

1. Find total number of electrons in p – orbitals of vanadium ($Z = 23$)

Ans: (12)

Sol: $23V = 1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$

2. Identify the correct sequence of hybridization of following species NH_4^+ , NO_2^+ , SF_4 , IF_5

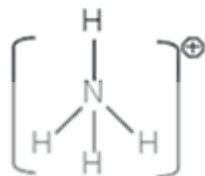
(1) sp^3, sp, sp^3d, sp^3d^2

(2) sp, sp^2, sp^3, sp^3d

(3) sp^3, sp, sp^3d, sp^3d

(4) $sp^3, sp^2, sp^3d, sp^3d^2$

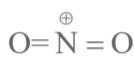
Ans: (1)



Sol: NH_4^+

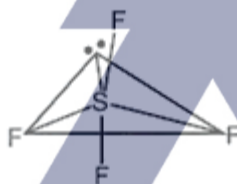
sp^3

NO_2^+



sp

SF_4



sp^3d

IF_5



sp^3d^2

3. Identify the incorrect statement regarding Mendeleev.

(1) He is the writer of chemistry book. i.e. , ‘principles of chemistry’

(2) Mendeleev developed accurate barometer.

(3) Atomic number 101 element named after Mendeleev

(4) Mendeleev developed accurate barometer.

Ans: (2)

Sol:

4. Identify the correct set which is paramagnetic and coloured.

(1) Cu^{2+}, Sc^+, Cr^{3+}

(2) $Mn^{7+}, Cr^{3+}, Hg^{2+}$

(3) Cu^+, Sc^{3+}, Co^+

(4) Mn^+, Cu^+, Cr^{3+}

Ans: (1)

Sol: Ion

No. of unpaired e^-

Cu^{2+}

1

Sc^+ 2

Cr^{3+} 3

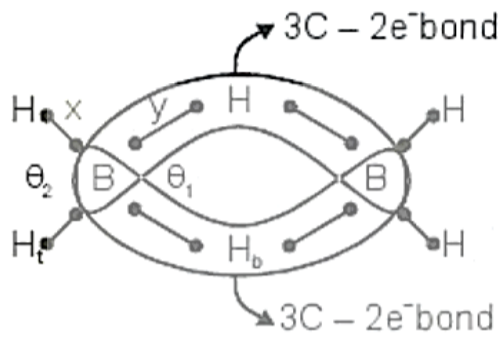
This set is "paramagnetic & coloured"

5. Identify the correct statement regarding diborane (B_2H_6)

- (1) Hybridisation of boron is sp^2 (2) It contains one 3 center -2 electron bond.
(3) It is a planar molecule (4) $NaBH_4$ on oxidation with I_2 gives B_2H_6

Ans: 4

Sol: $2NaBH_4I_2 \xrightarrow{\text{ether}} B_2H_6 + 2NaI + H_2 \uparrow$



6. K_p for the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ at 288 K is 47.9, then value of K_c is-

[Report your answer to nearest integer]

[Given $R=0.083$ bar lit/mole K]

Ans: 2

Sol: $K_p = K_c (RT)^{\Delta n_g}$

$$47.9 = K_c (0.083 \times 288)^1$$

$$K_c = 2$$

7. How many total number of unpaired electrons are present in $[Co(NH_3)_6]Cl_2$ and $[Co(NH_3)_6]Cl_3$

Ans: 1

Sol: Complex

(i) $[Co(NH_3)_6]Cl_2 \Rightarrow Co^{2+} = 3d^7$ unpaired electron=1

(ii) $[Co(NH_3)_6]Cl_3 \rightarrow Co^{3+} = 3d^6$ unpaired electron=0

Total unpaired electrons=1

8. Isotopes of hydrogen which emits low energy β^- particle with half life greater than 12 year is:

- (1) Tritium and Deuterium (2) Deuterium
(3) Tritium (4) Protium

Ans:

Sol: Only tritium is radioactive and emits low energy β particles ($t_{1/2}, 12.33$ years)

9. The concentration of glucose ($C_6H_{12}O_6$) in blood is 0.72 gram/lit, the molarity of glucose is $[x] \times 10^{-3} M$, then value of x is

Ans: 4

Sol:

10. 0.05 M solution of which compound have lowest freezing point

- (1) K_2SO_4 (2) KI (3) $C_6H_{12}O_6$ (4) $Al_4(SO_4)_3$

Ans: 4

Sol: $\Delta T_f = iK_f m$

Greater the i value lower will be freezing point

11. N_2O_5 dissociate according to 1st order kinetic as $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$. Kinetics initial concentration of N_2O_5 is $2.4 \times 10^{-2} M$ and concentration of N_2O_5 after 1 hour is $1.6 \times 10^{-2} M$, then the rate constant k in min^{-1} for this dissociation is $[x] \times 10^{-5} \text{min}^{-1}$, then x is.

