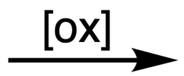
– answer –

A) 3,4-dimethylpentan-2-one

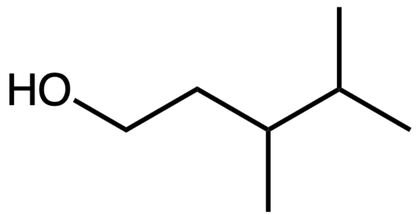


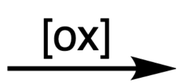
B) 2-methylhexan-1-al





C) 3,4-diemethylpentan-1-ol



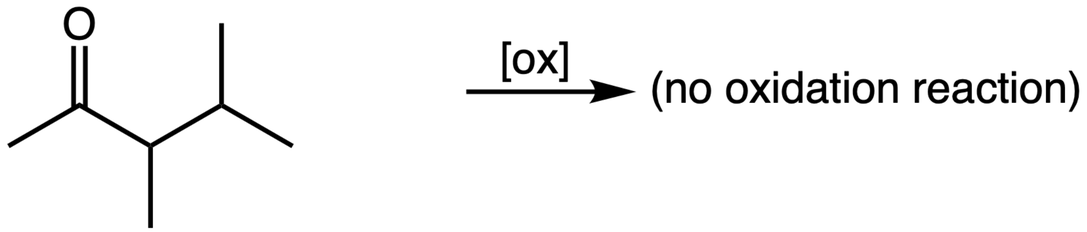


PRACTICE PROBLEM 1

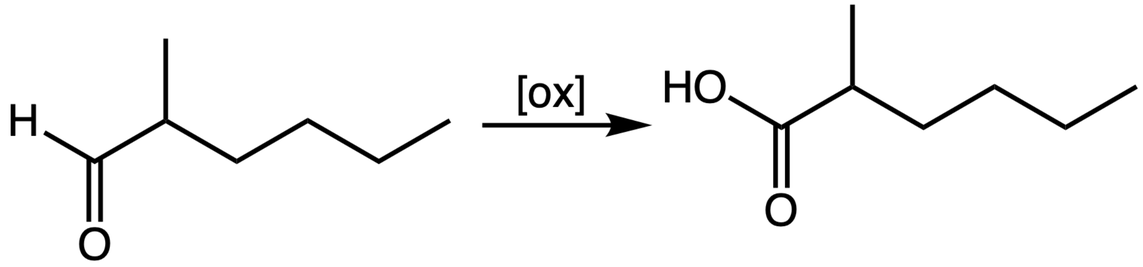
What are the products of the following oxidations?

