Welcome to Chemistry C.E.T. Class

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Physical Chemistry

Thermodynamics and Thermochemistry

Chemical Equilibrium

Surface Chemistry

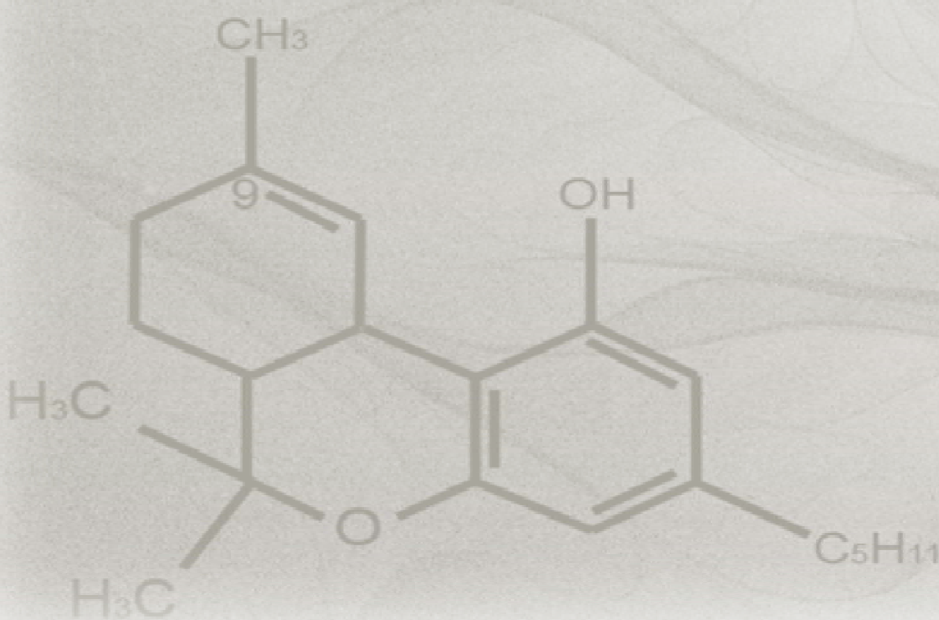
Catalyst & Adsorption

1. Which of the following values of heat of formation indicates that product is least stable?

1) -94 kcal
2) -231 kcal
3) +21.4 kcal
4) +64.8 kcal

Answer:

4) +64.8 kcal



Explanation:

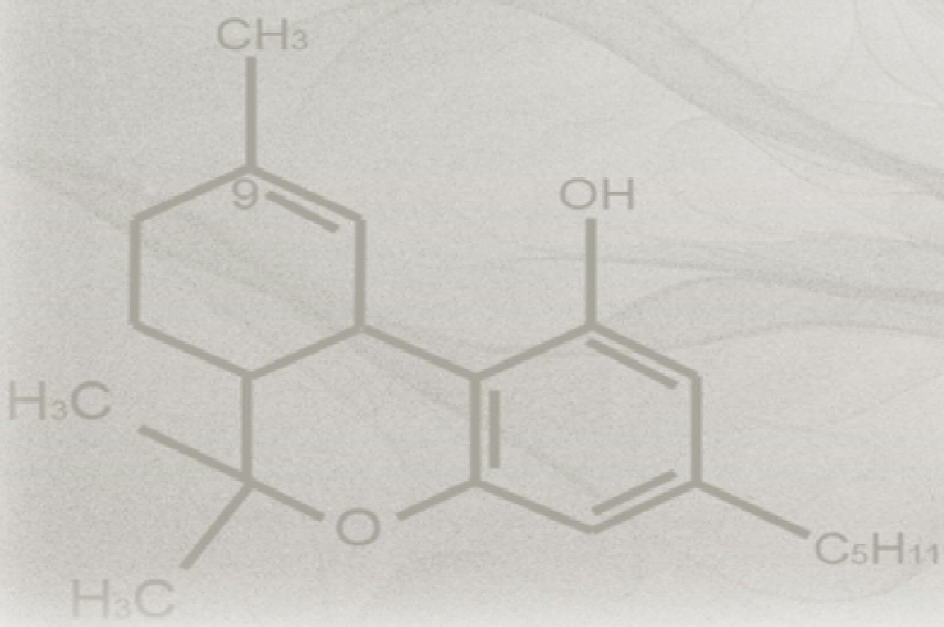
Stability of compounds depend on the amount of heat evolved during their formation, larger the heat evolved, more stable is the compound. i.e. more positive ΔH_f, least stable is the compound.

2. If in a chemical reaction the products have less energy than the reactants that reaction is

1) A reversible reaction
2) An endothermic reaction
3) An isothermal reaction
4) An exothermic reaction

Answer:

4) An exothermic reaction



Explanation:

Because $\Delta E = E_P - E_R$

Here, $E_P < E_R$

$\therefore \Delta E = -ve$

Hence the reaction is exothermic

3. Given that $Zn + 1/2\, O_2 \rightarrow ZnO + 35.28kJ$

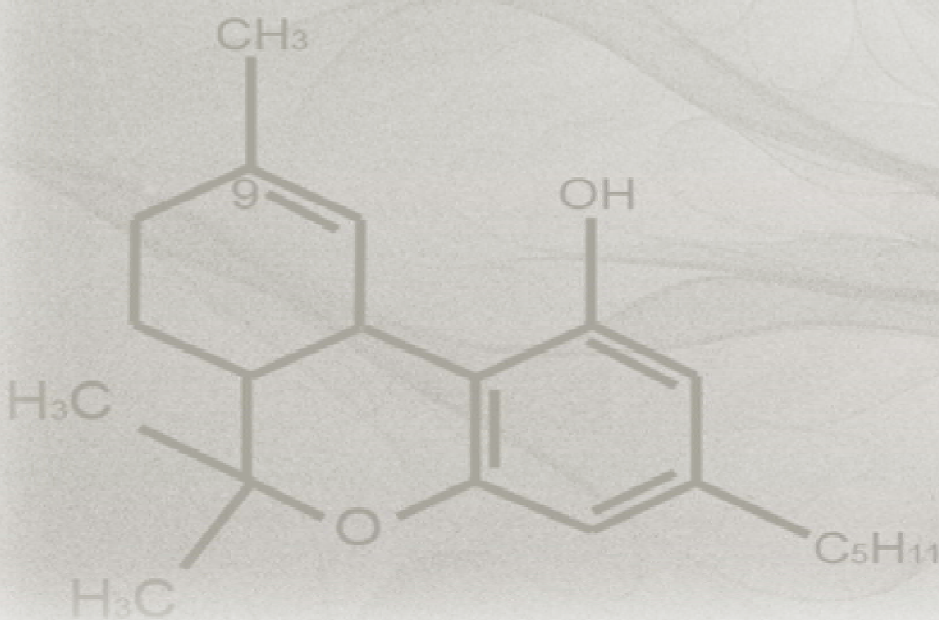
$HgO \rightarrow Hg + 1/2O_2 - 9.11kJ$ so that heat of the reaction

$Zn + HgO \rightarrow ZnO + Hg$ is

1) 26.17kJ
2) 44.39kJ
3) - 44.39kJ
4) 2.617kJ

Answer:

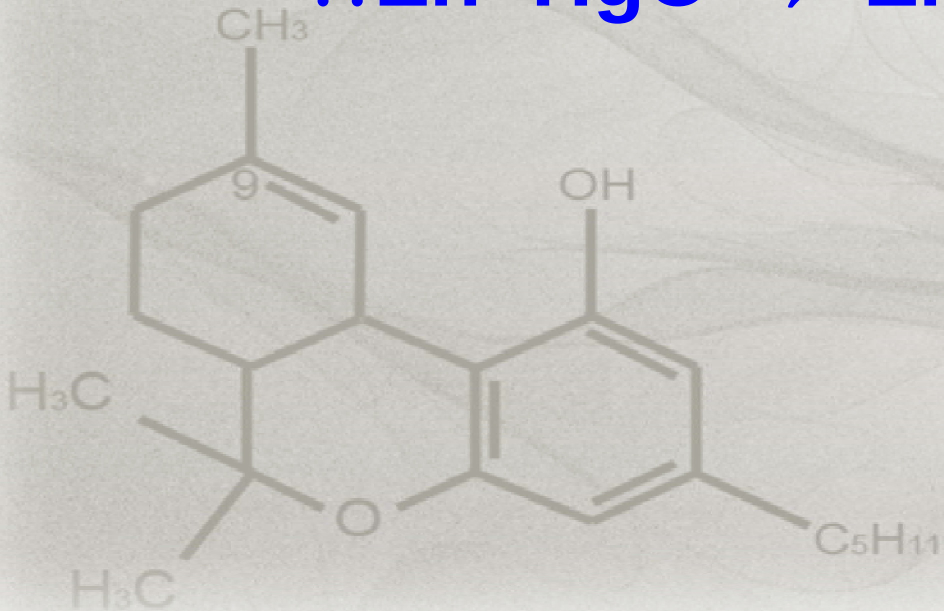
1) **26.17kJ**



Explanation:

Required equation=equation-1+ equation-2

$$\therefore Zn + HgO \rightarrow ZnO + Hg + 26.17$$



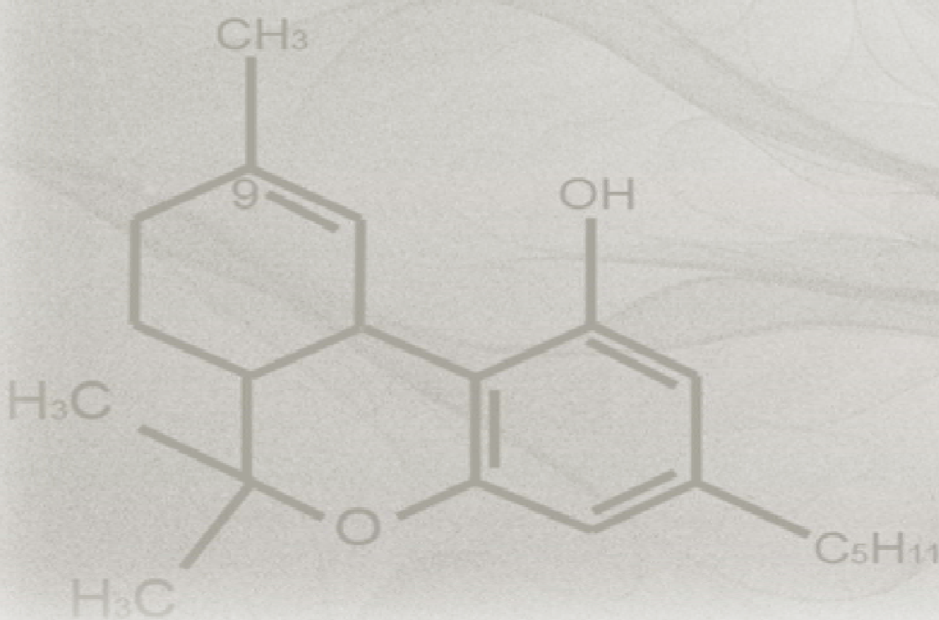
4. A mixture of two moles of carbon monoxide and one mole of oxygen in a closed vessel, is ignited to convert the carbon monoxide to carbon dioxide. If ΔH is the enthalpy change and ΔE is the change in internal energy

1) ΔH>ΔE 2) ΔH<ΔE 3) ΔH=ΔE

4) The relationship depends on the capacity of the vessel

Answer:

2) $\Delta H < \Delta E$



Explanation:

$$2CO_{(g)} + O_{2(g)} \rightarrow 2CO_{2(g)}$$

$$\Delta n_g = n_p - n_r$$

$$\Delta n_g = 2 - 3$$

$$\Delta n_g = -1$$

W.K.T. $\Delta H = \Delta E + RT \times \Delta n_g$

$\therefore \Delta H = \Delta E - RT$

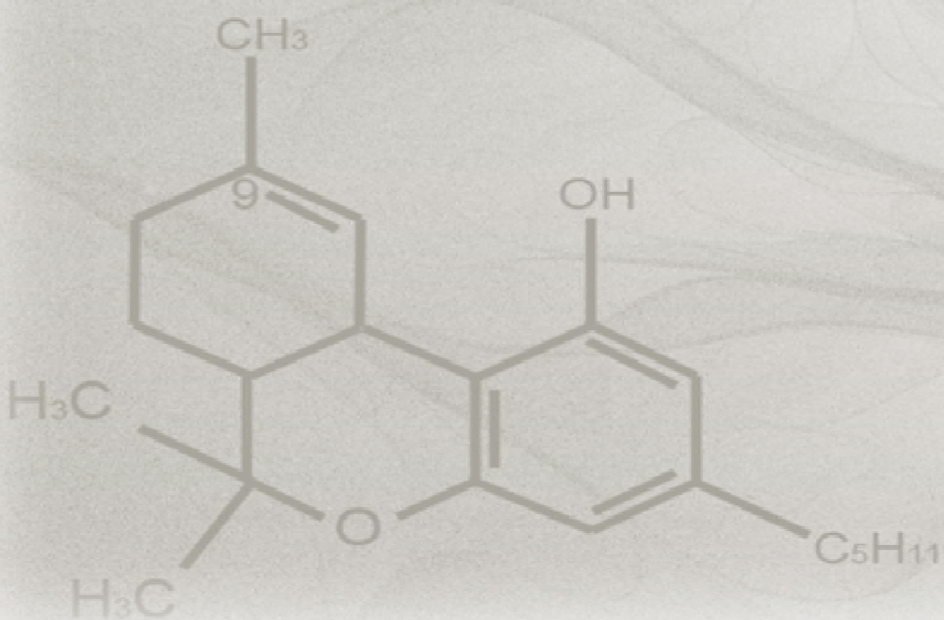
Hence $\Delta H < \Delta E$

5. Given C(graphite) $\rightarrow$ C(g) $\Delta H = 716.7 kJ$, C(diamond) $\rightarrow$ $C_{(g)}$, $\Delta H = 714.8 kJ$. The ΔH for the reaction C(graphite) $\rightarrow$ C(diamond) is

1) 1.9kJ
2) -1.9kJ
3) Zero
4) 714.8kJ

Answer:

1) 1.9kJ

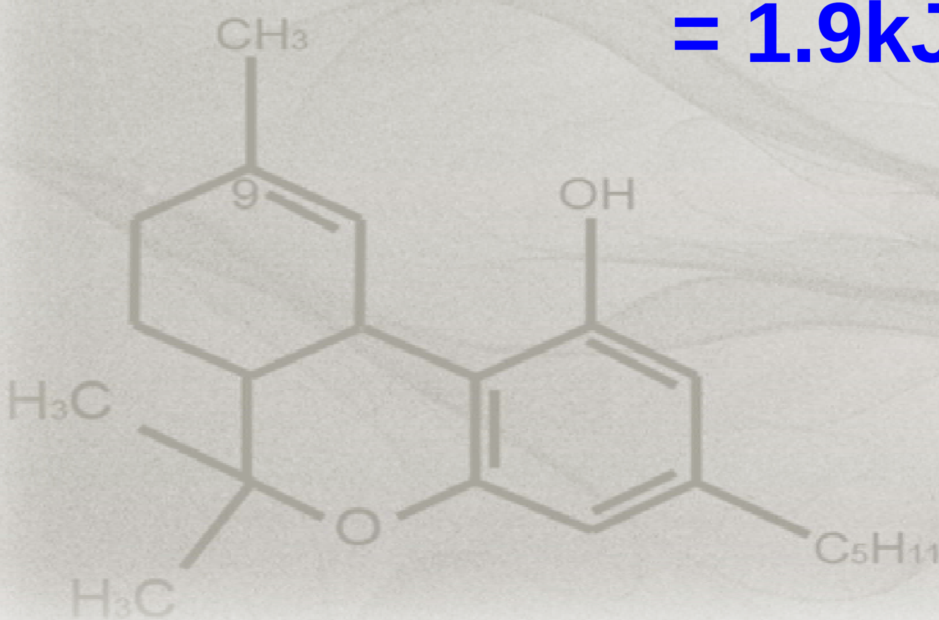


Explanation:

Required equation: equation1 – equation2

= 716.7kJ – 714.8kJ

= 1.9kJ

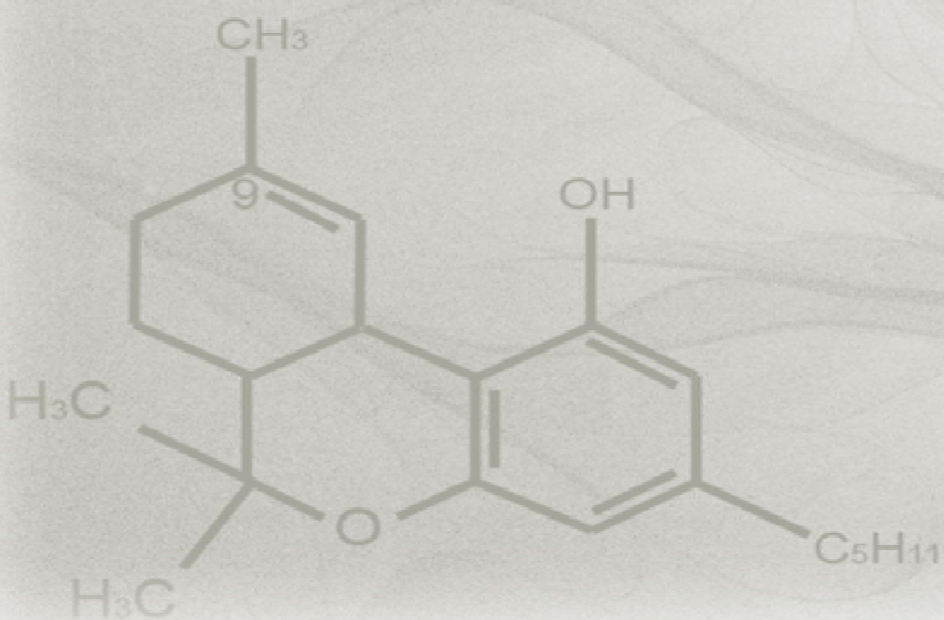


6. In the reaction $CO_2(g)+H_2(g) \rightarrow CO(g)+H_2O\ (g)$ $\Delta H=2.8kJ$ then ΔH represents

1) Heat of reaction
2) Heat of combustion
3) Heat of formation
4) Heat of solution

Answer:

1) Heat of reaction



Explanation:

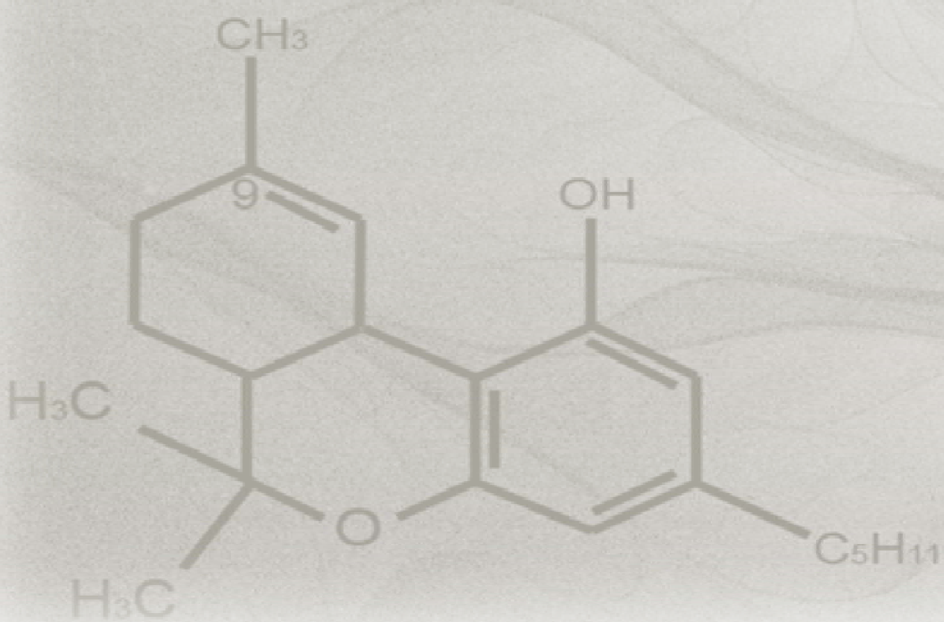
Enthalpy of reaction (ΔH_r): Enthalpy of reaction is the enthalpy change when the number of moles of reactants react completely to give the products as indicated by the balanced chemical equation.

7. The enthalpies of elements in their standard states are taken as zero. Hence the enthalpy of formation of a compound

1) Should always be negative
2) Should always be positive
3) Will be equal to twice the energy of combustion
4) May be positive or negative

Answer:

4) May be positive or negative



Explanation:

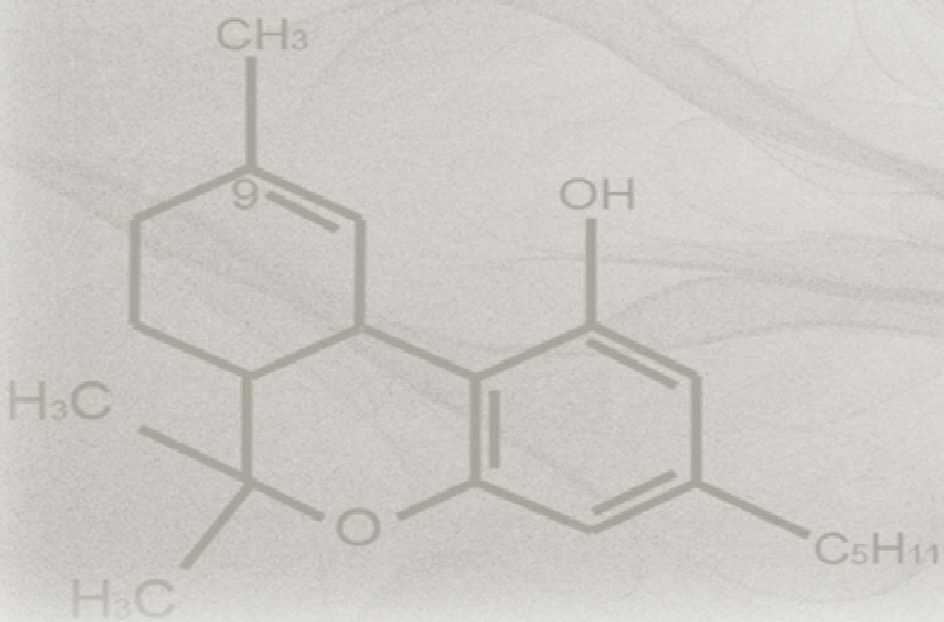
Enthalpy of formation (ΔH_f): It is the enthalpy change (heat evolved or absorbed) when one mole of compound formed from its elements under given condition.