Ans: 346

Sol: $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$

Initial $2.4 \times 10^{-2} M$

After 1 hour $1.6 \times 10^{-2} M$

$$t = \frac{1}{2k} \ln \left(\frac{a}{a-x} \right)$$

$$k = \frac{2.303}{2 \times 60} \log \left(\frac{2.4 \times 10^{-2}}{1.6 \times 10^{-2}} \right)$$

$$k = \frac{2.303}{2 \times 60} \log \left(\frac{3}{2} \right)$$

$$= \frac{2.303}{2 \times 60} \times [0.48 - 0.30]$$

$$= 0.00346$$

$$= 346 \times 10^{-5} \text{min}^{-1}$$



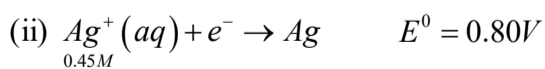
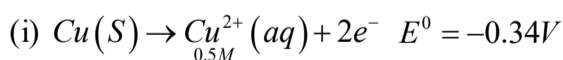
12. Oxygen is maximum soluble in

- (1) Water at $4^{\circ}C$ (2) Water at $80^{\circ}C$ (3) Polluted water (4) Boiling water

Ans: (1)

Sol: Solubility of oxygen is increase with decrease in temperature.

13. Using the following cell reaction find cell



[Given $\log 2.5 = 0.4$] $\frac{2.303RT}{F} = 0.06$

Report your answer as $[E_{cell}] \times 10^{-3}$

Ans: 448

Sol: $E_{cell}^{\circ} = (E_{RP}^{\circ})_C - (E_{RP}^{\circ})_A$

$$= 0.80 - 0.34 = 0.46V]$$

$$E_{cell} = E_{cell}^0 - \frac{0.06}{2} \log \frac{[Cu^{2+}]}{[Ag^+]^2} = 0.46 - \frac{0.06}{2} \log \left\{ \frac{0.5}{(0.45)^2} \right\}$$

$$= 0.46 - \frac{0.06}{2} \log 2.5 = 0.46 - \frac{0.06}{2} \times 2.5$$

$$= 0.46 - 0.012 = 0.448 = 448 \times 10^{-3}$$

14. Match column-I with column-II

Column-I

Column-II

(a) Li

(i) Soluble in organic compound

(b) Na

(ii) Outer electronic configuration is $6s^2$

(c) Ca

(iv) From strong monobasic compound

(1) a-i, b-iv, c-iii, d-ii

(2) a-i, b-ii, c-iii, d-iv

(3) a-iii, b-iv, c-i, d-ii

(4) a-i, b-iv, c-iii, d-ii

Ans: 1

Sol:

15. Find the sum of magnetic moment (spin only) of following ion Co^+ , Zn^{2+} , V^{5+}

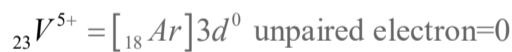
[Report your answer to nearest integer]

Ans: 5

Sol:



Unpaired electron=4



$$\text{So } \mu = \sqrt{n(n+2)}BM$$

$$= \sqrt{24}BM$$

$$= 4.89BM$$

16. Which of the following have strong reducing power

(1) PH_3

(2) BiH_3

(3) AsH_3

(4) SbH_3

Ans: 2

Sol: NH_3

PH_3

AsH_3

SbH_3

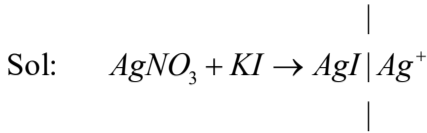
BiH_3

As we move down the group reducing power is increase.

