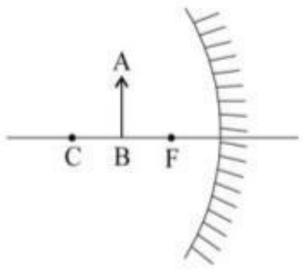
What is a virtual image?

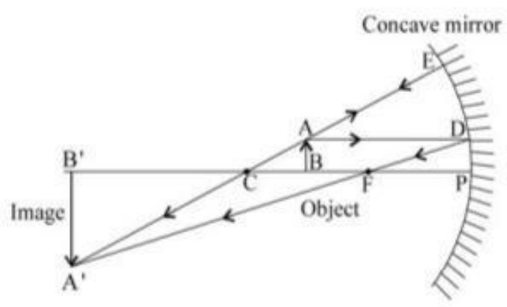
REFLECTION OF LIGHT BY DIFFERNT SURFACES

Continued from December 1st..

22. Draw the following diagram is your answer book and show the formation of image of the object AB with the help of suitable rays.

A.





23. What is the nature of image formed by a concave mirror if the magnification produced by the mirror is (a)+4 (b)-2? (As 1)

A. (a) If the magnification is positive (+4) the image is virtual and erect.

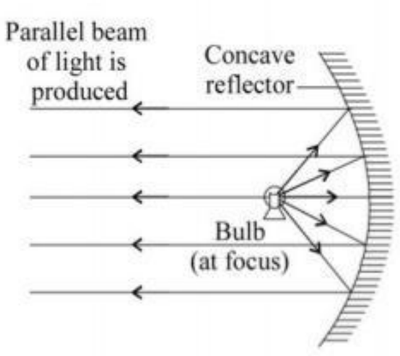
(b) If the magnification is negative (-2), the image is real and inverted.

24. An object is placed at a distance of 8 cm from a concave mirror of focal length 10 cm. Write the nature of image formed. (As 1)

A. The image formed will be virtual, erected and magnified.

25. Which mirror is used as a torch reflector ? Draw a labelled diagram to show how torch reflector can be used to produce a parallel beam of light. Where is the bulb placed In relation to the torch reflector ?

A. Concave mirror is used as a torch reflector. When a bulb is placed at the focus of a concave mirror, a parallel beam of light is produced.



26. Write the nature of image formed when the object is placed at a distance of 20 cm from a concave mirror of focal length 10cm. (As 1)

A. The image is real, inverted and of the same size.

27. State where an object must be placed so that the image formed by a concave mirror is (a) erect and virtual (b) at infinity (c) the same size as the object. (As 1)

A. (a) between pole and focus of the mirror (b) at focus (F) (c) at center of curvature(C).

28. Name a mirror that can give an erect and enlarged image of an object. (As 1)

A. Concave mirror can give an erect and enlarged image of an object.

29. The focal length of convex mirror is 16 cm. What is its radius of curvature? (As 1)

A. f = 16 cm

R = 2f = 2 × 16 = 32 cm.

30. Which mirror has wide field of view?(As 1)

A. A convex mirror has wider field of view, that's why they are used as view mirror in vehicles.

10th Class Special

31. What is the relation between focal length *(f)* and radius of curvature *(r)* ? (As 1)

A. The radius of curvature of a spherical mirror is twice to its focal length.

$\Rightarrow r = 2f$ (or) $f = \frac{2}{r}$

32. Which rays are called paraxial rays? (As 1)

A. The rays which are very nearer to the principal axis are called paraxial rays.

33. Write the mirror formula.

A. The mirror formula is $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

where : *f* = focal length ; u = object distance; v = image distance.

34. Which property of concave mirror is used by dentists? (As 7)

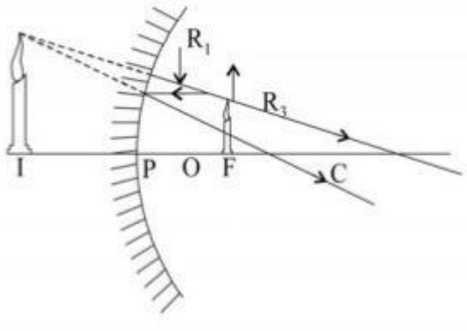
A. When a bulb is placed at the focus of a concave mirror light from the bulb gets reflected to produce a strong, parallel beam. By using this property, dentists are able to see the inner parts of the mouth clearly.