— answer —

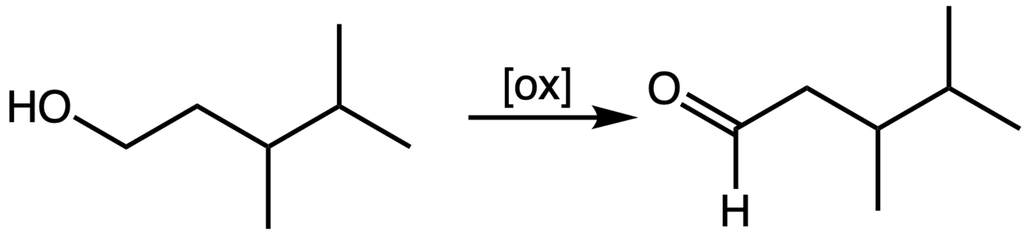
A) 3,4-dimethylpentan-2-one



B) 2-methylhexan-1-al



C) 3,4-diemethylpentan-1-ol

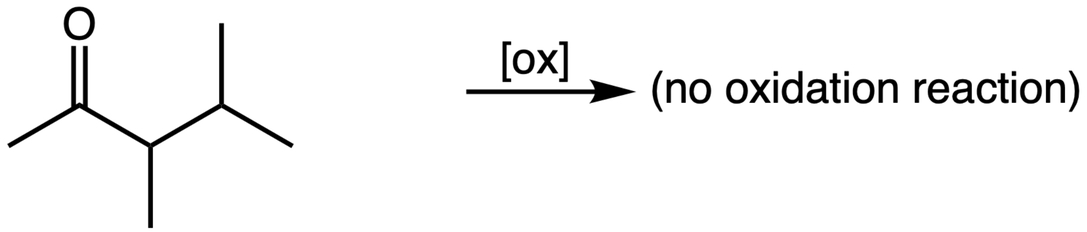


PRACTICE PROBLEM 1

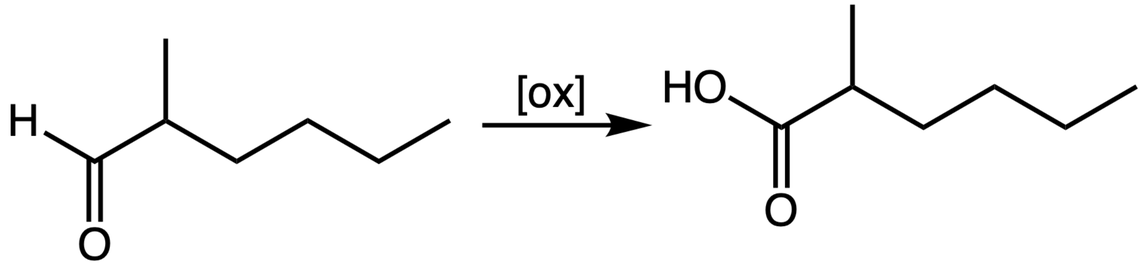
What are the products of the following oxidations?

— answer —

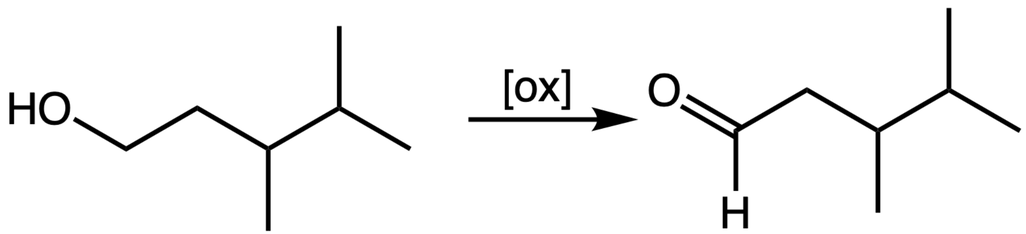
A) 3,4-dimethylpentan-2-one



B) 2-methylhexan-1-al



C) 3,4-diemethylpentan-1-ol



D) 3-methylhexan-2-ol

E) 2-methylhexan-2-ol

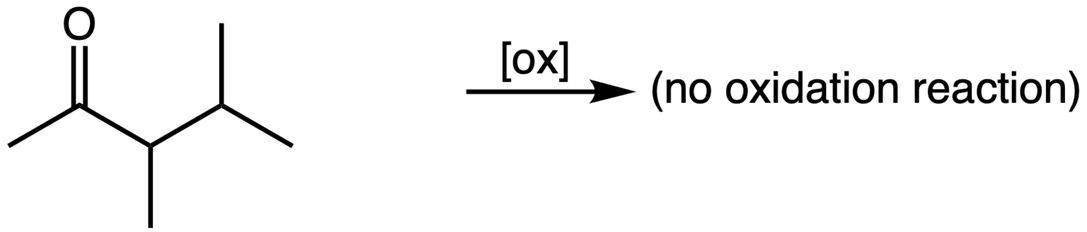
F) 3-methylhexan-1-ol

PRACTICE PROBLEM 1

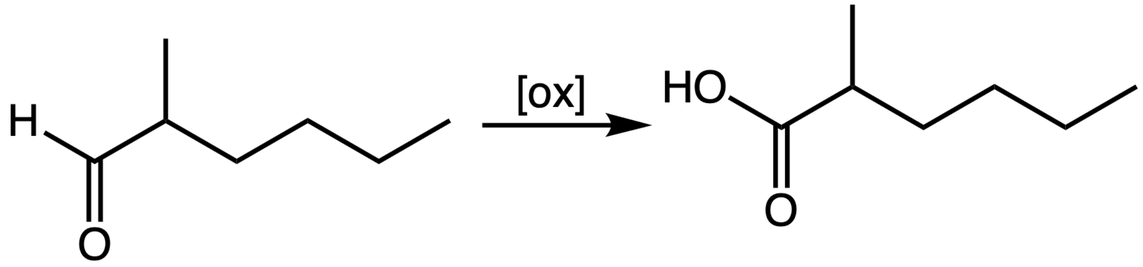
What are the products of the following oxidations?