17. When $AgNO_3$ solution is added to KI, the sol produced is

- (1) KI / NO_3^- (2) AgI / Ag^+ (3) AgI / I^- (4) $AgNO_3 / NO_3^-$

Ans:

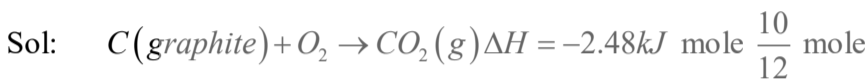


18. How much heat is released on (in kJ) of 10 gram graphite

[Given $\Delta H_{combustion}(\text{graphite}) = -2.48 \text{ kJ/mol}$]

[Report your answer to nearest integer]

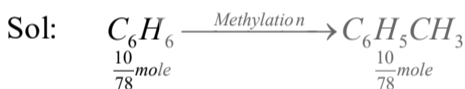
Ans: 2



$$\text{Total heat released} = 2.48 \times \frac{10}{12} = 1.90 \text{ kJ}$$

19. 10 gram Benzene (GMM=78) on methylation give 9.2 gram of Toluene (GMM=92), then percentage yield of process is:

Ans: 78.00



$$(W_{\text{theoretical}}) = \frac{10}{78} \times 92$$

$$\% \text{ yield} = \frac{W_{\text{actual}}}{W_{\text{theoretical}}} \times 100$$

$$= \left[\frac{9.2}{10 \times 92} \times 78 \right] \times 100 = 7.8\%$$

20. The total number of isomers of square planar complex $[MFCI(SCN)(NO_2)]$ is

- (1) 12 (2) 6 (3) 8 (4) 4

Ans: (1)

Sol: SCN / NO_2 -3 arrangements

NCS / NO_2 -3 arrangements

SCN / ONO -3 arrangements

NCS / ONO -3 arrangements

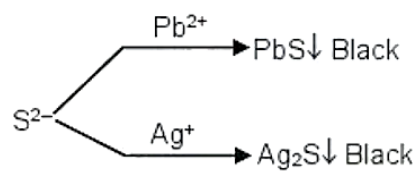
Total number of isomers=12

21. Consider sulphide ion $[S^{2-} \text{ ion}]$ as a soft base. Which of the following ion will form sulphide

- (1) Pb^{2+}, Ag^+ (2) Ag^+, Mg^{2+} (3) Al^{3+}, Ag^+ (4) Al^{3+}, Mg^{2+}

Ans: 3

Sol:

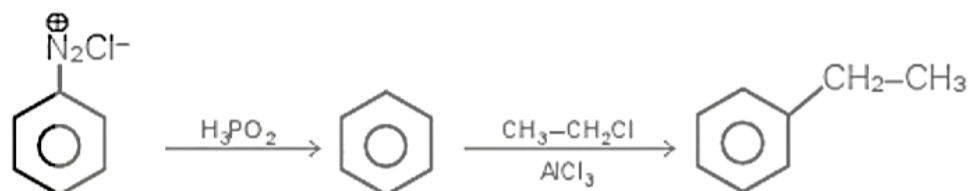


22. In the following sequence of reactions identify A & B respectively:

- (1) H_3PO_2 $\text{CH}_3-\text{CH}_2-\text{Cl}$ (2) H_3PO_2 $\text{CH}_3-\text{CH}_2-\text{OH}$
 (3) $\text{CH}_3-\text{CH}_2-\text{OH}$ H_3PO_2 (4) $\text{CH}_3-\text{CH}_2-\text{Cl}$ H_3PO_2

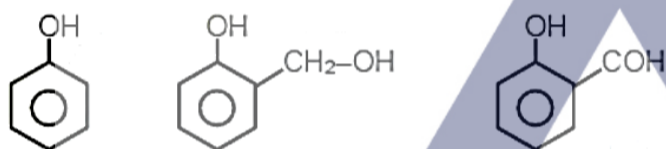
Ans: 1

Sol:



23. A ($\text{C}_6\text{H}_6\text{O}$) gives dark green colouration with FeCl_3 . A on reaction with CHCl_3 , KOH gives B. B can also be prepared from C by PCC. The correct option for A, B and C is:

(1)



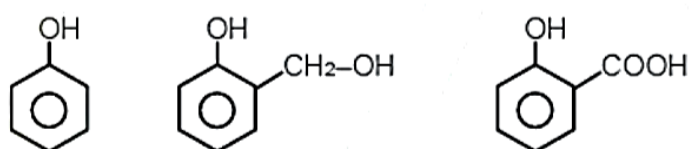
(2)



(3)

