NUCLEON CHEMISTRY

CLASSS FOR IIT-JEE

PT for
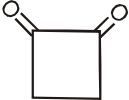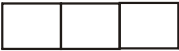Target IIT-JEE 2016
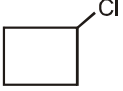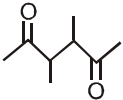
Time : 1 hr   **Marks : 120**

Atomic masses : [H = 1, D = 2, Li = 7, C = 12, N = 14, O = 16, F = 19, Na = 23, Mg = 24, Al = 27, Si = 28, P = 31, S = 32, Cl = 35.5, K = 39, Ca = 40, Cr = 52, Mn = 55, Fe = 56, Cu = 63.5, Zn = 65, As = 75, Br = 80, Ag = 108, I = 127, Ba = 137, Hg = 200, Pb = 207]

SCQ (30) [4 , –1]

1. Which of the following compounds would yield more then one monochloro products on photochemical chlorination
(A) Neopentane
(B) Hexamethylcyclohexane
(C) Hexamethylbenzene
(D) Hexamethylcyclopropane

2. Only one mole of compound P is obtained by reductive ozonolysis of Q. Q on catalylic hydrogenation formed R. R on monochlorination produced only one product 'S'. All compounds P,Q,R,S have same number of carbon atoms. Choose the correct option.

	P	Q	R	S
A	$(CH_3)_2C{=}O$	$(CH_3)_2C{=}C(CH_3)_2$	$(CH_3)_2CH{-}CH(CH_3)_2$	$(CH_3)_2C{-}CH(CH_3)_2$ with Cl
B	(structure)	(structure)	(structure)	(structure with Cl)
C	$O{=}$ — ${=}O$	(structure)	(structure)	(structure with Cl)
D	(structure)	(structure)	(structure)	(structure with Cl)

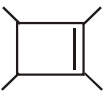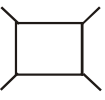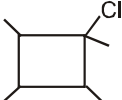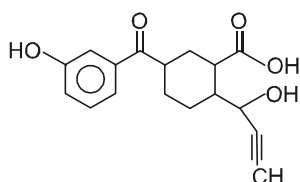**3.** Which one of the following will not give white precipitate with ammonical silver nitrate solution

(A) $CH_3 - C \equiv C - CH_3$

(B) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - C \equiv C - CH_3$

(C) $CH_3 - CH_2 - CH = CH_2$

(D) All of these

4. A set of reagents (1 to 7) are different sampls, seperately reacted with the following compound

1. $NaHCO_3$ 2. 2, 4, DNP   3. Na metal
4. $AgNO_3 + NH_4OH$ 5. Fehling's solution   6. $Cu_2Cl_2 + NH_4OH$
7. Br_2 / H_2O

The reagents which give positive test with the given compound are :
(A) 1, 2, 3, 4, 5   (B) 3, 4, 5, 6, 7   (C) 1, 2, 3, 4, 7   (D) 1,2,3,4,6,7

Physical & Inorganic By
NV Sir
B.Tech. IIT Delhi

A-479 Indra vihar, kota
Ph. - 9982433693 (NV Sir) 9462729791(VKP Sir)

Organic Chemistry By
VKP Sir
M.Sc. IT-BHU

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5. Which of the following conformations have zero dipolemoment :

(A) Newman projection with OH top, H's, OH bottom
(B) Newman projection with Cl top, H's, Cl bottom
(C) Newman projection with CH_3 top, H's, Cl bottom
(D) Newman projection with Cl top, H's, Br bottom

