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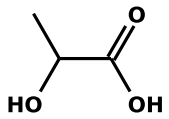
The structure of lactic acid represented below:



a) can have four stereoisomers.

b) can have three stereoisomers.

c) can have two stereoisomers.

d) can have one stereoisomer.

B01

Regarding the concepts of stereoisomerism, identify the correct alternative.

a) A racemic mixture is an equimolar mixture of two enantiomers.

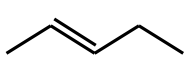
b) An enantiomeric excess is an equimolar mixture of two enantiomers.

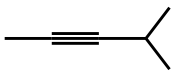
c) A meso compound causes rotation of the plane of polarized light.

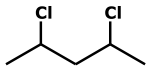
d) All compounds with stereogenic centers cause rotation of the plane of polarized light.

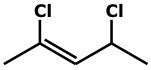
B02

Among the following structures, which exhibit stereoisomerism *E/Z* and optical.

a) 

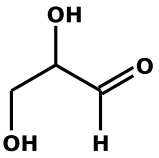
b) 

c) 

d) 

B03

Analyzing the structure of glyceraldehydes, we can conclude that:



a) it has *cis-trans* stereoisomerism.

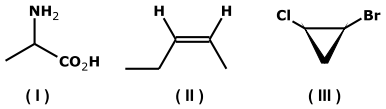
b) it has a stereogenic carbon.

c) it has no stereogenic center.

d) it is an achiral compound.

B04

Among the structures I, II and III, which one(s) is (are) optically active?



a) I.

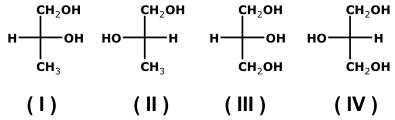
b) I and II.

c) I and III.

d) I, II and III.

B05

Analyze the structures I, II, III and IV and choose the correct option.



a) All exhibit optical activity.

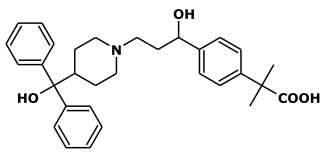
b) I and II exhibit optical activity.

c) II is achiral.

d) III and IV are enantiomers.

B06

Analyzing the structure of Fexofenadine represented below, we can conclude that the compound:



a) has two stereogenic carbons.

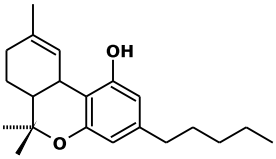
b) is achiral.

c) is optically active.

d) can have four stereoisomers.

B07

According to the structure of tetrahydrocannabinol (THC), the active ingredient in marijuana, we can say that:



a) has a stereogenic carbon.

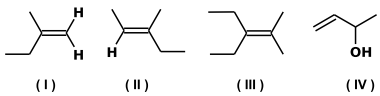
b) has two stereogenic carbons.

c) has three stereogenic carbons.

d) has four stereogenic carbons.

B08

According to the compounds I, II, III and IV, the correct alternative.



a) II shows *cis-trans* stereoisomerism and IV is chiral.

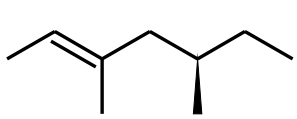
b) I and III are *cis-trans* stereoisomers.

c) IV shows *cis-trans* stereoisomerism.

d) All show *cis-trans* stereoisomerism.

B09

The structure below:



a) It has a double bond with *Z* configuration.

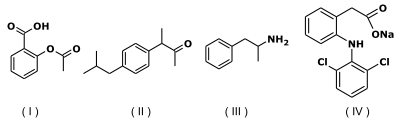
b) It has *S* configuration.

c) It has symmetry plane.

d) has two enantiomers.

B10

Among the compounds below, which have stereogenic centers?



(I) (II) (III) (IV)

a) I and II.

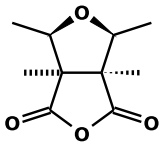
b) II and III.

c) I and IV.

d) II, III and IV.

B11

According to the structure of cantharidin represented below, indicate the correct alternative.



a) It has an enantiomer.

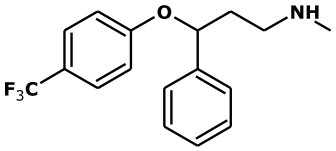
b) it has a plane of symmetry.

c) it is optically active.

d) It is a chiral molecule.

B12

Based on the structure of the antidepressant fluoxetine, we can affirm that it:



a) is a meso compound.

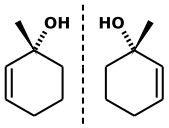
b) has a diastereomer.

c) has a stereogenic carbon.

d) is achiral.

B13

The 1-metilcicloex-2-en-1-ol is a natural pheromone isolated from Dendroctonus pseudotsugae. We can affirm that the compounds represented below are a pair of:



a) constitutional isomers.

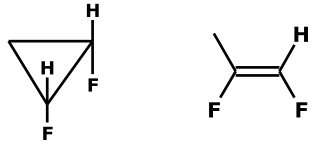
b) diastereoisomers.

c) enantiomers.

d) same compounds.

B14

The compounds shown below can be classified as:



a) constitutional isomers.

b) enantiomers.

c) diastereoisomers.

d) identical.

B15

The compounds shown below can be classified as:

a) constitutional isomers.

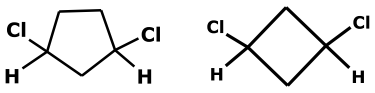
b) enantiomers.

c) diastereoisomers.

d) isomers are not.

B16

The compounds shown below can be classified as:



a) constitutional isomers.

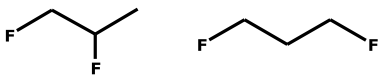
b) enantiomers.

c) diastereoisomers.

d) achiral.

B17

The compounds shown below can be classified as:



a) constitutional isomers.

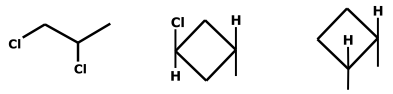
b) enantiomers.

c) diastereoisomers.

d) identical.

B18

According to the structures I, II and III, which molecule(s) has(have) a plane of symmetry?



(I) (II) (III)

a) I and II

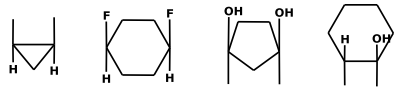
b) II

c) II and III

d) III

B19

According to the structures below, which does not have a plane of symmetry?



(I) (II) (III) (IV)

a) I

b) II

c) II

d) IV

B20

Among the characteristics below, which option does not can be related to a meso compound?

a) It is not optically active.

b) It has a plane of symmetry.

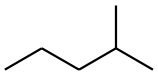
c) It has more than one stereogenic center.

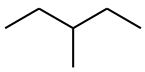
d) It does not have a plane of symmetry.

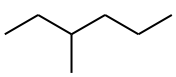
B21

Among the structures below which can provide optical activity?

a) 

b) 

c) 

d) 

B22

Can we affirm that a pair of enantiomers:

a) are constitutional isomers.

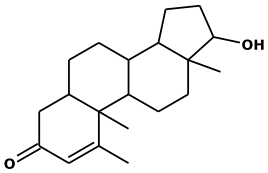
b) do not have a same molecular formula.

c) are not optically active.

d) maintain a non-overlapping image-object relationship.

B23

How many stereogenic carbons are in the structure below?



a) 5

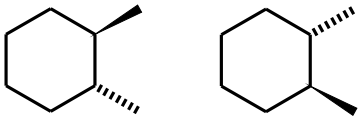
b) 6

c) 7

d) 8

B24

The compounds shown below can be classified as:



a) constitutional isomers.

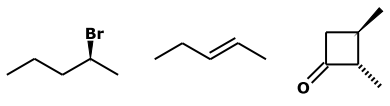
b) enantiomers.

c) diastereoisomers.

d) identical.

B25

Among the compounds below, which are optically active?



(I) (II) (III)

a) I and II

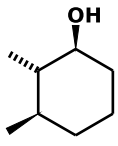
b) I and III

c) II and III

d) I, II and III

B26

How many optically active isomers are possible from the following connectivity?



a) 5

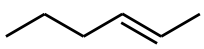
b) 6

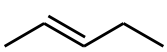
c) 7

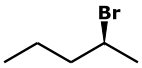
d) 8

B27

Among the structures below, which shows optical activity?

a) 

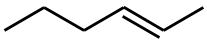
b) 

c) 

d) 

B28

Analyze the structure of the compound below and define the correct alternative.



a) It has an enantiomer.