35. What is the principle used in solar heater / cooker? (As 1)

A. When light rays coming from far distances, (rays from sun) and incident on large concave mirrors, to concentrate at 'focus' on the principal axis, after reflection. This sun light converges on the substance and heats it.

36. Where should the object kept in front of a concave mirror to get virtual image? Draw the ray diagram. (As 1)

A. When the object is kept between P and F of a concave mirror, then a virtual image is formed behind the mirror.



37. What is a virtual image? (As 1)

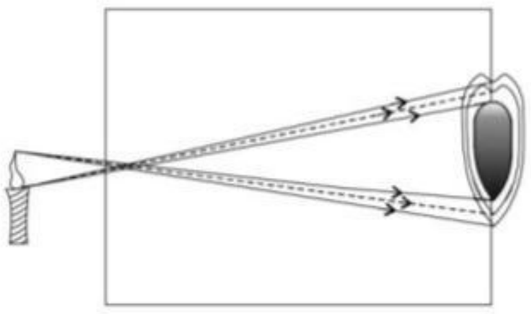
A. If the rays of light responsible for an image do not actually intersect, the image is called a virtual image. A virtual image cannot be formed on a screen.

38. What is a real image? (As 1)

A. An image formed by the actual intersection of light rays is called a real image. A real image can be formed on a screen.

39. What happens if the size of the hole of pin hole camera increased? Why? (As 2)

A. If the size of the hole of pinhole camera is increased, the image seems to be blurred.



Reasons:

(1) The light rays coming from the top of the object fall at different points on the screen.

(2) Similarly, the rays coming from bottom of the object also fall at different points on the screen.

(3) Thus, we get blurred image on the screen due to the big hole of the camera.

40. State Fermat's principle. (As 1)

A. Fermat's principle states that the light selects the path which takes the least time to travel. It is also applicable to reflection of light.

41. Why the angle of incidence is equal to angle of reflection ? (As 2)

A. When light gets reflected from a surface, according to Fermat's principle, it selects the path that takes the least time. That is why the angle of incidence is equal to the angle of reflection.

42. Which mirrors are used in saloons?(As 7)

A. Plane mirrors are used in saloons.

43. When does a ray reflect in the same path from a concave mirror? (As 1)

A. When it passes through centre of curvature.

44. What is magnification? (As 1)

A. The ratio of size of image to size of object is called magnification.

$$m = \frac{\text{Size of image (height)}}{\text{Size of object (height)}} \text{ (or) } = \frac{h_i}{h_o}$$

The ratio of image distance to object distance is called magnification.

$$m = \frac{\text{image distance}(v)}{\text{object distance}(u)} = -\frac{v}{u}$$

45. We wish to obtain an erect image of an object using a concave mirror of focal length of 15 cm. What should be range of distance of the object from the mirror? What is the nature of the image? Is the image larger or smaller than the object? (As 7)

A. The range of distance of object is between 0.

The image is virtual and erect.

The image is larger than the object.

OBJECTIVE TYPE QUESTIONS:

I. Choose the correct answer

1. If an object is placed at C on the principal axis in front of a concave mirror, the position of the image is (T.Q)( )

(A) at infinity (B) between F and C

(C) at C (D) beyond C

విజేత

For Feedback...
vijetha.nt@gmail.com

P. SRINIVAS
Physical Science
Faculty
Hyderabad
9700724464

2. We get a diminished image with a concave mirror when the object is placed.... (T.Q)( )

(A) at F

(B) between the pole and F

(C) at C

(D) beyond C

3. We get a virtual image in a concave mirror when the object is placed (T.Q)( )

(A) at F

(B) between the pole and F

(C) at C

(D) beyond C

4. Magnification m =.....(T.Q)( )

(A) $\frac{v}{u}$ (B) $\frac{u}{v}$

(C) $\frac{h_o}{h_i}$ (D) $\frac{h_i}{h_o}$

5. A ray which seems to be travelling through the focus of a convex mirror passes .....after reflection. (T.Q)( )

(A) parallel to the axis

(B) along the same path opposite direction

(C) through F

(D) through C

6. Size of image formed by a convex mirror is always (T.Q)( )

(A) enlarged

(B) diminished

(C) equal to the size of object

(D) Depends on position of object

7. An object is placed at a certain distance on the principal axis of a concave mirror. The image is formed at a distance of 30 cm from the mirror. Find the object distance if r = 15 cm. (T.Q)( )