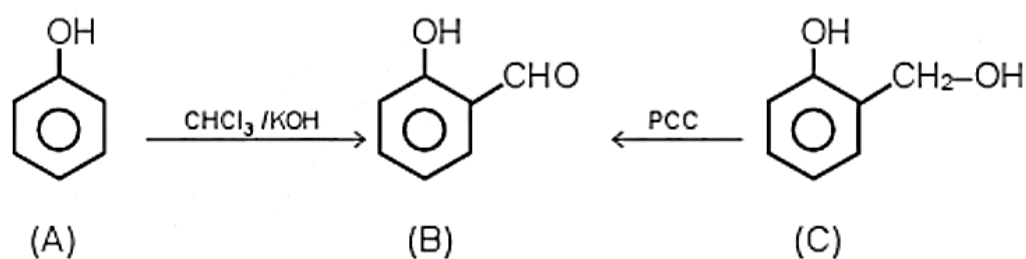


(4)

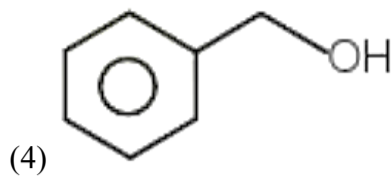
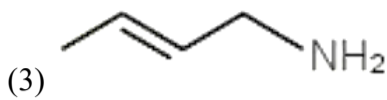
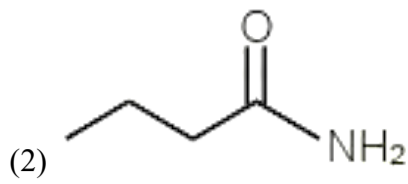
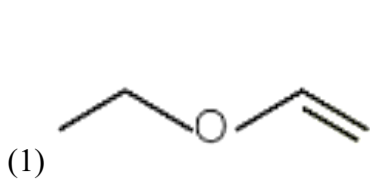


Ans: (3)

Sol:



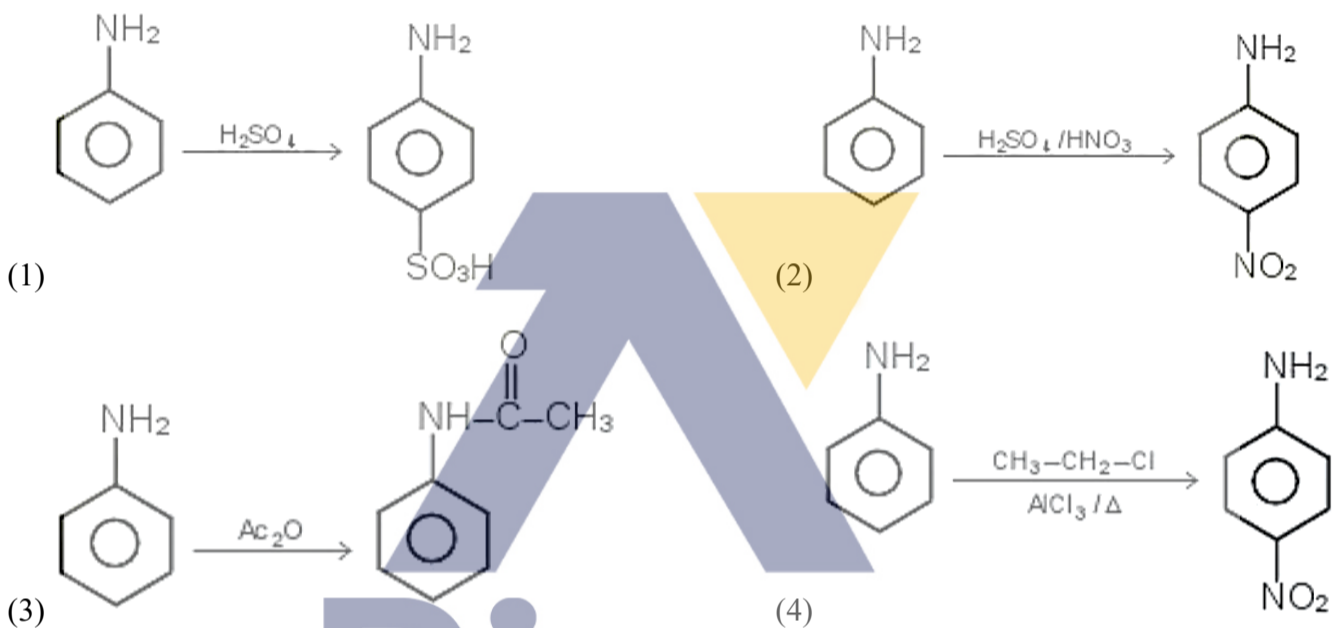
24. Which of the following does not show resonance.



