



قائمة الاسئلة

امتحان نهاية الفصل الدراسي الأول - للعام الجامعي 1446 هـ - الموافق -2025/2024-مكلية الصيدلة :: كيمياء عضوية صيدلانية (2) - (HA) د/ مختار الغرافي

- 1) What is the outcome when a racemic mixture is formed?\*\*\*
  - 1) - - A) Optically active
  - 2)  - B) Optically inactive
  - 3) - - C) A single enantiomer
  - 4) - - D) Chiral
- 2) 2. What is the maximum number of stereoisomers that can exist for a molecule with 4 chiral centers?
  - 1) - a) 2
  - 2) - b) 3
  - 3) - c) 4
  - 4)  d) 16
- 3) 3. A pair of molecules that are nonsuperimposable mirror images of each other is called:
  - 1)  a) Enantiomers
  - 2) - b) Diastereomers
  - 3) - c) Conformers
  - 4) - d) Racemates
- 4) What kind of isomerism is exhibited by cis-trans isomers?\*\*\*
  - 1) - - A) Optical isomerism
  - 2)  - B) Geometrical isomerism
  - 3) - - C) Functional group isomerism
  - 4) - - D) Structural isomerism
- 5) 5. Two compounds are considered enantiomers except if they:
  - 1)  a) Have the different molecular formula
  - 2) - b) Have the same connectivity of atoms
  - 3) - c) Have opposite configurations at all chiral centers
  - 4) - d) Have similar physical properties
- 6) What does stereochemistry primarily study?\*\*\*
  - 1) - A) Chemical reactions
  - 2)  B) Three-dimensional arrangement of atoms
  - 3) - C) Molecular mass
  - 4) - D) Reaction rates
- 7) 7. Which of the following is an example of geometric isomerism?
  - 1)  a) cis-trans isomerism
  - 2) - b) enantiomerism
  - 3) - c) diastereomerism
  - 4) - d) none of the above
- 8) Diastereomers are:\*\*\*
  - 1) - A) Superimposable mirror images
  - 2)  B) Non-superimposable and non-mirror images
  - 3) - C) Identical in all aspects
  - 4) - D) Only differentiated by molecular weight
- 9) 9. How many enantiomers can a molecule with three chiral centers and one double bond have?
  - 1) - a) 2
  - 2) - b) 4
  - 3) - c) 8
  - 4)  d) 16
- 10) 10. A molecule that has one or more chiral centers but also contains an internal plane of symmetry is called





a:

- 1) - a) Racemic mixture
  - 2) - b) Racemate
  - 3)  c) Meso compound
  - 4) - d) Achiral compound
- 11) 11. What are compounds called that contain an -NH<sub>2</sub> group in a side-chain attached to an aromatic ring?
- 1)  (a) Aniline
  - 2) - (b) Aromatic phenol
  - 3) - (c) Aromatic benzene
  - 4) - (d) None of the above
- 12) 12. Structural isomers differ in:\*\*
- 1) - A) Molecular formula
  - 2) - B) Physical properties only
  - 3)  C) Constitution or structure
  - 4) - D) Chemical reactivity only
- 13) 13. What does the (E<sup>+</sup>) symbol denote?
- 1) - (a) Nucleophile
  - 2)  (b) Electrophile
  - 3) - (c) Both a and b
  - 4) - (d) None of the above
- 14) 14. What is another name for aromatic characterization?
- 1) - (a) Basicity
  - 2)  (b) Aromaticity
  - 3) - (c) Electricity
  - 4) - (d) None of the above
- 15) 15. How many different atoms or groups does an asymmetric carbon atom have?
- 1) - a) One different atom or group
  - 2) - b) Two different atoms or groups
  - 3) - c) Three different atoms or groups
  - 4)  d) Four different atoms or groups
- 16) 16. What does a racemic mixture contain in equimolar concentration?
- 1)  a) Enantiomers
  - 2) - b) Diastereomers and meso compound
  - 3) - c) Enantiomer and meso compound
  - 4) - d) None of these
- 17) 17. What prefixes are used in the nomenclature of stereoisomers of alkene?
- 1) - a) Cis-E
  - 2) - b) Trans-Z
  - 3)  c) Cis-trans
  - 4) - d) None of these
- 18) 18. What instrument is used to measure optical rotation?
- 1)  a) Polarimeter
  - 2) - b) Microscope
  - 3) - c) Nicol prism
  - 4) - d) None of these
- 19) 19. What is a meso compound?
- 1) - a. A compound with no stereocenters.
  - 2)  b. A compound that has multiple stereocenters but is achiral due to an internal plane of symmetry.