— answer —

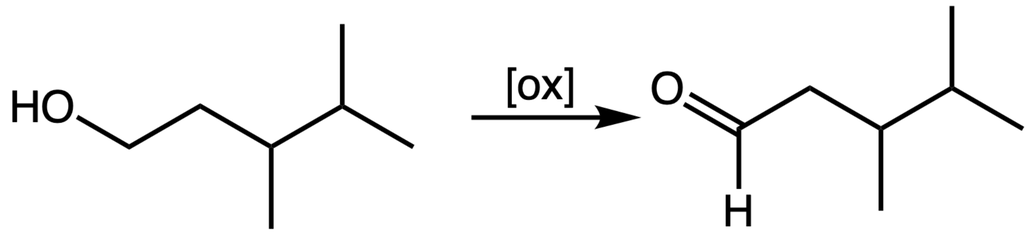
A) 3,4-dimethylpentan-2-one



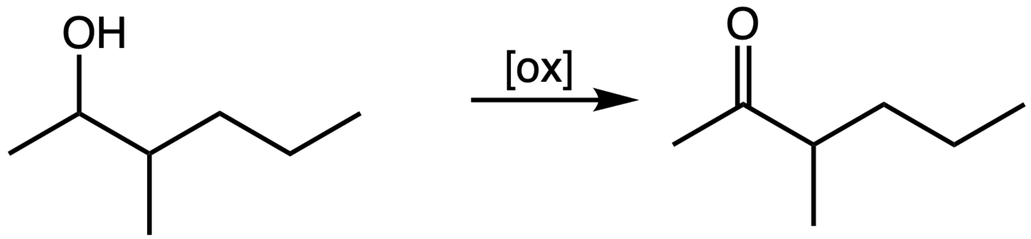
B) 2-methylhexan-1-al



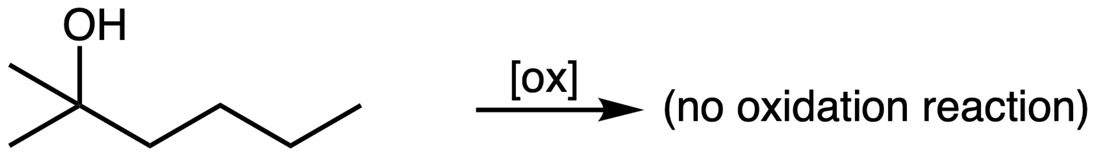
C) 3,4-diemethylpentan-1-ol



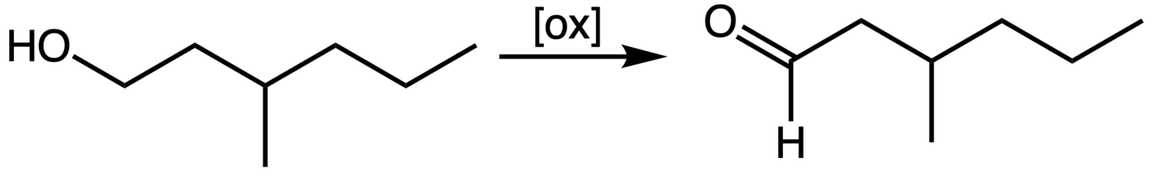
D) 3-methylhexan-2-ol



E) 2-methylhexan-2-ol



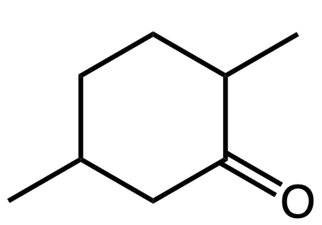
F) 3-methylhexan-1-ol



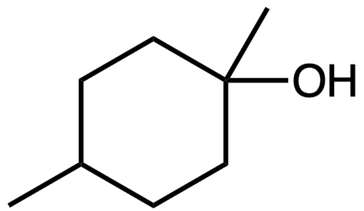
PRACTICE PROBLEM 2

How many of the following compounds could be oxidized to yield a ketone?