Ans: (3)

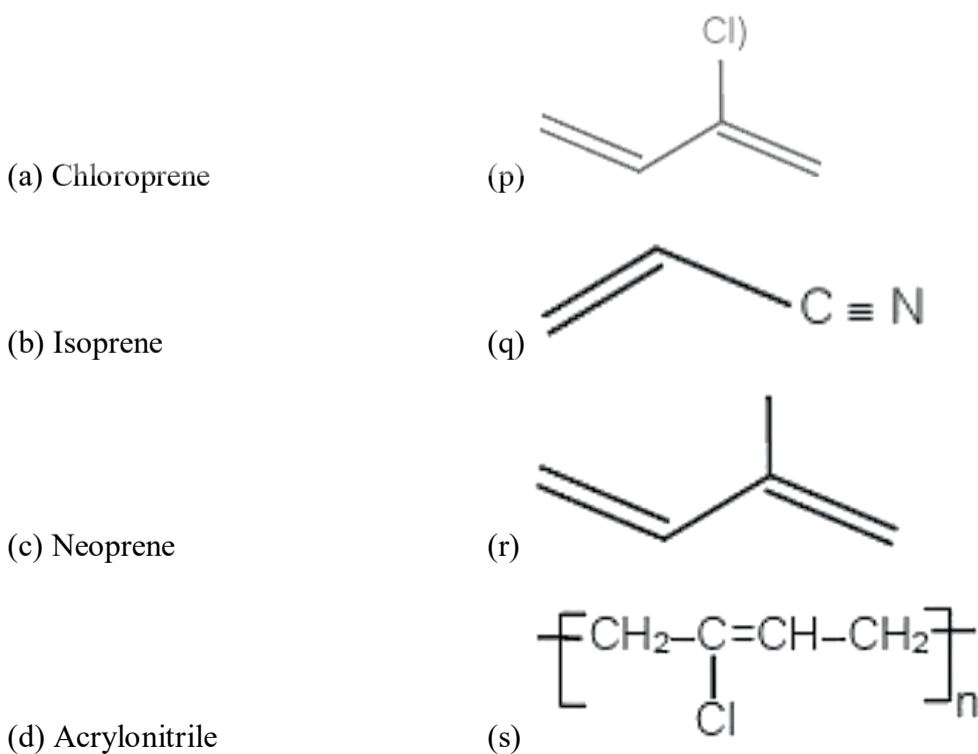
Sol: has no conjugation between π -bond and lone-pair hence there will be no resonance in this compound.

25. Which of the following reaction is not possible:



Ans: Friedel-craft alkylation is not possible in aniline due to formation of highly deactivated cationic salt.

26. Match the following:

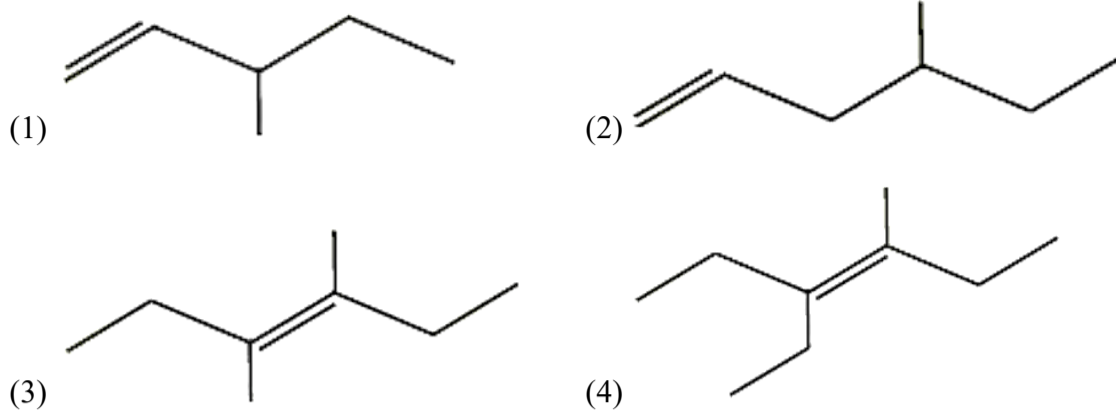


Ans: (1) (a) \rightarrow (p), (b) \rightarrow (r), (c) \rightarrow (s), (d) (q) (2) (a) \rightarrow (r), (b) \rightarrow (s), (c) \rightarrow (p), (d) (q)