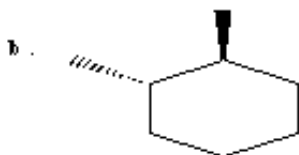




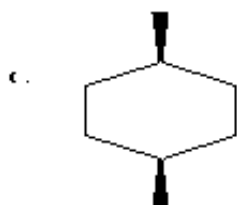
- 3) - c. A compound that exists only in one stereoisomeric form.  
4) - d. A compound that cannot undergo stereoisomerism.  
20) 20. Which compound will be optical active ?  
1) -



- 2) -

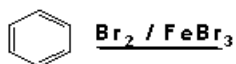


- 3) -

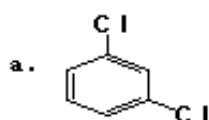


- 4)  A&b

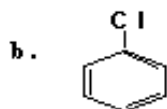
- 21) 21. Detect the product of the following?



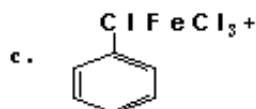
- 1) -



- 2) -



- 3) -

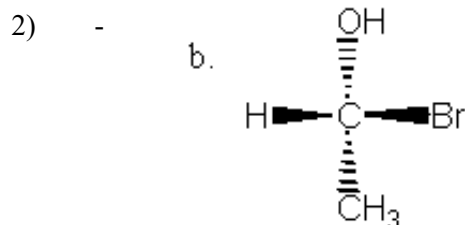
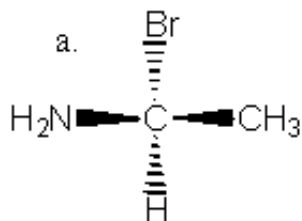


- 4)  d) None of the above

- 22) 22. The following isomer is or are S conformer

- 1)

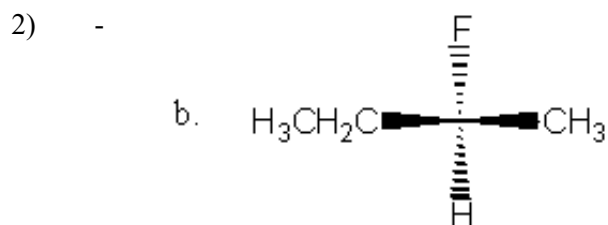
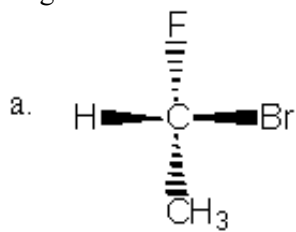




- 3) - c. a and b  
4) - d) None of the above

23) 23. The following isomer is or are R conformer

1)  +

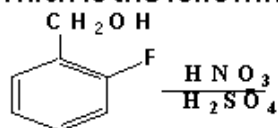


- 3) - c. a and b  
4) - d) None of the above

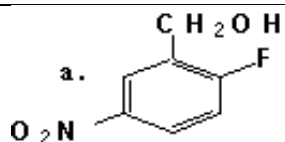
24) 24. Which of the following is an important reactive Electrophilic in aromatic ring nitration?

- 1)  + a) NO<sub>2</sub> (+)  
2) - b) NO (+)  
3) - c) N<sub>2</sub> (+)  
4) - d) None of the above

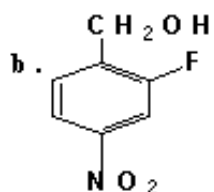
25) 25. Which is the following major product of the following?