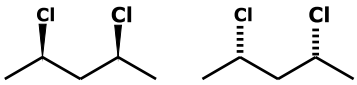
b) It has *cis-trans* stereoisomerism.

c) It has a *cis* double bond.

d) It is optically active.

B29

The compounds shown below can be classified as:



a) constitutional isomers.

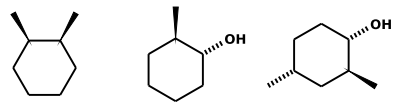
b) enantiomers.

c) diastereoisomers.

d) identical.

B30

Among the compounds below, which do not have a plane of symmetry?



a) I and II

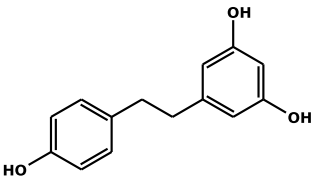
b) I and III

c) II and III

d) I, II and III

B31

According to the structure below, we can affirm that the compound:



a) has no stereogenic carbon.

b) has an optical activity.

c) it is formed by only carbon tetrahedral.

d) is chiral.

B32

Choose the correct alternative.

a) All molecules that have stereocenters are chiral.

b) A molecule with one stereogenic center can have four enantiomers.

c) A chiral molecule has a plane of symmetry.

d) Enantiomers are stereoisomers that show a non-overlapping image-object relationship.

B33

Choose the correct statement.

a) It is possible to match a chiral molecule with its mirror image (enantiomer).

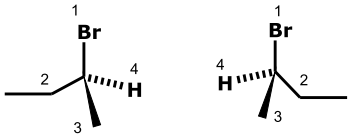
b) Meso compounds divert the plane polarized light.

c) All molecules with stereocenters divert the plane polarized light.

d) An optically active molecule in solution deflects the plane of polarized light.

B34

The configurations of stereogenic center on the two molecules bellow are respectively:



a) *R* and *R*.

b) *R* and *S*.

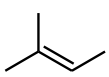
c) *S* and *R*.

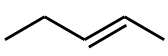
d) *S* and *S*.

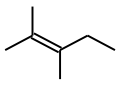
B35

Among the following compounds, which can exist as a pair of *cis-trans* stereoisomers?

a) 

b) 

c) 

d) 

B36

Indicate the alternative that shows the correct ascending order of priority of the groups bonded to tetrahedral stereogenic center according to the Cahn-Ingold-Prelog's rule.

a) $-H$, $-CH_3$, $-CH_2CH_3$

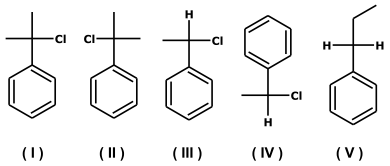
b) $-NH_2$, $-OH$, $-CH_3$

c) $-CH_2OH$, $-CH_3$, $-NH_2$

d) $-CH_2OH$, $-CHO$, $-H$

B37

According to the structures below, which can be classified as a chiral molecule?



(I) (II) (III) (IV) (V)

a) I, II, III, IV and V

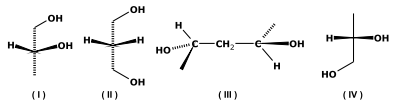
b) I, II, III and IV

c) I and II

d) III and IV

B38

Among the structures below, which is a meso compound?



(I) (II) (III) (IV)

a) I

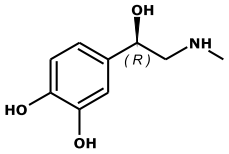
b) II

c) III

d) IV

B39

If the *R* enantiomer of the adrenaline is dextrorotatory and has specific rotation equal to 50, we can affirm that:



a) all *R* isomers of chiral compounds are dextrorotatory.

b) *(R)*-adrenaline has three stereogenic centers.

c) *(R)*-adrenaline is chiral.

d) *(S)*-adrenaline is achiral.

B40

Regarding the optical rotation of a compound, we can affirm that:

a) is nonzero for meso compounds.

b) is proportional to the concentration of the substance.

c) is always greater than zero.

d) is always constant.

B41

Regarding the specific rotation of a compound, we can state that:

a) is nonzero for meso compounds.

b) is directly proportional to the concentration of the substance.

c) is directly proportional to the length of the cell.

d) it is constant.

B42

Regarding the specific rotation of a compound, we can state that:

a) it is equal to zero for meso compounds..

b) is directly proportional to the concentration of the substance.

c) is directly proportional to the length of the cell.

d) is equal to zero for chiral compounds.

B43

A chiral compound (A) has a specific rotation equal to -34.5. Analysis of a mixture of (A) and its enantiomers showed that the specific rotation was zero. We can state that:

a) the mixture has an enantiomeric excess of (A).

b) the mixture is a racemate.

c) it is a enantiomerically pure substance.

d) enantiomer of (A) is dextrorotatory.

B44

mixing with the composition 40% of *R* isomer and 60% of the *S* isomer constitutes an enantiomeric excess of:

a) 20%

b) 40%

c) 60%

d) 80%

B45

A mixture made with 20% of *R* isomer and 80% of *S* isomer constitutes an enantiomeric excess of:

a) 20%

b) 40%

c) 60%

d) 80%

B46

A mixture made with 90% of *R* isomer and 10% of the *S* isomer constitutes an enantiomeric excess of:

a) 20%

b) 40%

c) 60%

d) 80%

B47

A mixture made with 75% of *R* isomer and 25% of the *S* isomer constitutes an enantiomeric excess of:

a) 25%

b) 50%

c) 60%

d) 75%

B48

If the optical rotation obtained from an unknown sample is zero, we can state that it is:

a) an enantiomeric exces.

b) a chiral compound.

c) an achiral compound.

d) an enantiomerically pure substance.

B49

If the optical rotation obtained from an unknown sample is equal to zero, we can state that it is:

a) an enantiomeric exces.

b) racemate.

c) chiral compound.

d) an enantiomerically pure substance.

B50

If the optical rotation obtained from an unknown sample is non-zero, we can say that it is:

a) an enantiomeric excess.

b) racemate.

c) an achiral compound.

d) a levorotatory compound.

B51

(+)-mandelic acid has specific rotation equal to +158. What would be the specific rotation of a mixture composed of 50% (-)-mandelic acid and 50% (+)-mandelic acid?

a) +39,5

b) +79,0

c) -118,5

d) 0,0

B52

Isomers that have the same connectivity but differ in their spatial arrangement are called:

a) tautomers.

b) stereoisomers.

c) identical.

d) constitutional isomers.

B53

Chiral objects which don't overlap their mirror image are called:

a) enantiomers.

b) identical.

c) diastereoisomers.

d) constitutional isomers.

B54

Compounds capable of diverting the plane polarized light are called:

a) isomers.

b) achiral.

c) optically active.

d) meso.

B55

The equipment used to measure the ability of organic compounds in diverting the plane polarized light is called:

a) fluorometer.

b) infrared

c) mass spectrometer.

d) polarimeter.

B56

The Cahn-Ingold-Prelog's nomenclature system is used to:

a) determine whether the compound is achiral.

b) determine the absolute configuration of a stereogenic center.

c) determine whether the compound has cis-trans stereoisomerism.

d) determine how many stereoisomers a molecule has.

B57

A solution containing equal amounts of both enantiomers is called:

a) chiral.

b) concentrated.

c) enantiomeric excess.

d) racemate.

B58

A solution containing different amounts of both enantiomers is called:

a) chiral.

b) achiral.

c) enantiomerically enriched.

d) racemate.

B59

If a compound with multiple stereogenic centers is achiral, we can state that:

a) it has an axis of symmetry.

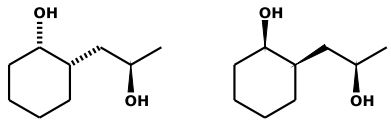
b) it has a plane of symmetry.

c) it deviates the plane of plane polarized light.

d) it has enantiomers.

B60

We can state that the two compounds below are:



a) enantiomers.

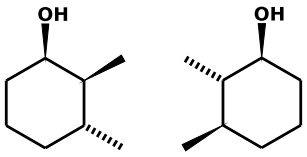
b) identical.

c) diastereoisomers.

d) constitutional isomers.

B61

We can state that the two compounds below are:



a) enantiomers.

b) identical.

c) diastereoisomers.

d) constitutional isomers.

B62

We can state that the two compounds below are:

a) enantiomers.