8. The enthalpy of neutralization of acetic acid and sodium hydroxide is -55.4kJ. What is the enthalpy of ionization of acetic acid

1) -1.9 kJ
2) +1.9 kJ
3) +5.54 kJ
4) -5.54 kJ

Answer:

2) +1.9 kJ



Explanation:

Enthalpy of ionization = Heat of neutralization of strong acid by a weak base or weak acid by a strong base + 57.3.

= - 55.4kJ + 57.3kJ

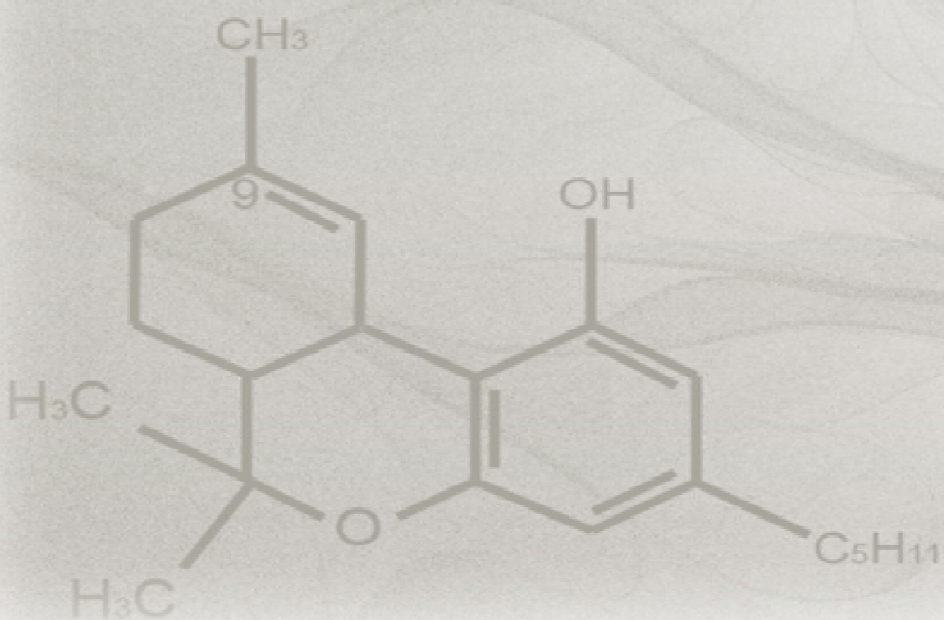
= 1.9kJ

9. The heat of formation of $Fe_2O_{3(s)}$ is -820kJ. The heat of combustion of iron is

1) – 410 kJ
2) – 820 kJ
3) 820 kJ
4) – 1620kJ

Answer:

1) – 410 kJ



Explanation:

$2Fe + O_2 \rightarrow Fe_2O_3 \quad \Delta H = -820 kJ$

2×56g of Fe liberates 820kJ of Heat.

$\therefore$ 56g of Fe liberates .... kJ of Heat.

$= 820 \times 56 \div 2 \times 56$

$= 410$ kJ

Enthalpy of combustion (ΔH_c): It is the enthalpy change when one mole of the substance completely burnt in excess of air or oxygen. ΔH_c is always negative.

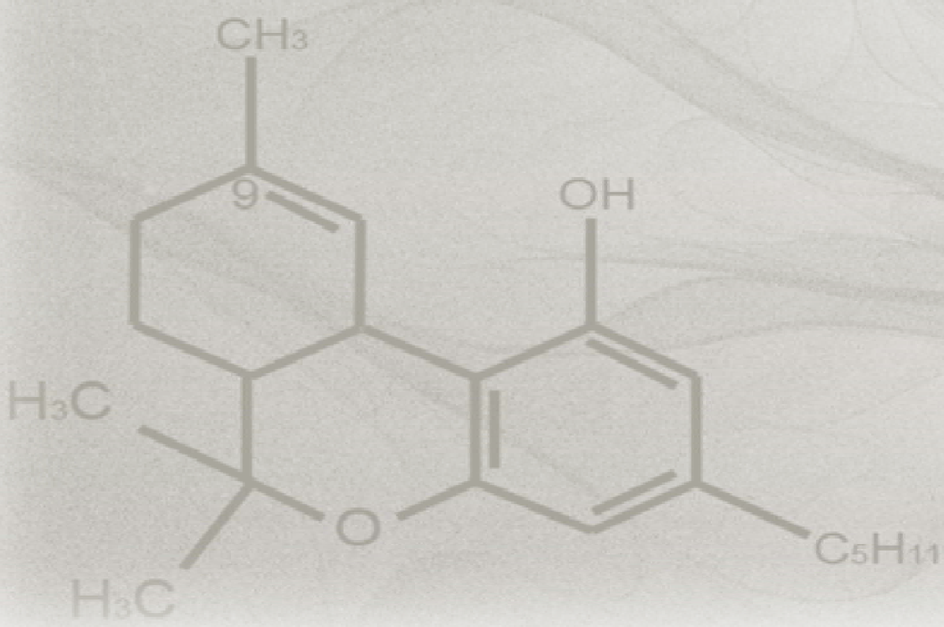
10. The thermochemical equation for the formation of Al_2O_3 is

$2Al + ……. \rightarrow Al_2O_{3(s)}$

1) $3CO_{2(g)}$
2) $3/2O_{2(g)}$
3) $3/4O_{2(g)}$
4) $2/3O_{2(g)}$

Answer:

2) $3/2O_{2(g)}$



Explanation:

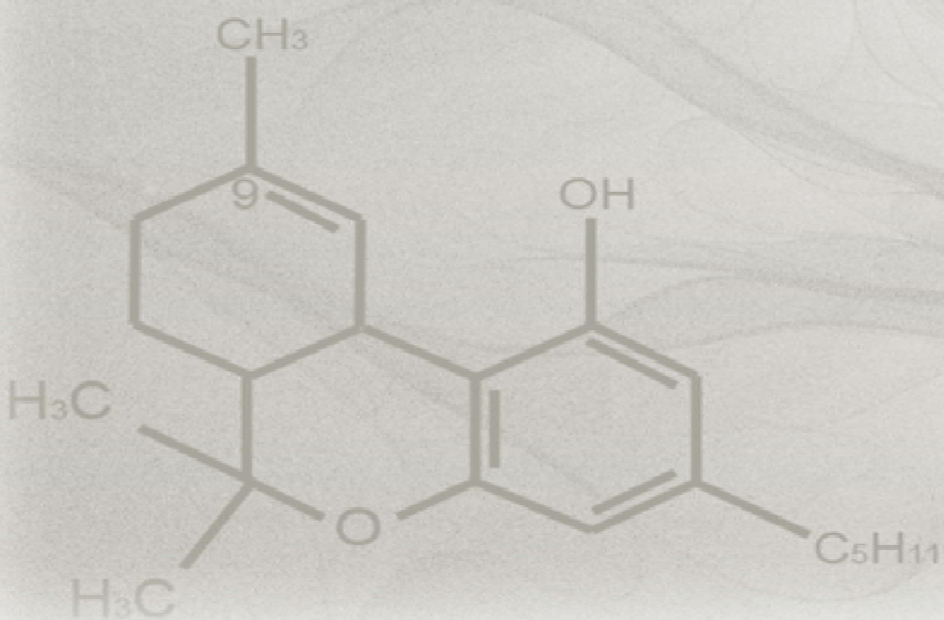
Enthalpy of formation (ΔH_f): It is the enthalpy change when one mole of compound formed from its elements under given condition.

11. If 4g of methane are to be completely burnt, the amount of oxygen required is

1) 4g
2) 8g
3) 16g
4) 32g

Answer:

3) 16g



Explanation:

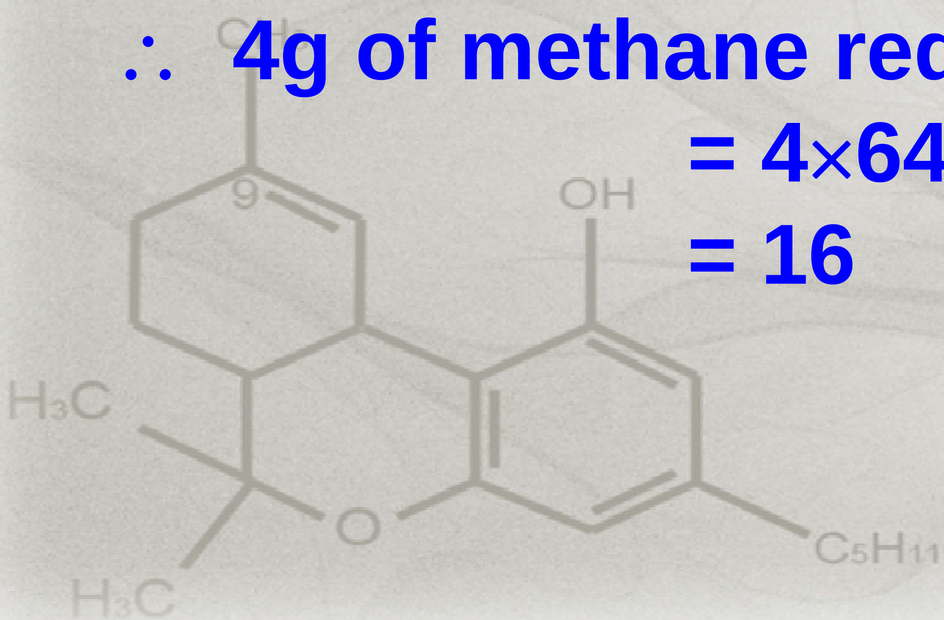
$$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$$

16g of methane requires 64g of O_2

$\therefore$ 4g of methane requires ……..g of O_2

$$= 4 \times 64 \div 16$$

$$= 16$$

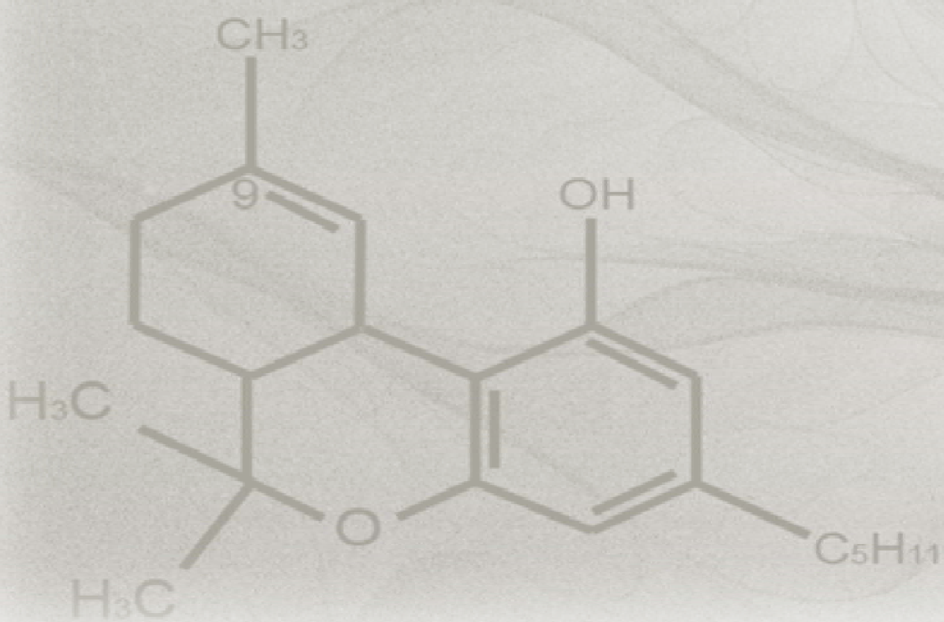


12. In an exothermic reaction heat is

1) Evolved
2) Absorbed
3) Either evolved or absorbed
4) Neither evolved nor absorbed