(A) 15 cm (B) 20 cm

(C) 30 cm (D) 7.5 cm

8. All the distances related to spherical mirrors will be measured from ..... (T.Q)( )

(A) Object to image

(B) Focus of the mirror

(C) Pole of the mirror

(D) Image to object

OBJECTIVE TYPE QUESTIONS:

1. A	2. B	3. A	4. C
5. B	6. B	7. C	8. C

The reactivity of alcohols is..

ALCOHOLS

Continued from 29th November..

11. Compound A reacts with Na metal to give B. A also reacts with PCl_5 to give C. B and C reacts with each other to give dimethyl ether. Then A, B and C respectively are

1) CH_3OH, CH_3ONa, CH_3COCl
2) CH_3OH, CH_4, CH_3Cl
3) CH_3OH, CH_3ONa, CH_3Cl
4) CH_3Cl, CH_4, CH_3OH

12. Two organic compounds A and B react with sodium metal and release H_2 gas. A and B react with each other to give ethyl acetate. The A and B are

1) CH_3COOH and C_2H_5OH
2) $HCOOH$ and C_2H_5OH
2) CH_3COOH and CH_3OH
4) CH_3COOH and $HCOOH$

13. Which one of the following reagents is useful in converting 1-butanol to 1-bromobutane?

1) $CHBr_3$ 2) Br_2 3) CH_3Br 4) PBr_3

14. Which of the following are the starting materials for the Grignard's synthesis of t-butanol?

1) $CH_3MgBr + CH_3COCH_3$
2) $CH_3CH_2MgBr + CH_3COCH_3$
3) $CH_3MgBr + CH_3CHOHCH_3$
4) $CH_3MgBr + (CH_3)_3CH$

15. Ethanol when reacted with PCl_5 gave A, $POCl_3$ and HCl. A reacts with silver nitrate to form B (major product) and $AgCl$. A and B are respectively

1) $C_2H_5Cl, C_2H_5OC_2H_5$ 2) $C_2H_6, C_2H_5OC_2H_5$
3) C_2H_5Cl, C_2H_5ONO 4) C_2H_6, C_2H_5ONO

16. The order of reactivity of alcohols towards Na or K metal is

1. Primary > Secondary > Tertiary
2. Primary < Secondary < Tertiary
3. Primary < Secondary > Tertiary
4. Primary > Secondary < Tertiary

17. The order of reactivity of dehydration of alcohol is

1. $1^0 > 2^0 > 3^0$ 2. $1^0 > 2^0 < 3^0$
3. $1^0 < 2^0 > 3^0$ 4. $1^0 < 2^0 < 3^0$

18. The dehydration of 1-butanol gives

1. 1-butene as the main product
2. 2-butene as the main product
3. equal amounts of 1-butene and 2-butene
4. 2- methylpropene

19. In the esterification reaction, the correct order of reactivity of alcohols is

1. $CH_3OH > CH_3CH_2OH > (CH_3)_2CHOH$
2. $CH_3OH > (CH_3)_2CHOH > CH_3CH_2OH$
3. $CH_3CH_2OH > (CH_3)_2CHOH > CH_3OH$
4. $(CH_3)_2CHOH > CH_3OH_2OH > CH_3OH$

20. The alcohol which gives the most stable carbonium ion on dehydration is:

1) $(CH_3)_2CHCH_2OH$ 2) $(CH_3)_3C-OH$
3) $CH_3CH_2CH_2CH_2OH$ 4) $CH_3-CH-CH_2CH_3$

21. Which of the following reactions will yield propan-2-ol?

1) $CH_2=CH-CH_3+HOH \xrightarrow{H^+}$
2) $CH_3-CHO \xrightarrow{CH_3MgBr/HOH}$
3) $CH_2O \xrightarrow{C_2H_5MgI/HOH}$
4) $CH_2=CH-CH_3 \xrightarrow{Neutral\ KMnO_4}$