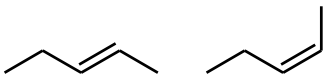
b) identical.

c) diastereoisomers.

d) constitutional isomers.

B63

We can state that the two compounds below are:



a) enantiomers.

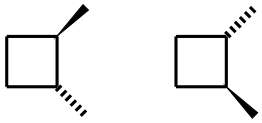
b) identical.

c) diastereoisomers.

d) constitutional isomers.

B64

We can state that the two compounds below are:



a) enantiomers.

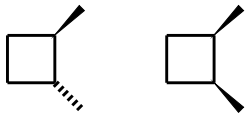
b) identical.

c) diastereoisomers.

d) constitutional isomers.

B65

We can state that the two compounds below are:



a) enantiomers.

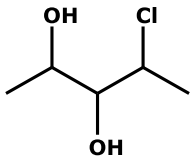
b) identical.

c) diastereoisomers.

d) constitutional isomers.

B66

The number of possible stereoisomers for the compound below is:



a) 4

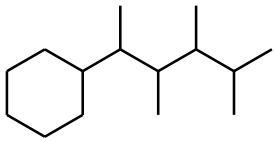
b) 5

c) 7

d) 8

B67

The number of possible stereoisomers for the compound below is:



a) 4

b) 8

c) 32

d) 64

B68

If a solution contains a mixture of two enantiomers in a ratio 49:1, which is the enantiomeric excess?

a) 48%

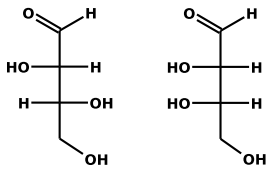
b) 49%

c) 50%

d) 51%

B69

We can state that the two compounds below are:



a) enantiomers.

b) identical.

c) diastereoisomers.

d) constitutional isomers.

B70

We can state that the two compounds below are:

a) enantiomers.

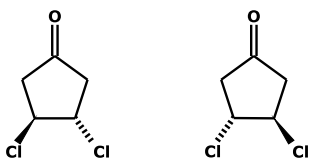
b) identical.

c) diastereoisomers.

d) constitutional isomers.

B71

We can state that the two compounds below are:



a) enantiomers.

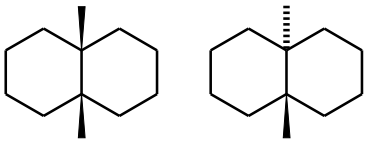
b) identical.

c) diastereoisomers

d) constitutional isomers.

B72

We can state that the two compounds below are:



a) enantiomers.

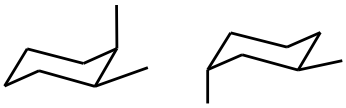
b) identical.

c) diastereoisomers.

d) constitutional isomers.

B73

We can state that the two compounds below are:



a) enantiomers.

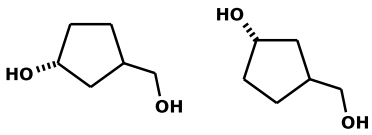
b) identical.

c) diastereoisomers.

d) constitutional isomers.

B74

We can state that the two compounds below are:



a) enantiomers.

b) identical.

c) diastereoisomers.

d) constitutional isomers.

B75

INTERMEDIATE

STEREOGAME

INTERMEDIATE

STEREOGAME

INTERMEDIATE

STEREOGAME

INTERMEDIATE

STEREOGAME

INTERMEDIATE

STEREOGAME

INTERMEDIATE

STEREOGAME

INTERMEDIATE

STEREOGAME

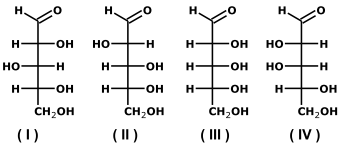
INTERMEDIATE

STEREOGAME

INTERMEDIATE

STEREOGAME

The hydroxyl group can be oxidized to afford a formyl group (CHO). Among the compounds below which could originate achiral compounds after suffering the oxidation?



a) I and II

b) I and III

c) II and III

d) II and IV

I10

Regarding *cis-trans* stereoisomers, it is correct to affirm that they:

a) are constitutional isomers.

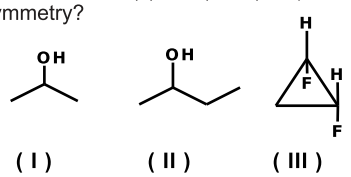
b) are enantiomers.

c) are diastereomers.

d) have different connectivities.

I11

According to the structures I, II and III, which molecule(s) has(have) a plane of symmetry?



a) I and II

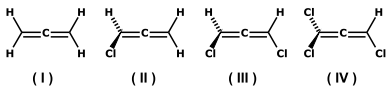
b) II and III

c) I and III

d) only I.

I12

Among the compounds below, which will divert the plane polarized light?



a) I

b) II

c) III

d) IV

I13

Among the following affirmations, which would be true for a stereoisomer with only one stereogenic center with *(S)* configuration?

a) Always diverts plane polarized light to the right.

b) Always diverts plane polarized light to the left.

c) Diverts plane polarized light.

d) Will possess an enantiomer with a stereogenic center *(R).*

I14

Which of the following physical properties can be used to differentiate a pair of enantiomers?

a) Boiling point.

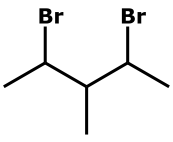
b) Melting point.

c) Specific rotation.

d) Density.

I15

How many stereoisomers are possible from the structure below?



a) 2

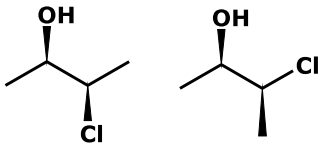
b) 4

c) 6

d) 8

I16

The compounds shown below can be classified as:



a) constitutional isomers.

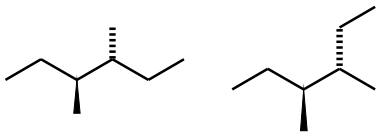
b) enantiomers.

c) diastereoisomers.

d) identical.

I17

The compounds shown below can be classified as:



a) constitutional isomers.

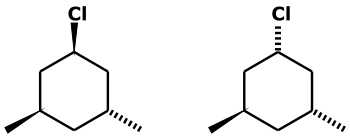
b) enantiomers.

c) diastereoisomers.

d) identical.

I18

The pair of compounds below can be classified as:



a) constitutional isomers.

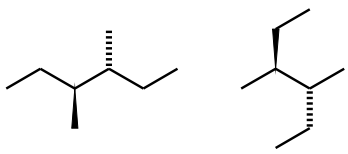
b) enantiomers.

c) diastereoisomers.

d) identical.

I19

The compounds shown below can be classified as:



a) constitutional isomers.

b) enantiomers.

c) diastereoisomers.

d) identical.

I20

Choose the correct alternative.

a) Stereoisomers have different connectivity.

b) Stereoisomers are also called constitutional isomers.

c) Stereoisomers have the same connectivity.

d) Stereoisomers are substances which can readily interconvert each other.

I21

Choose the correct alternative.

a) Stereoisomers can be separated.

b) There are two types of stereoisomers, *cis-trans* stereoisomers and the stereoisomers containing stereocenters.

c) Stereoisomers are also called conformational isomers.

d) *Cis-trans* stereoisomers are also called constitutional isomers.

I22

Choose the correct alternative.

a) Enantiomers are molecules that show a non-overlapping image-object relationship.

b) A chiral molecule must have at least one stereogenic carbon.

c) Othe only possible type of stereocenter is the tetrahedral.

d) All double bonds are stereocenters.

I23

Choose the correct alternative.

a) A tetrahedral stereocenter is an atom in which the exchange of two groups produces a stereoisomer.

b) A double bond with two equal groups on the same carbon can be considered a stereocenter.

c) Enantiomers have a plane of symmetry.

d) A tetrahedral stereogenic center must have at least three different substituents.

I24

Choose the correct affirmation.

a) The mirror image of an enantiomer is superimposable to the enantiomer itself.

b) A molecule which has a plane of symmetry is identical to its mirror image and hence is chiral.

c) A plane of symmetry is a plane that cuts through a molecule such that one half of the object is the mirror image of the other half.

d) A molecule that has a single tetrahedral stereogenic center with four different groups is achiral.

I25

Choose the correct affirmation.

a) A molecule can have stereogenic centers and be optically inactive.

b) A pair of enantiomers divert the plane polarized light to opposite sides and different angles.

c) Chiral molecules with only a stereogenic carbon with configuration *R* are dextrorotatory while those having the *S* stereocenter are levorotatory.

d) By convention, the rotation of plane polarized light to the left receives the positive sign (+), and rotation to the right gets the negative sign (-).