6. In the following reaction

$$\xrightarrow[\text{(ii) Zn , H}_2\text{O}]{\text{(i) O}_3} X \xrightarrow[\text{excess}]{\text{NH}_2\text{OH/ }\Delta} Y$$
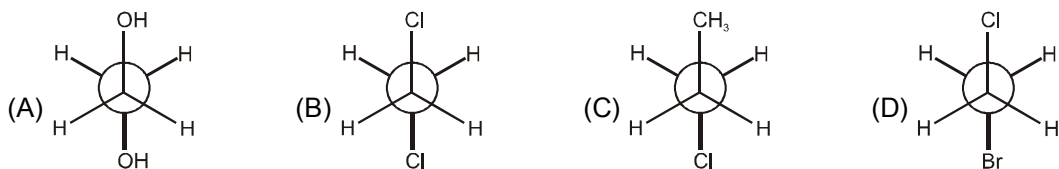
The number of stereoisomers of Y and number of optically active stereoisomers of Y formed respectively are.

(A) 3, 0   (B) 8, 8   (C) 4, 2   (D) 6, 4

7.
$$Ph - CH_2 - \underset{\underset{CH_3}{|}}{CH} - CH_3 \xrightarrow[h\nu]{Cl_2} \text{No. of monochloro Products 'm' (total isomers)} \xrightarrow{\text{Fractional Distillation}} \text{No. of Fractions 'n'}$$

value of 'm' and 'n' respectively

(A) 6, 5   (B) 6, 4   (C) 6, 6   (D) 5, 3

8. How many stereoisomers are possible for $C[CH(OH)CH_3]_4$:

(A) 8   (B) 6   (C) 5   (D) 4

9.

Column – I	Column – II
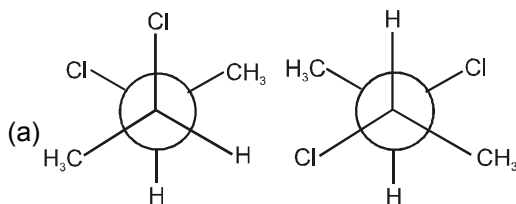
(a)   (p) Stereoisomers
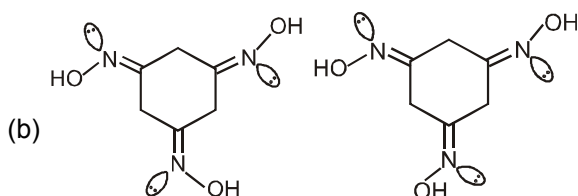
(b)   (q) Identical
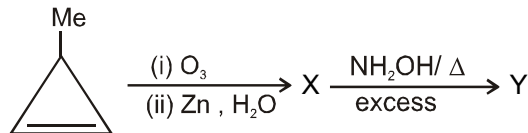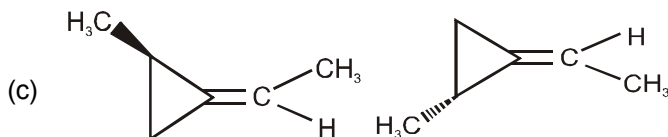
(c)   (r) Diastereomers
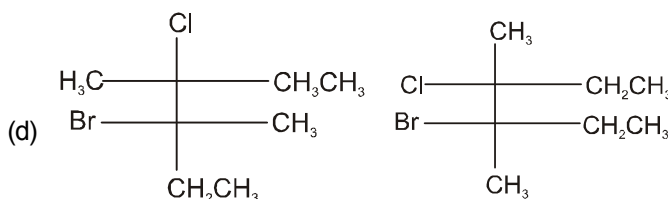
(d)   (s) Geometrical isomers

(A) (a) – p,r , (b) – p,r,s (c) – q (d) – p
(B) (a) – p,r , (b) – p,r (c) – p (d) – q
(C) (a) – p,q , (b) – r,s (c) – p (d) – p
(D) (a) – r , (b) – p (c) – q (d) – s

Physical & Inorganic By
NV Sir
B.Tech. IIT Delhi

A-479 Indra vihar, kota
Ph. - 9982433693 (NV Sir) 9462729791(VKP Sir)

Organic Chemistry By
VKP Sir
M.Sc. IT-BHU

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10. Which will not perform iodoform reaction with I_2/OH^-?
   (A) $CH_3COCH_2CH_3$ (B) CH_3CONH_2 (C) $C_6H_5COCH_3$ (D) CH_3CHO