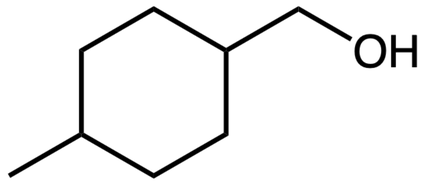
— answer —



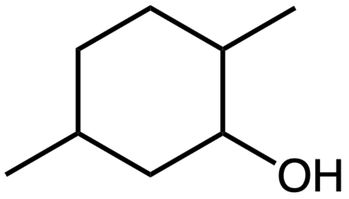
A



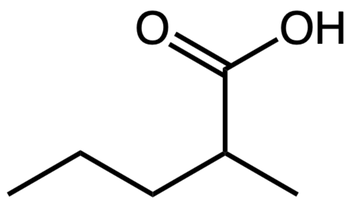
B



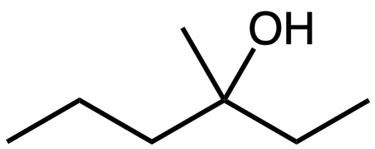
C



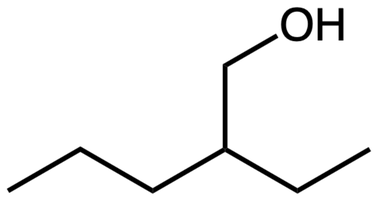
D



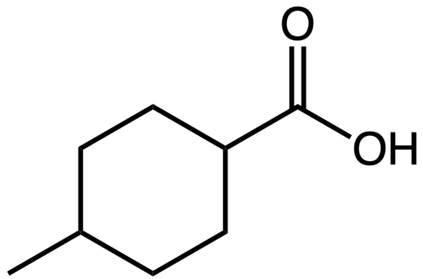
E



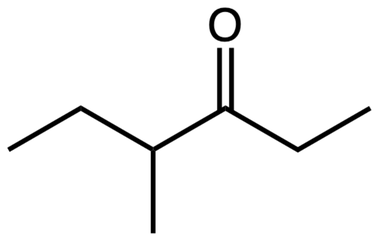
F



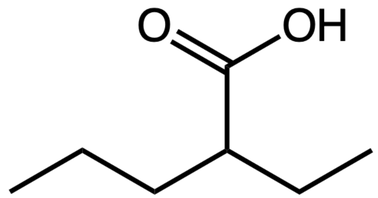
G



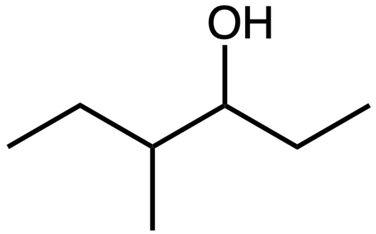
H



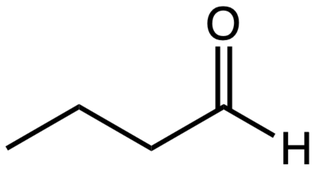
I



J



K



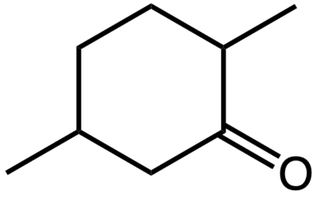
L

PRACTICE PROBLEM 2

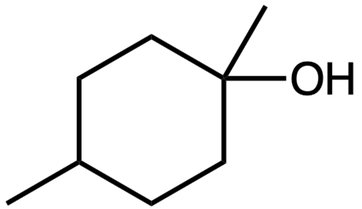
How many of the following compounds could be oxidized to yield a ketone?

– answer –

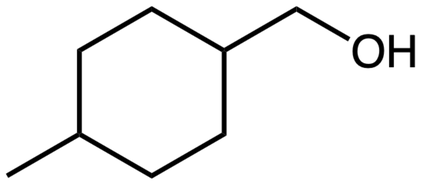
A ketone can only be produced from the oxidation of a secondary (2°) alcohol, where the –OH group is attached to a carbon with two groups or substituents off it.