I26

Choose the correct affirmation.

a) There is no obvious correlation between the configurations of enantiomers *(R* or *S)* and the direction (+ or -) to divert the plane polarized light.

b) The optical rotation observed in an experiment of polarimetry depends solely on the number of optically active molecules present in the cell.

c) The optical rotation does not depend on the length of the polarimeter cell.

d) The optical rotation is constant for all chiral compounds.

I27

Choose the incorrect affirmation.

a) An exchange between two groups of a tetrahedral stereogenic center inverts the center configuration.

b) Two exchanges between groups of a tetrahedral stereogenic center inverts the configuration of the center.

c) According to the Cahn-Ingold-Prelog priority system is assigned based on the atomic number of the atom that is directly attached to the stereocenter.

d) The isotope with higher atomic weight has priority on the Cahn-Ingold-Prelog priority system.

I28

Choose the correct affirmation.

a) A molecule with a single tetrahedral stereogenic center can have one diastereomer.

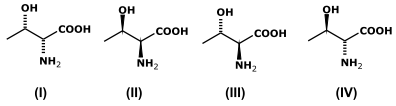
b) Diastereomers are stereoisomers which are not a mirror image of each other.

c) Diastereoisomerism can just be observed in molecules which have at least one tetrahedral stereogenic center.

d) A molecule with two stereogenic centers always has 8 different tetrahedral stereoisomers.

I29

Analyze the structures below and choose the correct affirmation.



a) I and II are diastereoisomers.

b) II and III are enantiomers.

c) I and III are diastereoisomers.

d) I and III are enantiomers.

I30

Choose the alternative containing the correct affirmation regarding the enantiomers and diastereomers.

a) All enantiomers have identical physical properties.

b) The diastereomers have different physical properties.

c) Diastereomers have identical chemical properties.

d) Enantiomers and diastereomers have identical chemical properties.

I31

Choose the correct affirmation.

a) An equimolar mixture of two diastereoisomers is a racemic mixture.

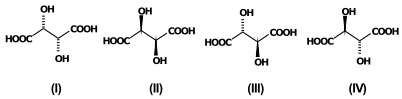
b) An equimolar mixture of (*R*)-2-butanol and (*S*)-2-butanol diverts the plane polarized light.

c) A racemic mixture shows rotation of plane polarized light.

d) An enantiomeric excess diverts the light polarized in an angle which is dependent on the concentration of the two enantiomers in the mixture.

I32

According to the structures below, choose the correct affirmation.



a) The above figure represents four different stereoisomers.

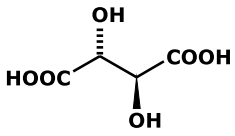
b) The stereoisomer with configuration 2*R*,3*R* is the meso compound.

c) The stereoisomers with configurations 2*R*,3*R* and 2*S*,3*S* are identical molecules.

d) The stereoisomers with configurations 2*R*,3*S* and 2*S*,3*R* are identical molecules.

I33

Consider the molecule and select the correct option.



a) Both stereogenic carbon of the molecule have *R* configuration.

b) Both stereogenic carbon of the molecule have *R* configuration.

c) The molecule is chiral and has two tetrahedral stereogenic centers.

d) The molecule is a meso compound.

I34

Choose the correct affirmation.

a) The meso compound has two stereogenic carbons with identical substituents and configurations.

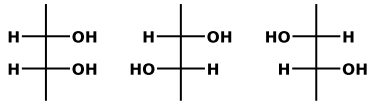
b) If a substance has a plane of symmetry, it is not optically active even if it has stereogenic carbons.

c) The meso compound has at most two stereogenic carbons with the same substituents.

d) The meso compound is also called a racemic mixture.

I35

Analyze the structures below and choose the correct affirmation.



a) II and III represent the identical molecules.

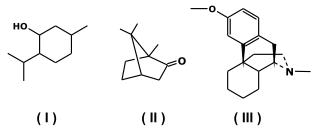
b) I represents a meso compound.

c) I and III represent identical compounds.

d) I and II represent a pair of enantiomers.

I36

Consider the molecules below and choose the option that contains the correct number of tetrahedral stereogenic centers in each molecule, respectively.



a) 3, 2, 3

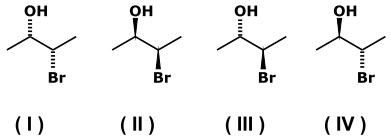
b) 3, 3, 3

c) 3, 4, 3

d) 2, 3, 4

I37

Consider the molecules I, II, III and IV and choose the incorrect option.



a) I and II are diastereomers.

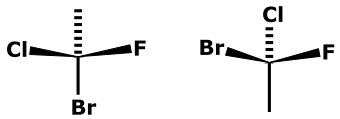
b) II and III are enantiomers.

c) I and IV, II and III are pair of diastereoisomers.

d) I and II and also III and IV are pairs of diastereoisomers.

I38

The molecules below can be classified as:



a) constitutional isomers.

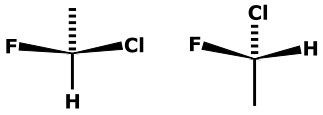
b) enantiomers.

c) diastereoisomers.

d) identical.

I39

The molecules below can be classified as:



a) constitutional isomers.

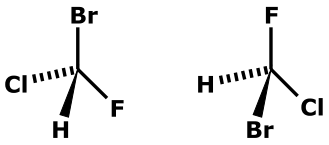
b) enantiomers.

c) diastereoisomers.

d) identical.

I40

The molecules below can be classified as:



a) constitutional isomers.

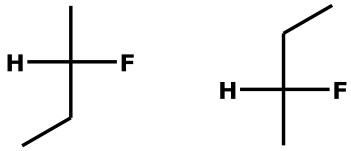
b) constitutional isomers.

c) diastereoisomers.

d) identical.

I41

Regarding the pair of compounds shown below, you can affirm that they:



a) have different melting points.

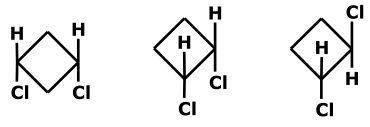
b) have identical specific rotations.

c) are achiral.

d) are enantiomers.

I42

Which of the following structures represent meso compounds?



a) I and II

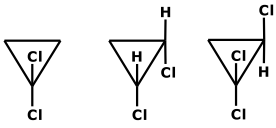
b) II and III

c) I and III

d) III

I43

Which of the following structure represent a meso compound?



a) I

b) II

c) III

d) I and II

I44

A chiral compound (A) has a specific rotation equal to -20. We can affirm that a mixture of (A) and its enantiomer may have values of specific rotation:

a) smaller than 20 and greater than 0.

b) smaller than 20 and greater than -20.

c) smaller than -20 and greater than 20.

d) smaller than 0 and greater than 20.

I45

A chiral compound (A) has a specific rotation equal to x. We can affirm that a mixture of (A) and its enantiomer can have values of specific rotation:

a) smaller than x and larger than 0.

b) smaller than -x and greater than x.

c) smaller than x and higher than -x.

d) smaller than 0 and higher than x.

I46

A chiral compound (A) has a specific rotation equal to -15. We stated that a mixture of (A) and its enantiomer cannot exhibit the same specific rotation equal to:

a) -16

b) 0

c) 14

d) -13

I47

A chiral compound (A) has a specific rotation number 16. Then we can affirms that a mixture of (A) and its enantiomer cannot exhibit the same specific rotation:

a) -16

b) 0

c) 17

d) 13

I48

To calculate of specific rotation, the length of the cell must be expressed as:

a) mm

b) dm

c) cm

d) m

I49

To calculate of specific rotation, the concentration must be expressed as:

a) molarity

b) molality

c) g/ml

d) g/L

I50

We can say about a compound which has two tetrahedral stereocenters and specific rotation equal to -9.25:

a) it has configurations (*S*, *S*).

b) *it has configurations(R,R).*

c) is not a meso compound.

d) *has configurations(R,S).*

I51

For a compound with three chiral centers and no plane of symmetry a set of stereoisomers is possible. How many enantiomers each one of these stereoisomers will have?

a) 1

b) 3

c) 5

d) 8

I52

For a compound with three chiral centers and no plane of symmetry a set of stereoisomers is possible. How many diastereoisomers each one of these stereoisomers will have

a) 1

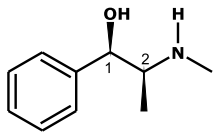
b) 3

c) 6

d) 8

I53

Choose the alternative that presents the correct configurations of the stereogenic centers in the following molecule.



a) 1*R*,2*S*

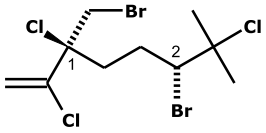
b) 1*S*,2*S*

c) 1*R*,2*S*

d) 1*S*,2*R*

I54

Choose the alternative that presents the correct configurations of the stereogenic centers in the following molecule.



a) 1*R*,2*S*

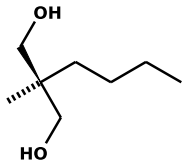
b) 1*S*,2*S*

c) 1*R*,2*S*

d) 1*S*,2*R*

I55

Regarding the specific rotation of the compound below, we can affirm that:



a) is greater than zero.