11. Compound (X) (C_3H_2DCl) rotates plane polarized light towards right hand side. It does not give red precipitate with Cu_2Cl_2/NH_4OH. (X) can be

   (A) $H–C\equiv C—CHDCl$ (B)

       (C) $CHD=C=CHCl$ (D) $CH_2=C=CDCl$

12. 2D, 3L, 4D, 5D, 6-Pentahydroxy hexanal can give.
   (x) Tollen's Test   (y) Lucas Test   (z) 2, 4-DNP Test
   (w) Baeyer's Test   (s) $FeCl_3$ Test
   (A) x, y, z, s   (B) x, y, z, w, s   (C) x, y, z   (D) x, y, z, w

13. The ozonolysis reaction of the given compound gives two products in the ratio :

   (A) 6 : 3 : 1   (B) 9 : 3 : 1   (C) 6 : 4   (D) 8 : 4

14. The number of stereoisomers and number of meso compounds possible for the given structural formula

   $$CH_3 – \underset{\underset{Ph}{|}}{CH} – HC = CH – \underset{\underset{Ph}{|}}{CH} – CH_3 \text{ is:}$$

   (A) 6, 2   (B) 4, 2   (C) 6, 3   (D) 4, 1

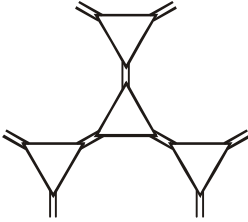15. Which statement is correct.
   (A) Most stable conformational isomer of $HOCH_2CH_2OH$ is Gauche.
   (B) All conformational isomers of n-butane are degenerate.
   (C) Conformational energy of ethane is more than that of n-butane.
   (D) Most stable conformational isomer of n-butane is Gauche.

16. The abundance of three isotopes of oxygen are as follows
   % of O^{16} = 90%
   % of O^{17} + % of O^{18} = 10%
   Assume at. mass same as mass no. Find out % of O^{17} , if the isotopic mass is 16.12.
   (A) 2   (B) 4   (C) 8   (D) 16

17. A given sample of pure compound contains 9.81 gm of Zn, 1.8×10^{23} atoms of chromium and 0.60 mol of oxygen atoms. What is the simplest formula.
   (A) $ZnCr_2O_7$ (B) $ZnCr_2O_4$ (C) $ZnCrO_4$ (D) $ZnCrO_6$

18. A drug marijuna owes its activity to tetrahydrocarbinol, which contains 70% as many C atoms as H atoms and 15 times as many hydrogen atoms as oxygen atoms. The number of mole in a gm of it is 0.00318. The molecular formula will be
   (A) $C_{20}H_{30}O_2$ (B) $C_{21}H_{30}O_2$ (C) $C_{12}H_{20}O_2$ (D) $C_{12}H_{20}O_3$

19. A mixture of NH_4NO_3 & $(NH_4)_2HPO_4$ showed the mass percent of nitrogen to be 30.40%. The mass ratio of the two components in the mixture will be
   (A) 2 : 1   (B) 1 : 2   (C) 1 : 3   (D) 3 : 1

Physical & Inorganic By
NV Sir
B.Tech. IIT Delhi

A-479 Indra vihar, kota
Ph. - 9982433693 (NV Sir) 9462729791(VKP Sir)

Organic Chemistry By
VKP Sir
M.Sc. IT-BHU

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20. 5 moles of A, 6 moles of Z and mixed with sufficient amount of C to produce final produced 'F'. Then find the maximum moles of 'F' which can be produced. Assuming that the product formed can also be reused. Reactions are

$$A + 2Z \longrightarrow B$$
$$B + C \longrightarrow Z + F$$

(A) 3 moles   (B) 4.5 moles   (C) 5 moles   (D) 6 moles

21. A sample of H_2SO_4 (density 1.787 g mL^{-1}) is labelled as 86% by weight. What volume of acid has to be used to make 1 litre of 0.2 M H_2SO_4 ?