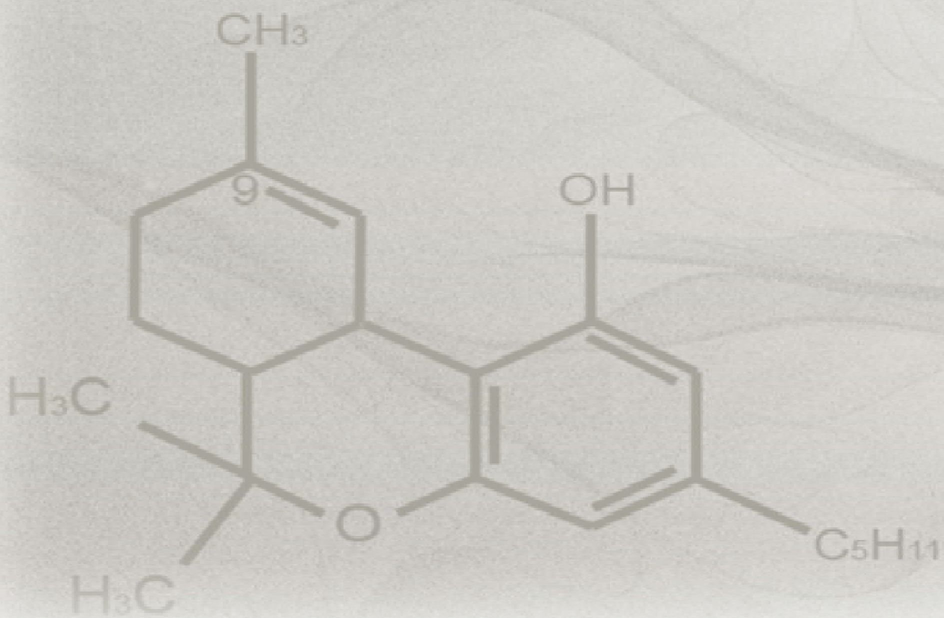
Answer:

1) Evolved



Explanation:

All exothermic reactions takes place with the liberation of heat.

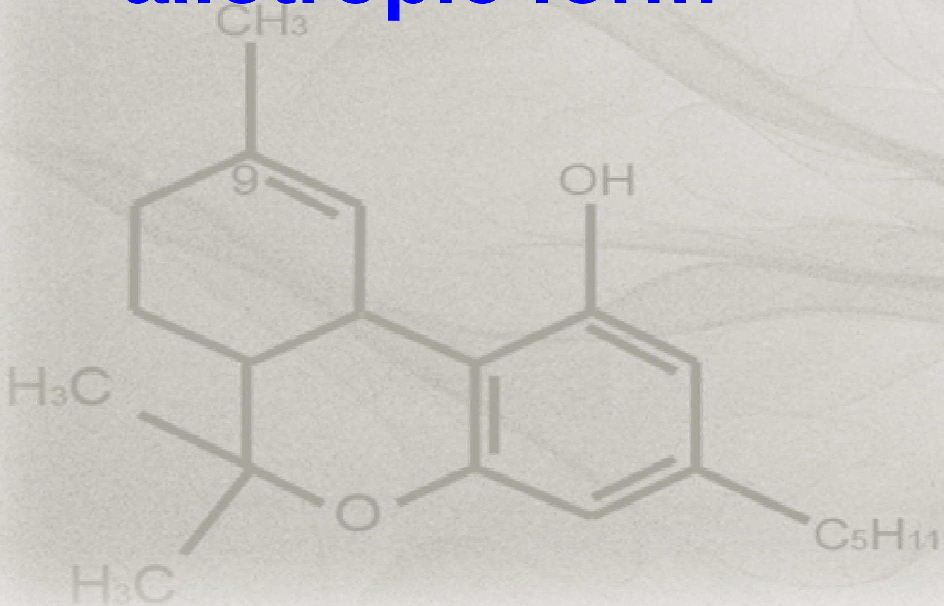


13. Heat of transition is the heat evolved or absorbed when a substance is converted from

1) Solid to liquid
2) Solid to vapour
3) Liquid to vapour
4) One allotropic form to another allotropic form

Answer:

4) One allotropic form to another allotropic form



Explanation:

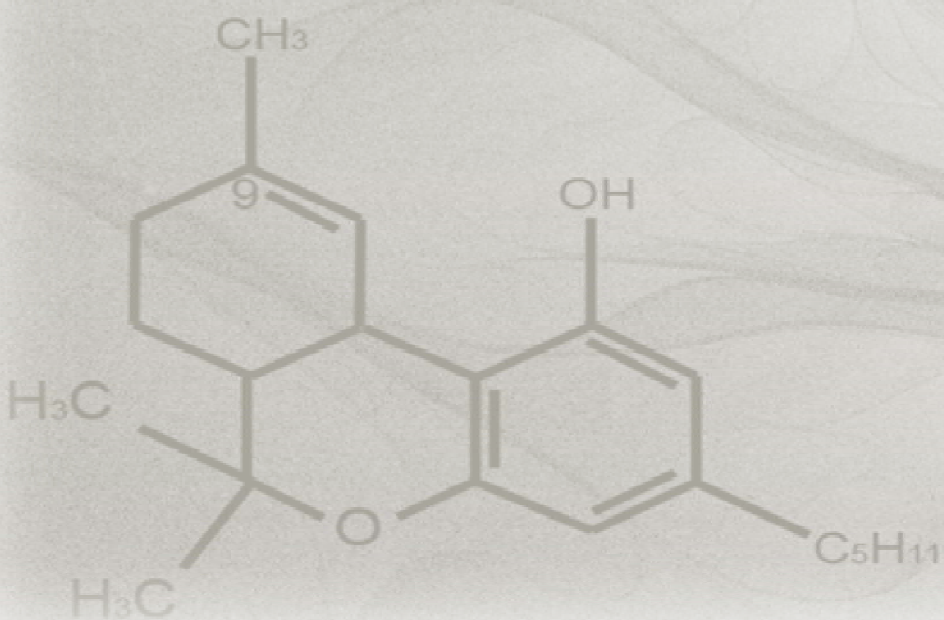
It is the enthalpy change when one mole of an element undergoes a transition from one allotropic form to another.