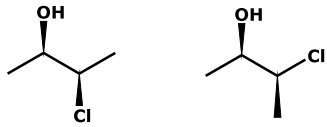
b) is smaller than zero.

c) is equal to zero.

d) cannot be predicted.

I56

We can affirm that the two compounds below are:



a) enantiomers.

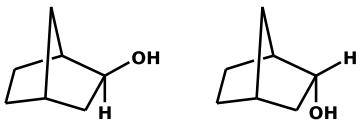
b) identical.

c) diastereoisomers.

d) constitutional isomers.

I57

We can affirm that the two compounds below are:



a) enantiomers.

b) identical.

c) diastereoisomers.

d) constitutional isomers.

I58

Among the compounds below, which are achiral?

(I) (II) (III)

a) II and III.

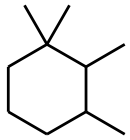
b) I and II.

c) I and III.

d) I, II and III.

I59

How many stereoisomers are possible for the following compound?



a) 3

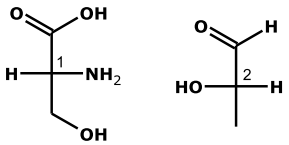
b) 4

c) 8

d) 16

I60

The configurations of the sterogenics centers on the molecules below are respectively:



a) *R* and R.

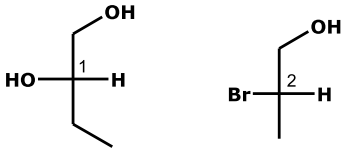
b) *S* and *S*.

c) *R* and *S*.

d) *S* and *R*.

I61

The configurations of the sterogenics centers on the molecules below are respectively:



a) *R* and *R*.

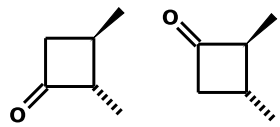
b) *S* and *S*.

c) *R* and *S*.

d) *S* and *R*.

I62

We can affirm that the two compounds below are:



a) enantiomers.

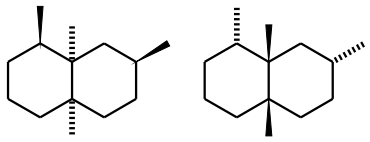
b) identical.

c) diastereoisomers.

d) constitutional isomers.

I63

We can affirm that the two compounds below are:



a) enantiomers.

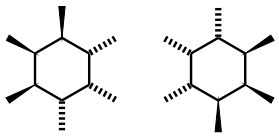
b) identical.

c) diastereoisomers.

d) constitutional isomers.

I64

We can affirm that the two compounds below are:



a) enantiomers.

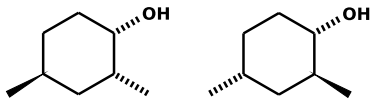
b) identical.

c) diastereoisomers.

d) constitutional isomers.

I65

We can affirm that the two compounds below are:



a) enantiomers.

b) identical.

c) diastereoisomers.

d) constitutional isomers.

I66

We can affirm that the two compounds below are:

a) enantiomers.

b) identical.

c) diastereoisomers.

d) constitutional isomers.

I67

We can affirm that the two compounds below are:

a) enantiomers.

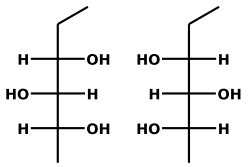
b) identical.

c) diastereoisomers.

d) constitutional isomers.

I68

We can affirm that the two compounds below are:



a) enantiomers.

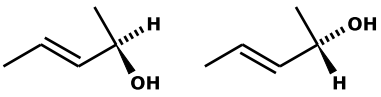
b) identical.

c) diastereoisomers.

d) constitutional isomers.

I69

We can affirm that the two compounds below are:



a) enantiomers.

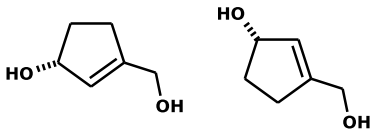
b) identical.

c) diastereoisomers.

d) constitutional isomers.

I70

We can affirm that the two compounds below are:



a) enantiomers.

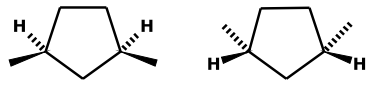
b) identical.

c) diastereoisomers.

d) constitutional isomers.

I71

We can affirm that the two compounds below are:



a) enantiomers.

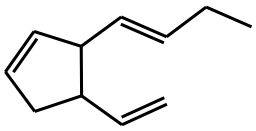
b) identical.

c) diastereoisomers.

d) constitutional isomers.

I72

How many stereoisomers are possible from the connectivity presented for the molecule below?



a) 4

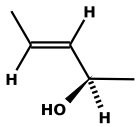
b) 8

c) 16

d) 32

I73

Regarding the structure below it is possible to affirm that the estereogenic centers of its enantiomer have the following configurations:



a) (2*R*, 3*Z*)

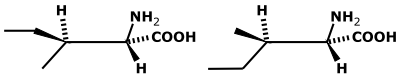
b) (2*S*, 3*E*)

c) (2*R*, 3*E*)

d) (2*S*, 3*Z*)

I74

Regarding the structures of the amino acids isoleucine and alloisoleucine, we can affirm that they:



Isoleucina
(Isoleucine)

aloisoleucina
(alloisoleucine)

a) are enantiomers.

b) are optically inactive.

c) are diastereoisomers.

d) have planes of symmetry.

I75

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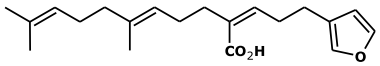
STEREOGAME

We can say that the molecule below has



a) 3 double bonds with *E* configuration.

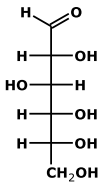
b) 2 double bonds with *Z* configuration and 1 double bond with *E* configuration.

c) 1 double bond with *Z* configuration and 1 double bond with *E* configuration.

d) 2 double bonds with *Z* configuration.

A01

Analyzing the structure of glucose below, we can affirm that it has:



a) 16 stereoisomers.

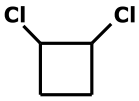
b) 5 stereogenic centers.

c) 2 stereogenic centers with *S* configuration.

d) 1 enantiomer.

A02

How many optically active isomers are possible from the structure below?



a) 1

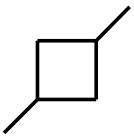
b) 2

c) 3

d) 4

A03

According to the structure below, we can affirm that:



a) 2 stereoisomers are possible.

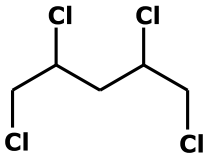
b) 4 stereoisomers are possible.

c) 12 diastereomers are possible.

d) 2 enantiomers and 1 meso compound are possible.

A04

How many stereoisomers are possible from the structure below?



a) 2

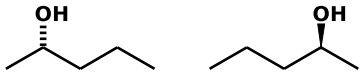
b) 3

c) 4

d) 8

A05

The compounds shown below can be classified as:



a) constitutional isomers.

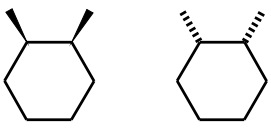
b) enantiomers.

c) diastereoisomers.

d) identical.

A06

The compounds shown below can be classified as:



a) constitutional isomers.

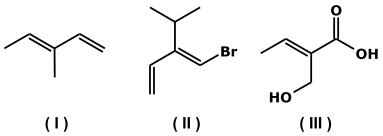
b) enantiomers.

c) diastereoisomers.

d) identical.