LEVEL II A KEY

11) 1 12) 4 13) 1 14) 3
15) 4 16) 3 17) 3 18) 2 19) 3 20) 1

LEVEL II B

1. 2-Methylpentanol-1 is a

1) 1^0 alcohol 2) 2^0 alcohol
3) 3^0 alcohol 4) enol

2. Primary alcohol cannot be prepared by the reduction of

1) aldehyde 2) acid 3) ketone 4) ester

3. The two enzymes present in yeast that are responsible for the formation of ethylalcohol from molasses in the fermentation process are

1) Invertase, zymase 2) Invertase, diastase
3) Zymase, diastase 4) Invertase, maltase

4. An organic compound 'A' containing C,H and O has a pleasant odour with boiling point 78°C. On boiling 'A' with conc H_2SO_4, a colourless gas is released. The organic liquid 'A' is:

1) C_2H_5Cl 2) $C_2H_5COOCH_3$
3) C_2H_5OH 4) C_2H_6

5. When equal weights of methyl alcohol and ethyl alcohol react with excess of sodium metal, the volume of H_2 liberated is more in the case of

1) C_2H_5OH 2) CH_3OH
3) Equal in both 4) H_2 is not liberated

6. Which one of the following gases is liberated when ethyl alcohol is heated with methyl magnesium iodide ?

1) Methane 2) Ethane
3) Carbondioxide 4) Propane

7. Which one of the following alcohols is expected to have the lowest pK_a value ?

1) Ethanol 2) 2-Fluoro ethanol
3) 2,2,2-Trifluoroethanol 4) 2-Chloroethanol

8. $R-OH+HX \rightarrow R-X+H_2O$. In this reaction, the reactivity of alcohols is

1) Tertiary > Secondary > Primary
2) Tertiary < Secondary < Primary
3) Tertiary > Primary > Secondary
4) Secondary > Primary > Tertiary

9. $(CH_3)_2CHOH \xrightarrow{mild\ oxidation} X \xrightarrow[H_2O]{(i)\ CH_3MgBr} Y$

Here 'Y' is

1) Iso butyl alcohol 2) Iso butylene
3) sec.Butyl alcohol 4) tert.Butyl alcohol

10. Haloform reaction is not given by

1) CH_3COCH_3 2) $CH_3COC_2H_5$
3) $C_6H_5COC_2H_5$ 4) $CH_3CHOHCH_3$

11. What is the final product obtained when chlorine reacts with ethyl alcohol in KOH?

1) $CHCl_3$ 2) CCl_3CHO 3) CH_3Cl 4) none

12. $C_2H_5OH \xrightarrow{KMnO_4/H^\oplus} X \xrightarrow[H_2SO_4]{Y}$ $CH_3COOC_2H_5$, X and Y respectively are

1) $CH_3OH; C_2H_5OH$ 2) $CH_3CHO; CH_3OH$
3) $CH_2=CH_2; CH_3COOH$ 4) $CH_3COOH; C_2H_5OH$

13. $R-OH+HX \rightarrow R-X+H_2O$. In this reaction, the reactivity of alcohols is

1) Tertiary > Secondary > Primary
2) Tertiary < Secondary < Primary
3) Tertiary > Primary > Secondary
4) Secondary > Primary > Tertiary

14. Match the following lists

List - I	List - II
A) Ethlene	1) Natalite
B) Acetylene	2) Preservative
C) Ethanol	3) Hawker's lamp
D) Diethyl ether	4) Drug
	5) Polvethvlene

Correct match is :

	A	B	C	D		A	B	C	D
1)	3	2	1	5	2)	5	1	2	3
3)	5	3	2	1	4)	5	1	4	2

15. 3 moles of ethanol react with one mole of phosphorous tribromide to form 3 moles of bromo ethane and one mole of X. Which of the following is "X"