(3) $(a) \rightarrow (r), (b) \rightarrow (p), c \rightarrow (q), d(s)$ (4) $(a) \rightarrow (q), (b) \rightarrow (r), c \rightarrow (p), d(s)$

Sol: NCERT

27. Which of the following does not show stereoisomerism



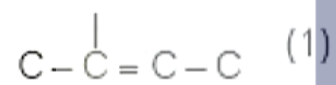
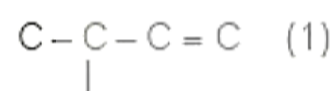
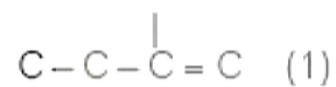
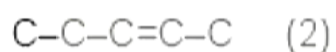
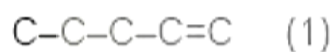
Ans: (4)

Sol:

28. Total acyclic number of structures including geometrical of pentene is

Ans: 6

Sol:



29. Thiamin & pyridoxine vitamin are respectively:

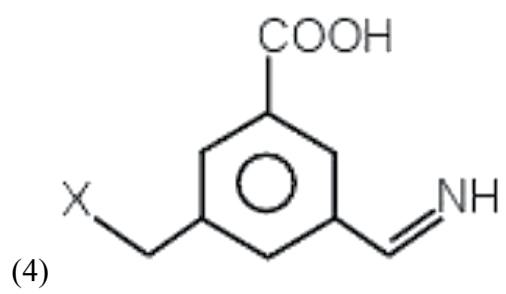
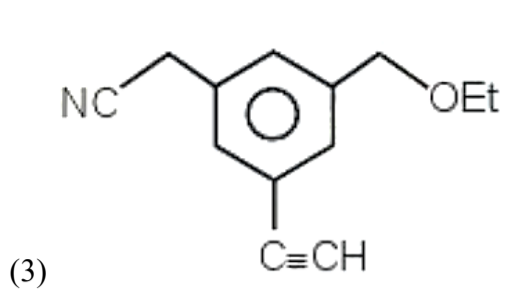
(1) B_1 & B_6 (2) B_2 & E (3) B_1 & E (4) E_1 & B_6

Ans: 1

Sol: NCERT

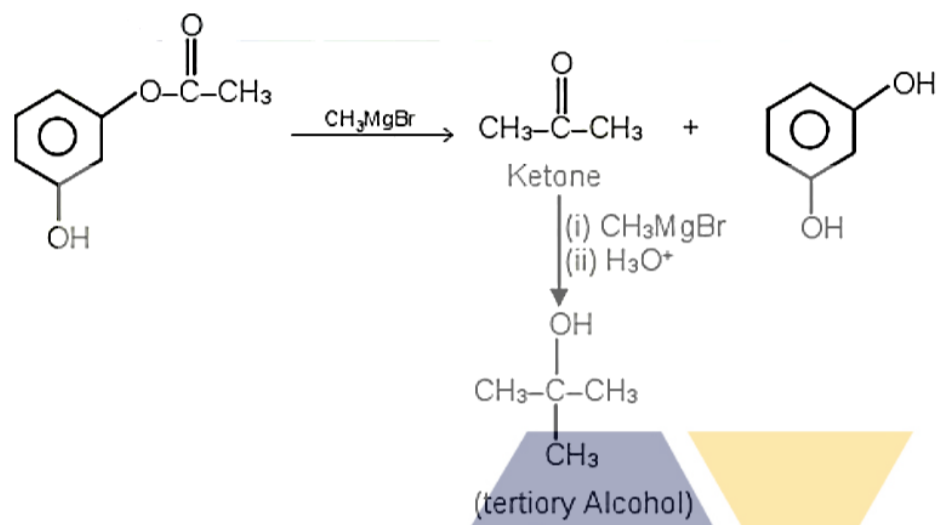
30. Which of the following give tertiary alcohol with excess Grignard reagent (CH_3MgBr)





Ans: 2

Sol:



Rizee