A07

The following molecules have trisubstituted double bonds, respectively, with configurations:



a) *E, E, E*

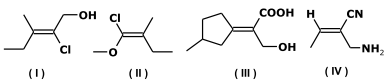
b) *E, E, Z*

c) *Z, Z, E*

d) *E, Z, Z*

A08

The following molecules have double bonds, respectively, with configurations:



a) *Z, E, E, Z*

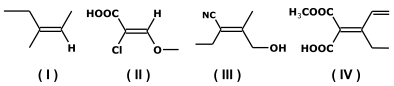
b) *E, E, E, Z*

c) *Z, E, E, E*

d) *E, Z, Z, E*

A09

The following molecules have double bonds, respectively, with configurations:



(I) (II) (III) (IV)

a) *Z, E, E, E*

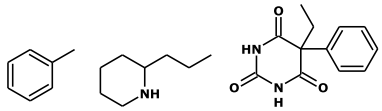
b) *Z, Z, E, Z*

c) *E, E, Z, E*

d) *Z, Z, Z, E*

A10

Which compound(s) is(are) chiral?



(I) (II) (III)

a) I

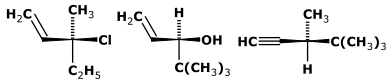
b) II

c) III

d) II and III

A11

Select the alternative that contains the correct configuration of the stereogenic centers in the compounds below, respectively.



a) *S, R, S*

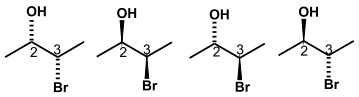
b) *S, R, S*

c) *R, R, S*

d) *S, R, R*

A12

Analyze the molecules below and choose the alternative that contains the correct indication of the absolute configurations of the stereogenic centers:



(I) (II) (III) (IV)

a) in I the stereogenic carbons are 2*R* and 3*S*.

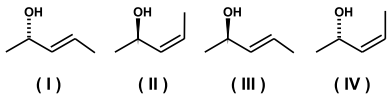
b) in II the stereogenic carbons are 2*R* and 3*R*.

c) in III the stereogenic carbons are 2*S* and 3*R*.

d) in IV the stereogenic carbons are 2*S* and 3*R*.

A13

Analyze the compounds below and choose the correct answer that represents a pair of enantiomers.



(I) (II) (III) (IV)

a) I and III

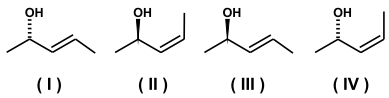
b) I and IV

c) II and III

d) III and IV

A14

Analyze the compounds below and choose the correct alternative that does not represent a pair of diasteroisomers.



(I) (II) (III) (IV)

a) I and II

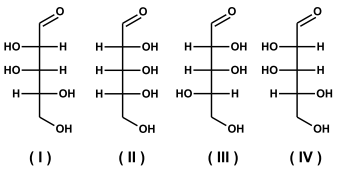
b) I and IV

c) II and IV

d) III and IV

A15

Analyze the compounds below and choose the correct alternative.



(I) (II) (III) (IV)

a) I and II represent a pair of enantiomers.

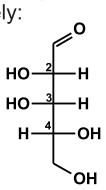
b) I and III represent a pair of enantiomers.

c) III and IV represent a pair of enantiomers.

d) II and III represent a pair of enantiomers.

A16

The configuration of the stereogenic centers indicated by the numbers 2, 3 and 4 are, respectively:



a) *R, S, S*

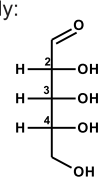
b) *S, S, R*

c) *R, R, S*

d) *R, S, R*

A17

The configuration of the stereogenic centers indicated by the numbers 2, 3 and 4 are, respectively:



a) *R, S, S*

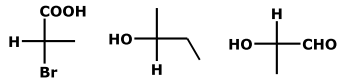
b) *R, R, R*

c) *R, R, S*

d) *R, S, R*

A18

Consider the following compounds and choose the alternative that represents the correct configurations of the stereogenic centers, respectively.



(I) (II) (III)

a) *R, S, S*

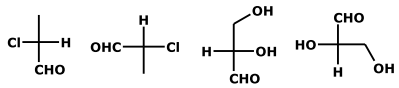
b) *S, S, R*

c) *S, R, S*

d) *R, S, R*

A19

Analyze the compounds below and select the correct alternative.



(I) (II) (III) (IV)

a) I and II represent the same compound.

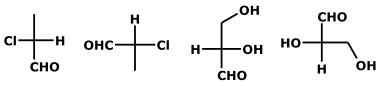
b) III and IV represent the same compound.

c) I and II represent a pair of enantiomers.

d) III and IV represent a pair of diastereoisomers.

A20

Analyze the compounds below and select the correct alternative that represents the correct configurations of stereogenic centers in the indicated compounds:



(I) (II) (III) (IV)

a) I and II have configuration *R* and *R,* respectively.

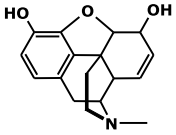
b) I and II have *S* and *R* configurations, respectively.

c) III and IV have *S* and *S* configuration, respectively.

d) III and IV have *S* and *R* configurations, respectively.

A21

Analyze the stereoisomer of morphine shown below, and select the alternative that correctly indicates the number of stereogenic centers and stereoisomers which it has:



a) 5 tetrahedral stereogenic centers, 31 stereoisomers.

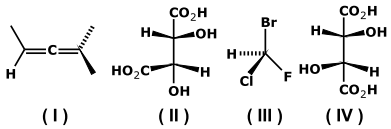
b) 4 tetrahedral stereogenic centers, 16 stereoisomers.

c) 5 tetrahedral stereogenic centers, 32 stereoisomers.

d) 3 tetrahedral stereogenic centers, 7 stereoisomers.

A22

Which of the molecules below is achiral?



(I) (II) (III) (IV)

a) I

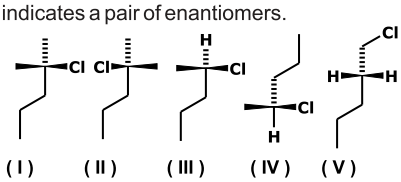
b) II

c) III

d) IV

A23

Analyze the structures of the compounds below, and select the alternative that indicates a pair of enantiomers.



(I) (II) (III) (IV) (V)

a) I and II

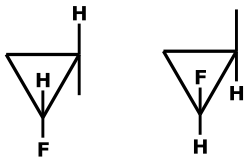
b) II and III

c) III and IV

d) IV and V

A24

The molecules below can be classified as:



a)constitutional isomers.

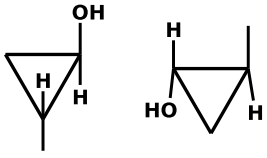
b) enantiomers.

c) diastereoisomers.

d) identical.

A25

The molecules below can be classified as:



a)constitutional isomers.

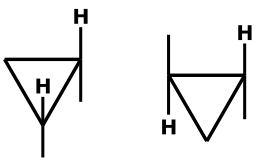
b) enantiomers.

c) diastereoisomers.

d) identical.

A26

The molecules below can be classified as:



a)constitutional isomers.

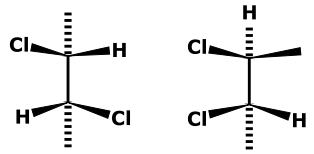
b) enantiomers.

c) diastereoisomers.

d) identical.

A27

The molecules below can be classified as:



a) enantiomers.

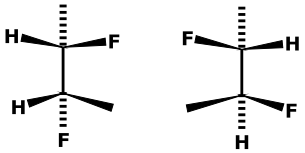
b) diastereoisomers.

c) constitutional isomers.

d) identical.

A28

The molecules below can be classified as:



a) constitutional isomers.

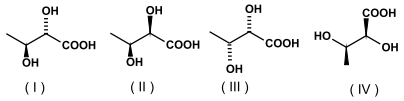
b) enantiomers.

c) enantiomers.

d) identical.