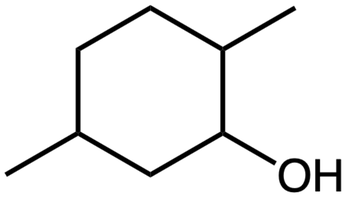
A



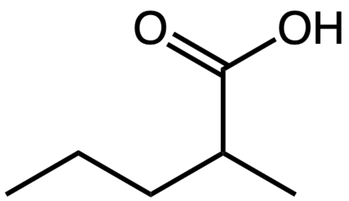
B



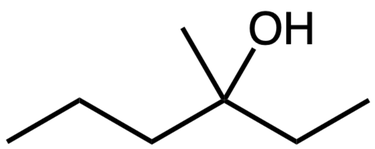
C



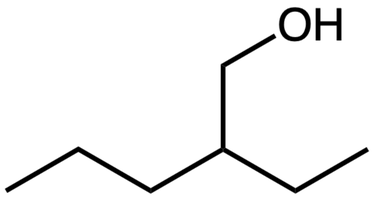
D



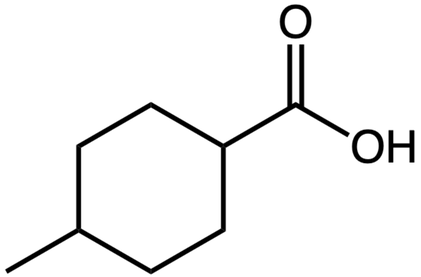
E



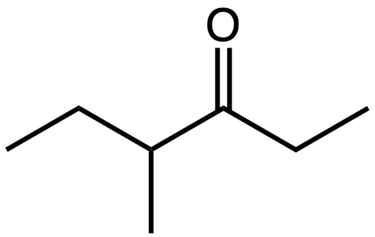
F



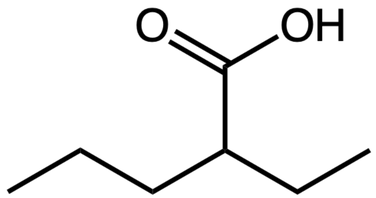
G



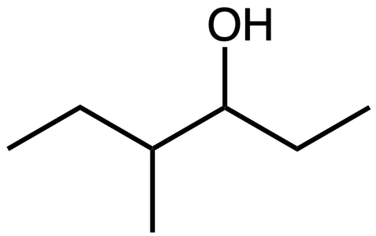
H



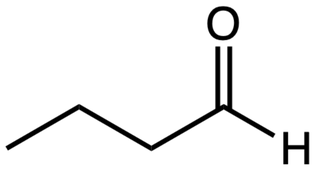
I



J



K

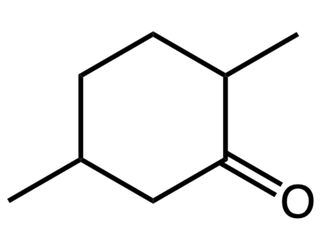


L

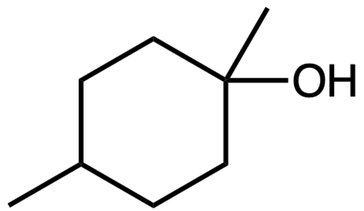
PRACTICE PROBLEM 3

How many of the following compounds could be reduced to yield a primary (1°) alcohol?