1) H_3PO_4 2) H_3PO_2 3) HPO_3 4) H_3PO_3

16. Which of the following is most suitable method for removing the traces of water from ethanol ?

1) Heating with Na metal
2) Passing dry HCl through it
3) Distilling it with CaO 4) Reacting with Mg

17. Which of the following compound gives ethylmethyl ketone on oxidation ?

1) Propan -2-ol 2) Butan -1-ol
3) Butan - 2-ol 4) 2-methylbutan-2-ol

18. In CH_3CH_2OH, the bond that undergoes heterolytic cleavage most readily in reaction with 'Na' is

1) $C-C$ 2) $O-H$ 3) $C-H$ 4) $C-O$

19. What are X and Y in the reaction

$C_2H_4+H_2SO_4 \xrightarrow{80^0C} X \xrightarrow{H_2O/\Delta} Y$

1) C_2H_6, C_2H_5OH 2) C_2H_2, C_2H_5SH
3) $C_2H_5OSO_3H, C_2H_5OH$ 4) C_2H_2, CH_3CHO

20. Which one of the following contains $C_{SP^2}-OH$ bond ?

1) vinyl alcohol 2) allyl alcohol
3) benzyl alcohol 4) carbolic acid

LEVEL II B KEY

1) 1 2) 3 3) 1 4) 3 5) 2 6) 1 7) 3
8) 1 9) 4 10) 3 11) 1 12) 4 13) 1 14) 3
15) 4 16) 3 17) 3 18) 2 19) 3 20) 1

BIOMOLECULES

Carbohydrates: Initially carbohydrates were considered as hydrates of carbon as most of them have general formulae $C_n(H_2O)_m$

Eg: **Glucose :** $C_6H_{12}O_6$ or $C_6(H_2O)_6$,

Sucrose : $C_{12}H_{22}O_{11}$ or $C_{12}(H_2O)_{11}$.

But all the compounds with formula $C_n(H_2O)_m$ are not necessarily carbohydrates.

eg: Formaldehyde : $HCHO$ or $C(H_2O)$; Acetic acid : CH_3COOH or $C_2(H_2O)_2$.

A few carbohydrates may not have the formula $C_n(H_2O)_m$. eg : Rhamnose, $C_6H_{12}O_5$.

- They can be better described as optically active polyhydroxy aldehydes (or) ketones (or) the compounds which yield them on hydrolysis.
- Most of them are similar to sugar in taste, and hence they are also known as Saccharides. (Latin word for sugar is saccharum)

Classification of carbohydrates: The carbohydrates are divided into 3 major classes based on hydrolysis.

JEE MAIN Special

Monosaccharides(Simple Sugars): These cannot be further hydrolysed to simpler molecules.

Ex: Erythrose, Threose, Glucose, fructose, ribose etc..

- There are about 20 monosaccharides occur in nature.
- Their general formula is $(CH_2O)_n$ where $n=3-7$.
- Depending upon the total number of carbon atoms in monosacharides and on nature of functional groups present (aldehyde or ketone), the terms for their classification are as follows:

NO.OF CARBON ATOMS	GENERAL TERM	ALDOSE	KETOSE
3	Triose	Aldotriose	Keto triose
4	Tetrose	Aldotetrose	Keto tetrose
5	Pentose	Aldopentose	Keto pentose
6	Hexose	Aldohexose	Keto hexose
7	Heptose	Aldoheptose	Keto heptose
8	Octose	Aldooctose	Keto octose

Oligosaccharides: These undergo hydrolysis and yield 2 to 10 monosaccharide units.

Disaccharide: A disaccharide on hydrolysis gives 2 monosaccharide units of same or different kind. Ex:- Sucrose, Maltose and Lactose

$C_{12}H_{22}O_{11}+H_2O \xrightarrow{H^+} C_6H_{12}O_6 + C_6H_{12}O_6$

Sucrose Glucose Fructose

- A trisaccharide on hydrolysis gives 3 monosaccharide units.

Example: Raffinose on hydrolysis gives Glucose, Fructose and Galactose.

Polysaccharides: These undergo hydrolysis and give more than 10 monosaccharide units.