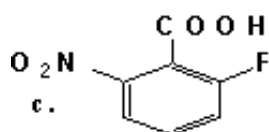
1) -



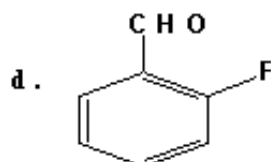
2)  +



3) -

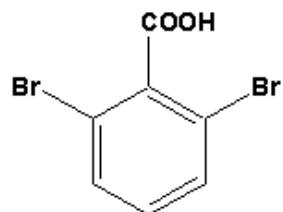


4) -



26)

26. What is the name of the following compound?



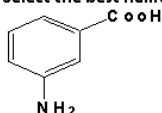
- 1) - (a) 1,3-dibromophenol  
2) - (b) 1,2-dibromobenzoic acid  
3)  + (c) 2,6-dibromo-benzoic acid  
4) - (d) m-dibromophenol

27)



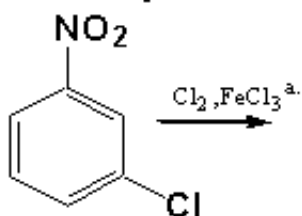


27. Select the best name for:



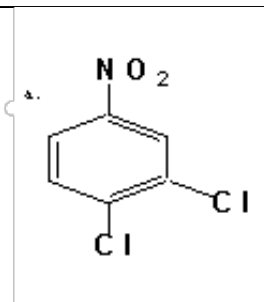
- 1)  (a) m-amino-benzoic acid  
2)  (b) o-chlorobenzaldehyde  
3)  (c) p-chlorobenzoate  
4)  (d) m-chlorosalicylic acid
- 28) 28. Which statement about phenol (PhOH) is incorrect?  
1)  a. React rapidly with electrophilic substitution  
2)  b. Donating group  
3)  c. Acidic in character  
4)  d. basic in character
- 29) Which of the following pairs represents enantiomers?  
1)  a. (R)-2-butanol and (S)-2-butanol  
2)  b. (E)-2-butene and (Z)-2-butene  
3)  c. Cis-1,2-dichloroethene and trans-1,2-dichloroethene  
4)  d. 2-pentanone and 3-pentanone
- 30) 30. The most product of the following?

**30. The most product of the following?**

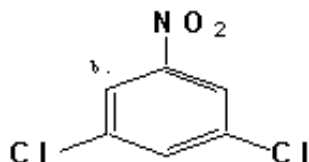


- 1)  -

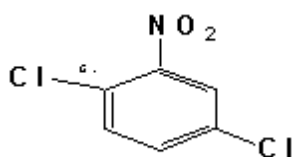




2) -



3) +



4) - d) None of the above

31) 31. What is Huckel's rule?

1) - (a)  $3n+2$

2) + (b)  $4n+2$

3) - (c)  $2n+2$

4) - (d)  $1n+2$

32) 32. Hydroxybenzene also called as:

1) - (a) Aniline

2) - (b) Benzyl alcohol

3) + (c) Phenol

4) - (d) Resorcinol

33) 33. Compounds which contain an  $-NH_2$  group in a side-chain attached to an aromatic ring are called:

1) + (a) Aniline

2) - (b) Aromatic phenol

3) - (c) Aromatic Amine

4) - (d) None of the above

34) 34. Give an answer in one word ,the uses of phenol

1) - (a) Pain Killers

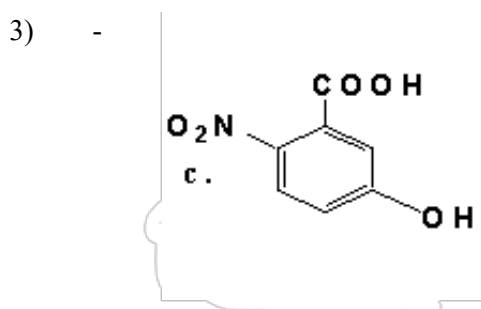
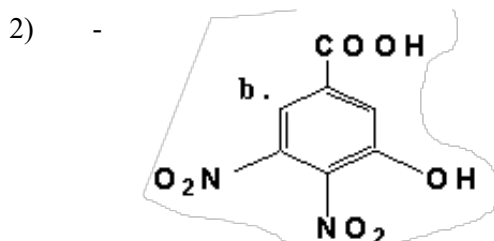
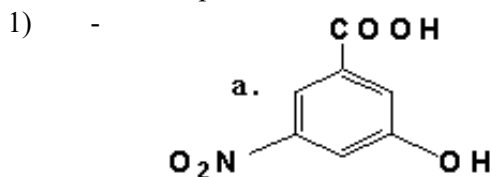
2) - (b) Insecticides