A29

Which structures below are a pair of enantiomers?



a) I and II

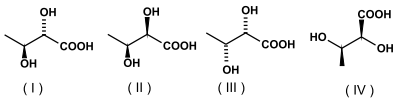
b) II and III

c) III and IV

d) I and IV

A30

Which structures below are a pair of identical compounds?



a) I and II

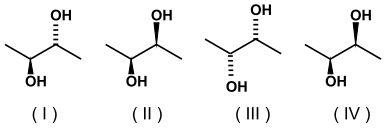
b) II and III

c) III and IV

d) I and IV

A31

Which of the following structures represents a meso compound?



a) I and II

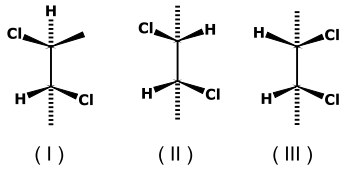
b) II and III

c) III and IV

d) I and IV

A32

Which of the following structures represent meso compounds?



a) I

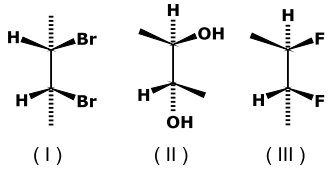
b) II

c) III

d) I and III

A33

Which of the following structures represent meso compounds?



a) I

b) II and III

c) III

d) I and II

A34

Regarding the specific rotation of a compound, we can affirm that:

a) is nonzero for meso compounds.

b) it is directly proportional to the concentration of the substance.

c) it is equal to zero for racemic mixtures.

d) It is directly proportional to the length of the cell.

A35

A chiral compound (A) has a specific rotation equal to 34.5. Analysis of the mixture of (A) and its enantiomer showed that the specific rotation was equal to -23.8. Then we can affirm that:

a) it is a racemic mixture.

b) it is a enantiomerically pure substance.

c) the mixture has an enantiomeric excess of (A).

d) the mixture has an enantiomeric excess of the enantiomer of (A).

A36

A chiral compound (B) has a specific rotation equal to 34.5. Analysis of a mixture of (B) and its enantiomer showed that the specific rotation was equal to +23.8. We can affirm that:

a) the mixture has an enantiomeric excess (B).

b) the mixture is racemic.

c) it is a enantiomerically pure substance.

d) the mixture has an enantiomeric excess of the enantiomer of (B).

A37

An aqueous solution containing 10 g of optically pure fructose was diluted with 500 ml of water and placed in a polarimeter tube of 20 cm length. The measurement of the optical rotation was -5.20°. The specific rotation of fructose is equal to:

a) -30 degrees.

b) -13 degrees.

c) -17 degrees.

d) -130 degrees.

A38

An aqueous solution containing 1 g of optically pure fructose was diluted in 5 ml of water and placed in a polarimeter tube of 20 cm length. The measurement of the optical rotation was -27 °. The specific rotation of fructose is equal to:

a) +67.5 degrees.

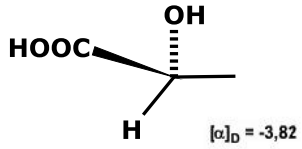
b) +6.75 degrees.

c) -6.75 degrees.

d) -67.5 degrees.

A39

Analyzing the structure of (+)-lactic acid, we can affirm that:



a) it is a compound achiral.

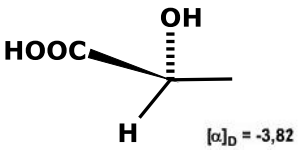
b) it has two enantiomers.

c) its optical rotation will be equal to -38.2 degrees when placed in a cell of a polarimeter with 10 dm and concentration of 10g/L.

d) its optical rotation will be equal to -38.2 degrees when placed in a cell of a polarimeter with 10 dm and concentration of 1g/L.

A40

Analyzing the structure of (+)-lactic acid, we can sate about its enantiomer that:



a) it is a compound achiral.

b) it has two enantiomers.

c) its optical rotation will be equal to +38.2 degrees when placed in a cell of a polarimeter with 10 dm and concentration of 1g/L.

d) its optical rotation will be equal to -38.2 degrees when placed in a cell of a polarimeter with 10 dm and concentration of 1g/L.

A41

Which is the optical rotation of a solution of sucrose with concentration 0.5 g/mL? Consider that the specific rotation of sucrose is equal to +47 and that the length of the polarimeter cell is 25 cm.

a) 58.75 degrees.

b) -5.875 degrees.

c) 5.875 degrees.

d) -58.75 degrees.

A42

Which is the optical rotation of a solution of sucrose with concentration 0.5 g/mL? Consider that the specific rotation of sucrose is equal to -47 and that the length of the polarimeter cell is 25 cm.

a) -58.75 degrees

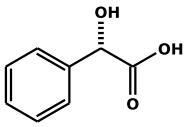
b) -5.875 degrees

c) 5.875 degrees

d) 58.75 degrees

A43

(+)-mandelic acid has specific rotation equal to +158. What would be the specific rotation of a mixture composed of 25% (-)-mandelic acid and 75% (+)-mandelic acid?



a) +39.5

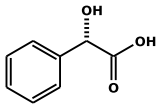
b) +79.0

c) -118.5

d) 0.0

A44

(+)-mandelic acid has specific rotation equal to +158. What would be the specific rotation of a mixture composed of 75% (-)-mandelic acid and 25% (+)-mandelic acid?



a) +39.5

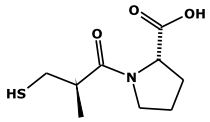
b) +79.0

c) -79.0

d) -39.5

A45

The (*S,S*)-captropil inhibits the growth of tubercle bacilli and presents specific rotation equal to -130. What would be the specific rotation of a mixture containing approximately 70% of (*S, S*)-captropil and 30% of (*R,R*)-captropil?



a) +5.2

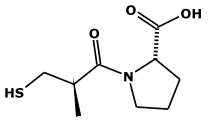
b) +52.0

c) -5.2

d) -52.0

A46

(*S,S*)-captropil inhibits the growth of tubercle bacilli and presents specific rotation equal to -130. What would be the specific rotation of a mixture containing approximately 30% (*S,S*)-captropil and 70% of (*R,R*)-captropil?



a) +5.2

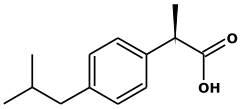
b) +52.0

c) -5.2

d) -52.0

A47

(*R*)-ibuprofen is an anti-inflammatory and has a specific rotation equal to -58. What would be the approximate composition of a mixture of enantiomers of ibuprofen whose specific rotation is equal to -42?



a) 13.3% *(S)* and 68.7% *(R)*

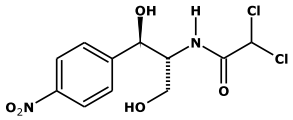
b) 46.4% *(S)* and 53.6% *(R)*

c) 46.4% *(R)* and 53.6% *(S)*

d) 13.3% *(R)* and 68.7% *(S)*

A48

(*R,R*)-cloranfenicol is an antibiotic and has a specific rotation equal to +19.5. What would be the approximate composition of a mixture of enantiomers of the chloramphenicol whose specific rotation is equal to 10?



a) 75.6% *(S,S)* and 24.4% *(R,R)*

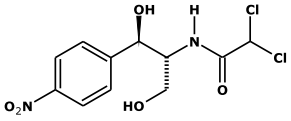
b) 52.5% (*S,S*) and 47.5% (*R,R*)

c) 75.6% (*R,R*) and 24.4% (*S,S*)

d) 52.5% (*R,R*) and 47.5% (*S,S*)

A49

(*R,R*)-cloranfenicol is an antibiotic and has a specific rotation equal to +19.5. What would be the approximate composition of a mixture of enantiomers of the chloramphenicol whose specific rotation is equal to -12?



a) 46.9% (*R,R)* and 24.4% (*S,S)*

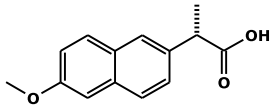
b) 46.9% (*S,S*) and 24.4% (*R,R*)

c) 19.2% (*S,S*) and 80.8% (*R,R*)

d) 19.2% (*R,R*) and 80.8% (*S,S*)

A50

(S)-naproxeno is an inflammatory with specific rotation equal to 66. We can conclude that when a solution of 0.075g/ml is placed in a polarimeter tube 15 cm long:



a) the optical rotation will be smaller than 10 degrees.

b) the specific rotation will be equal to +66 degrees.

c) the specific rotation will be equal to zero.

d) the optical rotation will be greater than 73 degrees.

A51

When a mixture composed of 50% of a enantiomer and 50% of a racemic mixture, it will have:

a) specific rotation equal to the enantiomerically pure substance.

b) specific rotation equal to the half of the enantiomerically pure substance.

c) specific rotation greater than that of the enantiomerically pure substance.

d) specific rotation equal to 2x of the enantiomerically pure substance.

A52

The specific rotation of pure (+)-(2*S*)-ibuprofen is equal to +58,0 but the product of a attempt of synthesis of the drug ibuprofen had a specific rotation equal to +29. Then the percentages of the enantiomers (+) and (-) which compose the synthesized product are, respectively,

a) 50 to 50%.