Example: Starch, cellulose, glycogen, dextrin, Gums.General fomula $(C_6H_{10}O_5)_n$

$(C_6H_{10}O_5)_n + nH_2O \xrightarrow[393k]{H^+/2-3\ atm} n\,C_6H_{12}O_6$

Sugars and Non Sugars: Both monosaccharides and oligosaccharide are crystalline solids,soluble in water and sweet in taste. These are colletively known as **sugars**.

- Polysaccharides are amorphous,sparingly soluble in water and taste less and are known as **non-sugars**.

For Feedback...
vijetha.nt@gmail.com

Dr. Krupakar Pendli
Centre Head
Urbane junior colleges
7893774888

- The Carbohydrates are also classified as either reducing or non-reducing sugars.

  Reducing and Non Reducing Sugars: The saccharides, that reduce Fehling's reagent, Tollen's reagent, are called as **reducing sugars**.
- They form silver mirror with Tollens' reagent and give red precipitate with Fehling's solution.
- All monosaccharides, whether aldose(or) ketose, are reducing sugars.
- **All reducing sugars exhibit mutarotation.**

  ex:- Glucose , fructose, triose, tetroses, pentoses & Hexoes

  All Disaccharides are Redcing sugars except sucrose

  ex :- maltose, lactose
- The Saccharides, which do not reduce Fehling's reagent and Tollen's reagent, are called **non-reducing sugars**.
- All polysaccharides are non redcing sugars

  ex:- starch ,celluose , glycogen ,dextrin

Class	Molecular	Structural formula	n No.of Chiral Carbons	2^n No.of Optional Isomers	Examples Aldose
Aldotrioses	$C_3H_6O_3$	$CH_2OH.CHOH.CHO$	1	2	Glyceraldehyde
Aldotetroses	$C_4H_8O_4$	$CH_2OH.(CHOH)_2.CHO$	2	4	Erythose, threose
Aldopentoses	$C_5H_{10}O_5$	$CH_2OH.(CHOH)_3.CHO$	3	8	Arabinose, ribose, xylose, lyxose
Aldohexoses	$C_6H_{12}O_6$	$CH_2OH.(CHOH)_4.CHO$	4	16	Glucose, mannose, galactose, glucose, talose, idose, allose, altrose
Ketoses					
Ketotrioses	$C_3H_6O_3$	$CH_2OH.CO.CH_2OH$	-	-	Dihydroxyacetone
Ketotetroses	$C_4H_8O_4$	$CH_2OH.CO.CHOH.CH_2OH$	1	2	Erytrulose
Ketopentoses	$C_5H_{10}O_5$	$CH_2OH.CO.(CHOH)_2.CH_2OH$	2	4	Ribulose, xylulose
Ketohexoses	$C_6H_{12}O_6$	$CH_2OH.CO.(CHOH)_3.CH_2OH$	3	8	Fructose, sorbose, tagatose etc.

- Non reducing sugars do not exhibit mutarotation and does not form osazone.
- In disaccharides depending upon the position of linkages between monosaccharide units, the resulting disaccharide may be reducing (or) non reducing.

  The stereo chemistry of all sugars is determined with respect to D- or L-Glyceraldehyde.

  Sugars can be classified into D- and L- forms basing on their configuration.
- The enantiomer whcih rotates the monochromatic light to right is written as (+) or 'd' and the other which rotates the monochromatic light to the left is written as (–) or '*l*'
- The direction of the rotation of monochromatic light can be denoted by (+) or (–), but cannot indicate the arrangement of –OH and –H around chiral carbon atom.
- Rosanoff proposed a system to designate the stereo chemistry of carbohydrates by considering the simplest sugar, glyceraldehyde as standard.
- The sugars having the same configuration as D–glyceraldehyde at the least prioarity chiral carbon adjacent to primary alcoholic group $(-CH_2OH)$ are called D–sugars and having the configuration as L–glyceraldehyde are called L–sugars.
- Practically D–sugars may be D–(+) or D–(–) and L–sugars may be L–(+) L–(–). The symbol (+) or 'd' is used for dextro and (–) or '*l*' is used for laevo rotatory compound.
- It is observed that natural glucose, ribose and fructorse are D–form.