3) + (c) Antiseptic

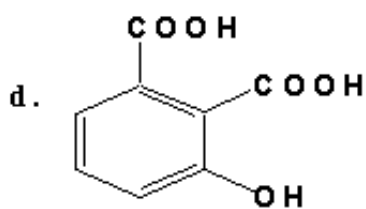
4) - (d) None of the above



- 35) 35. These (E+) symbol is denoted as:
- 1) - (a) Nucleophile
  - 2)  (b) Electrophile
  - 3) - (c) Both
  - 4) - (d) None of the above
- 36) 36. Aromatic characterization also called as:
- 1) - (a) Basicity
  - 2)  (b) Aromaticity
  - 3) - (c) Electricity
  - 4) - (d) None of the above
- 37) 37. Salicylic acid is the precursor to \_\_\_\_\_.
- 1)  (a) Aspirin
  - 2) - (b) Paracetamol
  - 3) - (c) None of these
  - 4) - (d) Amines
- 38) 38. Benzene structure are not drawn possible as:
- 1) - (a) Cyclic structure
  - 2)  (b) Straight -chain structure
  - 3) - (c) Kekule's structure
  - 4) - (d) None of the above
- 39) 39. Which compound is most acidic?

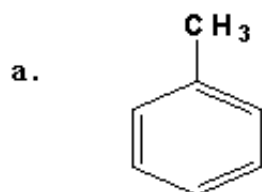




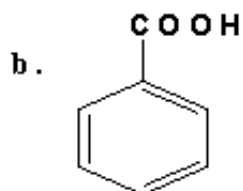


40) 40. Which compound is easily oxidized by cytochrome P450?

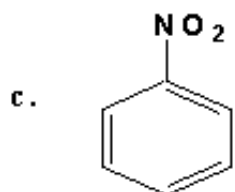
1)  +



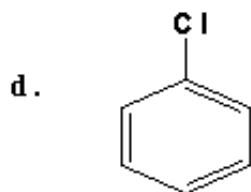
2) -



3) -



4) -



41) Which of the following is NOT a characteristic of aromatic compounds?

1) - a. Planarity

2)  + b. High reactivity in electrophilic substitution

3) - c. Delocalized  $\pi$  electrons

4) - d. Conjugated double bonds

42) Which of the following groups is a strong electron-donating group?