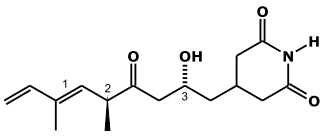
b) 75 and 25%.

c) 85 and 15%.

d) 55 and 45%.

A53

Choose the alternative that presents the correct configurations of the stereogenic centers in the following molecule.



a) 1E, 2*R*, 3S.

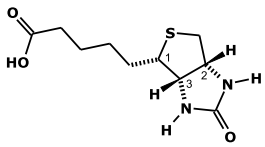
b) 1*E*, 2*R*, 3*S*.

c) *1E*, 2*S*, 3*R*.

d) 1*Z*, 2*S*, 3*R*.

A54

Choose the alternative that presents the correct configurations of the stereogenic centers in the following molecule.



a) 1*R*, 2*R*, 3*R*.

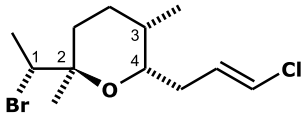
b) 1*S*, 2*S*, 3*S*.

c) 1*R*, 2*S*, 3*R*.

d) 1*S*, 2*R*, 3*S*.

A55

Choose the alternative that presents the correct configurations of the stereogenic centers in the following molecule.



a) 1*S*, 2*R*, 3*R*, 4*R*.

b) 1*R*, 2*S*, 3*S*, 4*R*.

c) 1*R*, 2*R*, 3*S*, 4*S*.

d) 1*S*, 2*S*, 3*R*, 4*R*.

A56

The specific rotation of (*R*)-butan-2-ol is +13.5. When 1.00 g of the isomer is dissolved in 10 ml of ethanol and placed in a cell 10 cm long, which optical rotation is observed?

a) +1.35

b) +13.5

c) zero

d) +0.135

A57

The specific rotation of L-dopa in water (15 °C) is equal to -39.5. What is the enantiomeric excess of a mixture of L-dopa and its enantiomer whose specific rotation is equal to -37?

a) 47

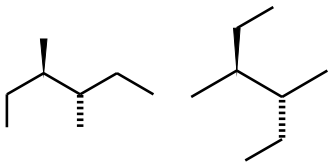
b) 53

c) 67

d) 94

A58

We can affirm that the two compounds below are:



a) enantiomers.

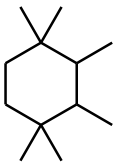
b) identical.

c) diastereoisomers.

d) constitutional isomers.

A59

How many stereoisomers are possible for the following compound?



a) 2

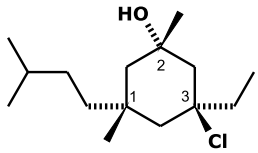
b) 4

c) 8

d) 16

A60

The configurations of the sterogenics centers on the molecule below is respectively:



a) 1*R*, 2*R*, 3*R*

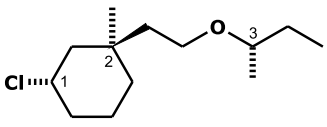
b) 1*S*, 2*S*, 3*S*

c) 1*R*, 2*S*, 3*S*

d) 1*R*, 2*S*, 3*R*

A61

The configurations of the sterogenics centers on the molecules below are respectively:



a) 1*S*, 2*R*, 3*S*

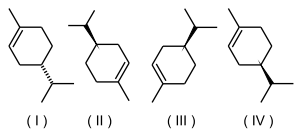
b) 1*S*, 2*S*, 3*S*

c) 1*R*, 2*S*, 3*S*

d) 1*R*, 2*S*, 3*R*

A62

Limonene is found in many fruits, including orange and lemon. Analyze the structures below and locate the isomers with R configuration at their stereogenic centers.



a) I and II

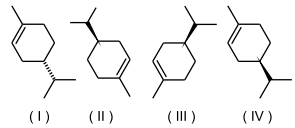
b) II and III

c) III and IV

d) II and IV

A63

Limonene is found in many fruits, including orange and lemon. Analyze the structures below and locate the isomers with S configuration in their stereogenic centers.



a) I and II

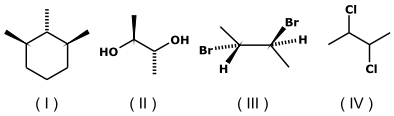
b) I and III

c) III and IV

d) II and IV

A64

Among the compounds below, which one is (are) achiral?



a) I

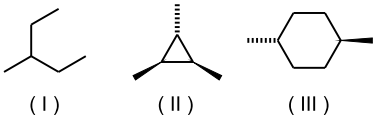
b) I and II

c) III and IV

d) All

A65

Among the compounds below, which one is (are) chiral?



a) I

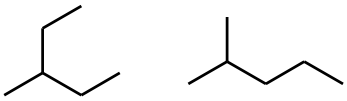
b) II

c) III

d) none.

A66

We can affirm that the two compounds below are:



a) enantiomers.

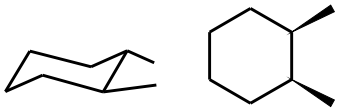
b) identical.

c) diastereoisomers.

d) constitutional isomers.

A67

We can affirm that the two compounds below are:



a) enantiomers.

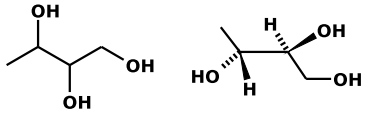
b) identical.

c) diastereoisomers.

d) constitutional isomers.

A68

We can affirm that the two compounds below are:



a) enantiomers.

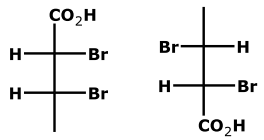
b) identical.

c) diastereoisomers.

d) constitutional isomers.

A69

We can affirm that the two compounds below are:



a) enantiomers.

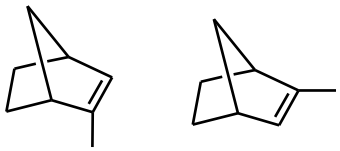
b) identical.

c) diastereoisomers.

d) constitutional isomers.

A70

We can affirm that the two compounds below are:



a) enantiomers.

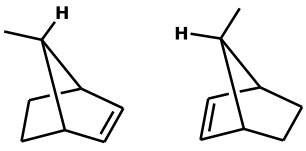
b) identical.

c) diastereoisomers.

d) constitutional isomers.

A71

We can affirm that the two compounds below are:



a) enantiomers.

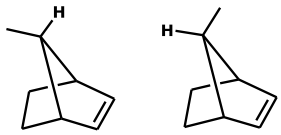
b) identical.

c) diastereoisomers.

d) constitutional isomers.

A72

We can affirm that the two compounds below are:



a) enantiomers.

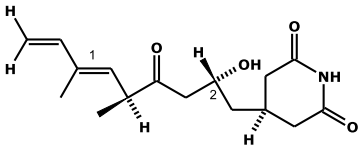
b) identical.

c) diastereoisomers.

d) constitutional isomers.

A73

The configurations of the double bond (1) and of the tetrahedral stereogenic center (2) in the molecule below are, respectively:



a) *Z and R*

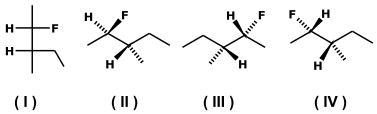
b) *Z and E*

c) *E and R*

d) *E and S*

A74

Regarding the structures below we can affirm that:



(I) (II) (III) (IV)

a) I and II are enantiomers.

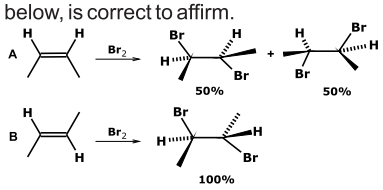
b) II and III are enantiomers.

c) I to IV are identical.

d) III and IV are diastereomers.

I75

Regarding the stereochemistry of the reactions of bromination of alkenes A and B below, is correct to affirm.



a) the *cis* alkene leads to the formation of two diastereomers in proportion.

b) the *trans* alkene leads to the formation of an optically active product.

c) the *Z* alkene leads to the formation of two identical compounds in the same proportions.

d) the A and B alkenes leads to optically inactive products.

A76

A sample of (S)-(+)-lactic showed optical purity of 72%. We can affirm that the percentages of the isomers *S* and *R* in this sample are, respectively:

a) 72% and 28%

b) 14% and 86%

c) 86% and 14%

d) 28% and 72%

A77