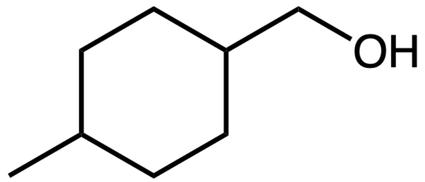
— answer —



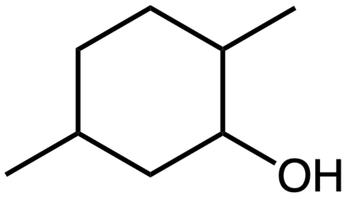
A



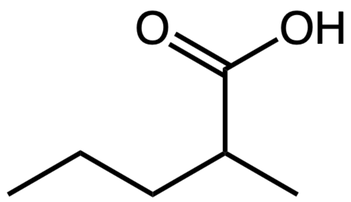
B



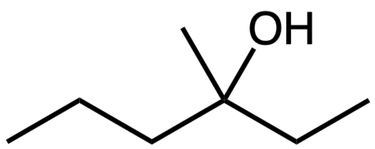
C



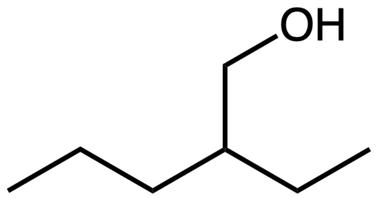
D



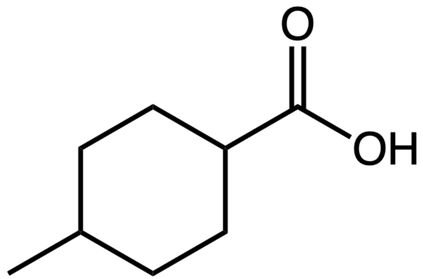
E



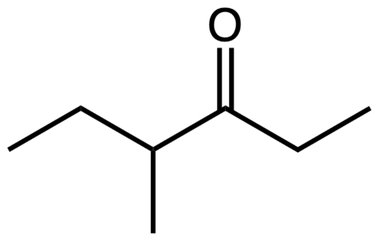
F



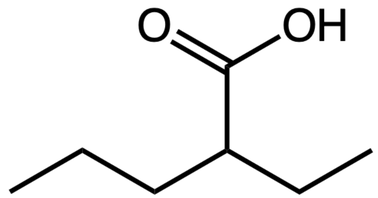
G



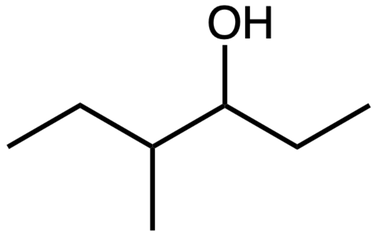
H



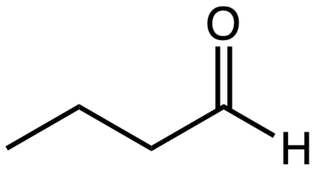
I



J



K



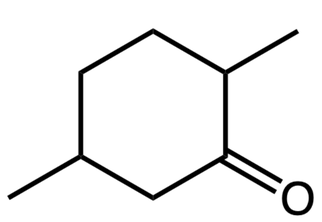
L

PRACTICE PROBLEM 3

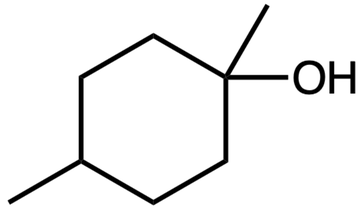
How many of the following compounds could be reduced to yield a primary (1°) alcohol?

— answer —

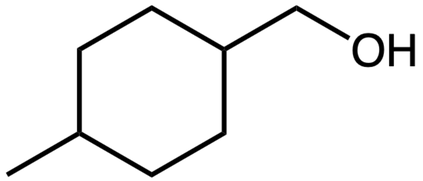
A primary (1°) alcohol, where the –OH group is attached to a carbon with only one group or substituent off it, can be made from the reduction of aldehydes and carboxylic acids.



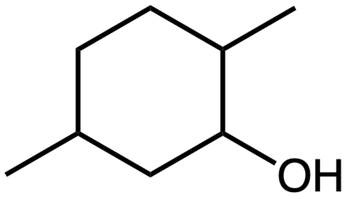
A



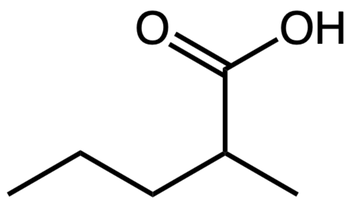
B



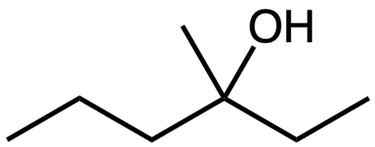
C



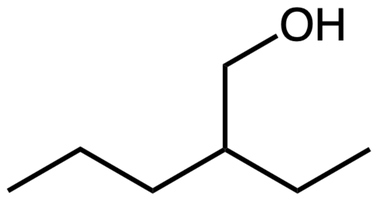
D



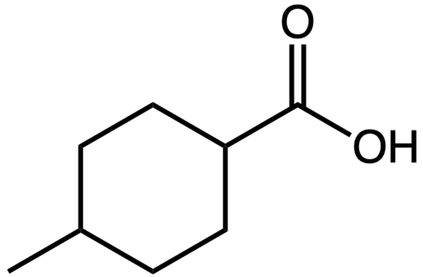
E



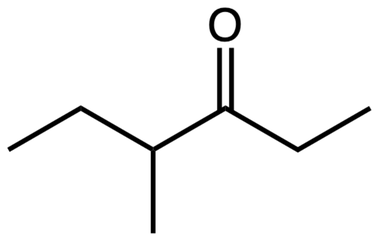
F



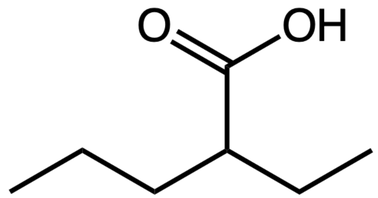
G



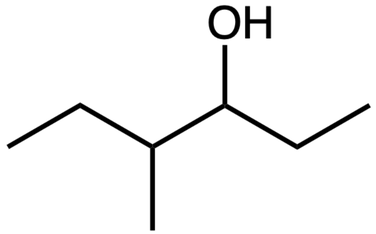
H



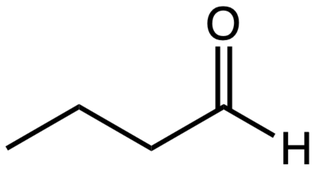
I



J



K



L