(A) 25.5 mℓ (B) 51 ml   (C) 12.75 mℓ (D) 102 ml

22. What would be the molality of a solution obtained by mixing equal volumes of 30% by weight H_2SO_4 (d = 1.218 g mL^{-1}) and 70% by weight H_2SO_4 (d = 1.610 g mL^{-1}) ?

(A) 11.22   (B) 22.44   (C) 5.61   (D) 2.805

23. In an evacuated closed isolated chamber at 250° C, 0.02 mole PCl_5 and .01 mole Cl_2 are mixed ($PCl_5 \rightleftharpoons PCl_3 + Cl_2$). At equilibrium density of mixture was 2.48 g/L and pressure was 1 atm. The number of total moles at equilibrium will be approximately

(A) 0.012   (B) 0.022   (C) 0.032   (D) 0.045

24. In the reaction $A_2(g) + 4B_2(g) \rightleftharpoons 2AB_4(g)$, $\Delta H > 0$. The decomposition of $AB_4(g)$ will be favoured at
(A) low temperature and hight pressure   (B) high temperature and low pressure
(C) low temperature and low perssure   (D) high temperature and high pressure

25. In which of the following reactions, the system will shift towards the forward reaction by adding inert gas at constant pressure?
(A) $PCl_5(g) \rightleftharpoons PCl_5(g) + Cl_2(g)$ (B) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
(C) $CO(g) + Cl_2(g) \rightleftharpoons COCl_2(g)$ (D) $CO(g) + 2H_2(g) \rightleftharpoons CH_3OH(g)$

26. The equilibrium constant K_p for the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ at 497°C is found to be 636 mm Hg. If the pressure of the gas mixture is 182 mm, calculate the percentage dissociation of N_2O_4. At what pressure will it be half dissociated?
(A) 477 mm   (B) 277 mm   (C) 877 mm   (D) 1477 mm

27. At some temperature and under a pressure of 4 atm, PCl_5 is 10% dissociated. Calculated the pressure at which PCl_5 will be 20% dissociated temperature remaining same.
(A) 0.96 atm   (B) 1.96 atm   (C) 3.96 atm   (D) 5.96 atm

28. Some solid NH_4HS is placed in flask containing 0.5 atm of NH_3. What would be the pressure of H_2S when equilibrium is reached.

$$NH_4HS(g) \rightleftharpoons NH_3(g) + H_2S(g) ; \quad K_p = 0.11$$

(A) 1.1653 atm   (B) 0.1653 atm   (C) 3.1653 atm   (D) 5.1653 atm

29. Vapour density of PCl_5 is 104.16 but when heated to 230°C its vapour density is reduced to 62. The degree of dissociation of PCl_5 at this temperature will be :
(A) 6.8%   (B) 68%   (C) 46%   (D) 64%

30. For the reaction, $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$ the amount of CaO after attainment of equilibrium can be increased by –
(A) adding some $CaCO_3(s)$ (B) removing some $CaCO_3(s)$
(C) adding some lime water   (D) decreasing the temperature

ANSWER KEY

1.	(B)	2.	**(C)**	3.	(D)	4.	(D)	5.	(B)	6.	(C)	7.	(D)
8.	(C)	9.	(A)	10.	(B)	11.	(C)	12.	(C)	13.	(C)	14.	(A)
15.	(A)	16.	(C)	17.	(B)	18.	(B)	19.	(A)	20.	(C)	21.	(C)
22.	(A)	23.	(D)	24.	(C)	25.	(A)	26.	(A)	27.	(A)	28.	(B)
29.	(B)	30.	(C)										

Physical & Inorganic By
NV Sir
B.Tech. IIT Delhi

A-479 Indra vihar, kota
Ph. - 9982433693 (NV Sir) 9462729791(VKP Sir)

Organic Chemistry By
VKP Sir
M.Sc. IT-BHU

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