1) - a. -NO<sub>2</sub>



- 2) - b. -COOH  
3)  c. -OH  
4) - d. -CN
- 43) Which of the following reactions is an example of electrophilic aromatic substitution?  
1) - a. Hydration of an alkene  
2)  b. Nitration of benzene  
3) - c. Reduction of a ketone  
4) - d. Hydrolysis of an ester
- 44) Which of the following statements is true regarding electron-donating groups on aromatic rings?  
1) - a. They deactivate the ring towards electrophilic substitution.  
2) - b. They increase the electron density of the ring.  
3) - c. They make the ring more susceptible to electrophilic attack.  
4)  d. Both b and c.
- 45) Which of the following is a common electrophile used in electrophilic aromatic substitution reactions?  
1) - a. Water  
2) - b. Sodium hydroxide  
3)  c. Chlorine (Cl<sub>2</sub>) with FeCl<sub>3</sub>  
4) - d. Ammonia
- 46) Which of the following is an example of an electron-withdrawing group?  
1) - a. -OH  
2) - b. -NH<sub>2</sub>  
3)  c. -NO<sub>2</sub>  
4) - d. -OCH
- 47) Which of the following aromatic compounds is likely to undergo faster metabolism?  
1) - a. Benzene  
2)  b. Toluene (with a -CH<sub>3</sub> donating group)  
3) - c. Nitrobenzene (with a -NO<sub>2</sub> withdrawing group)  
4) - d. Chlorobenzene (with a -Cl withdrawing group)
- 48) Which aromatic compound is least reactive towards metabolic oxidation ?  
1) - a. Ethylbenzene (with a -C<sub>2</sub>H<sub>5</sub> donating group)  
2) - b. Benzene  
3)  c. Chlorobenzene (with a -Cl withdrawing group)  
4) - d. Anisole (with a -OCH<sub>3</sub> donating group)
- 49) Aromatic compounds with no substituents groups generally undergo which type of metabolic reaction?  
1) - a. Conjugation  
2) - b. Hydrolysis  
3) - c. Electrophilic substitution  
4)  d. Oxidation to form phenolic compounds
- 50) When an electron-withdrawing group (EWG) is attached to an aromatic ring, which position is typically favored for electrophilic substitution?  
1) - a. Ortho only  
2) - b. Para only  
3)  c. Meta only  
4) - d. Ortho and para
- 51) In the presence of group, such as -C≡N, where would you expect electrophilic substitution to occur on the ring?  
1) - a. Ortho  
2) - b. Para  
3)  c. Meta



- 4) - d. All positions equally
- 52) If an aromatic compound has an -OH group and a -COOH group, which position will most likely be substituted in an electrophilic substitution reaction?
- 1)  a. Ortho to the -OH
  - 2) - b. Meta to the -COOH
  - 3) - c. Para to the -OH
  - 4) - d. The substitution will be less favorable overall.
- 53) Which of the following statements is true regarding the orientation of electrophilic substitution in aromatic compounds?
- 1) - a. Electron-donating groups always direct substitution to the meta position.
  - 2) - b. Electron-withdrawing groups direct substitution to the ortho or para positions.
  - 3)  c. Electron-donating groups enhance the electron density at the ortho and para positions.
  - 4) - d. All substituents have the same directing effects on electrophilic substitution.
- 54) Which of the following statements is TRUE about Z and E isomers?
- 1) - a. They can only exist in cyclic compounds.
  - 2)  b. Z isomers have higher priority groups on the same side.
  - 3) - c. E isomers have lower molecular weights.
  - 4) - d. Both Z and E isomers are superimposable.
- 55) Which of the following compounds is likely to exhibit optical activity?
- 1) - a. 2-butene
  - 2) - b. Cis-1,2-dichloroethene
  - 3)  c. (R)-2-pentanol
  - 4) - d. (E)-2-butene
- 56) Which isomer of 1,2-dimethylcyclohexane is expected to have less steric strain?
- 1) - a. Cis
  - 2)  b. Trans
  - 3) - c. Both have the same steric strain
  - 4) - d. None of the above
- 57) Which of the following is a characteristic feature of trans-1,2-dimethylcyclohexane when drawn in a chair conformation?
- 1) - a. Both methyl groups are axial.
  - 2) - b. One methyl group is axial and the other is equatorial.
  - 3)  c. Both methyl groups are equatorial.
  - 4) - d. It cannot adopt a stable conformation.
- 58) Which of the following is an example of stereoisomers?
- 1) - a. Butane and isobutane
  - 2) - b. 1-butanol and 2-butanol
  - 3)  c. (R)-2-pentanol and (S)-2-pentanol
  - 4) - d. Ethylene and acetylene
- 59) Why are racemic mixtures often less effective than pure enantiomers in pharmacology?
- 1) - a. They are more expensive to produce.
  - 2)  b. They contain both active and inactive forms, decrease the therapeutic effect.
  - 3) - c. They are always more toxic.
  - 4) - d. They are less soluble in water.
- 60) why is stereochemistry is important in metabolism of drugs ?
- 1) - a. It affects the physical appearance of the drug.
  - 2)  b. Different stereoisomers can be metabolized at different rates
  - 3) - c. It has no effect on metabolism.
  - 4) - d. All stereoisomers are metabolized in the same way.