14. Heat of neutralisation of a strong acid by a strong base is a constant because

1) Salt formed does not hydrolyse
2) Only H^+ and OH^- ions react in every case
3) The strong base and strong acid react completely
4) The strong base and strong acid react in aqeous solution.

Answer:

2) Only H^+ and OH^- ions react in every case



Explanation:

Heat of neutralisation of strong acid by a strong base is nothing but reaction of H^+ ion of strong acid with OH^- ion of strong base to form water only.

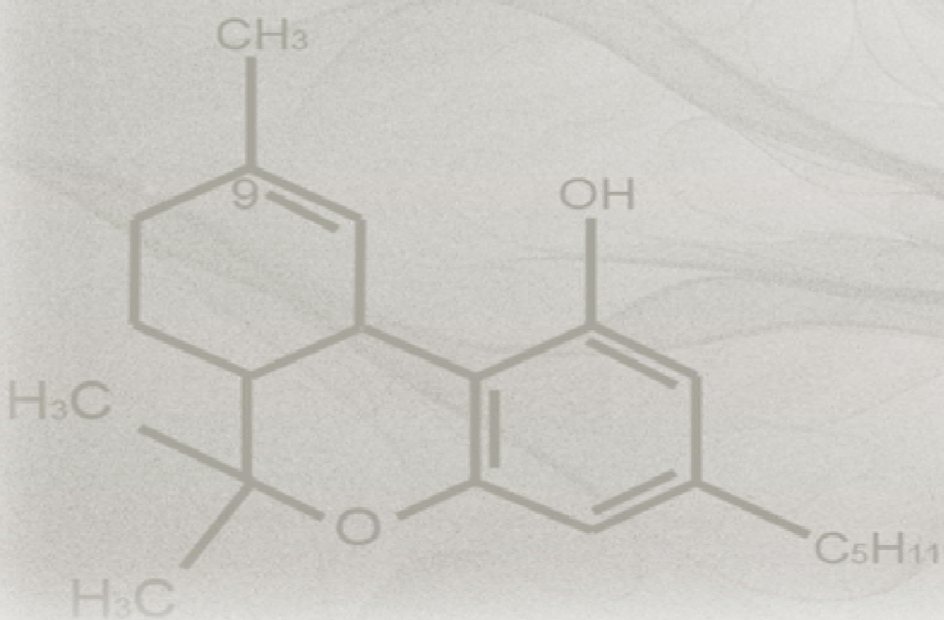
i.e. $H^+ + OH^- \rightarrow H_2O \qquad \Delta H = -57.3$ kJ.

15. The heat of formation of carbon dioxide is -393.5kJ. The heat of decomposition of carbon dioxide into the elements is

1) 393.5kJ
2) 161.7kJ
3) 196.7kJ
4) 203kJ

Answer:

1) 393.5kJ



Explanation:

According to Lavoisier and Laplace law 'The quantity of heat that required to decompose a compound in to its elements is equal to the quantity of heat liberated when the same amount of compound is formed from its elements.

16. When a gm. atom of carbon is converted into a gm. molecule of carbon dioxide, the heat liberated is the same

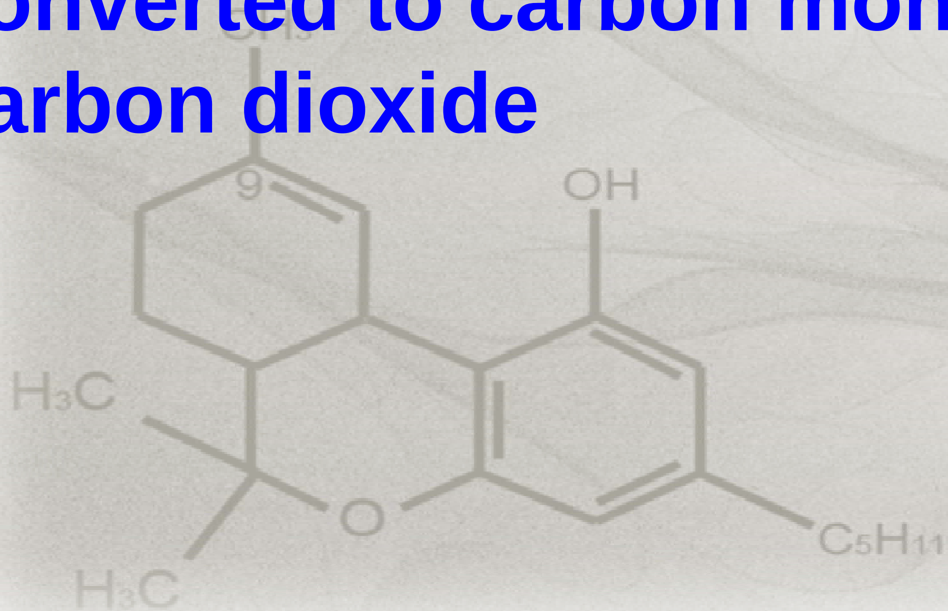
1) Irrespective of whether the volume is kept constant.
2) Irrespective of the temperature at which the reaction was carried out.

3) Whether the carbon taken was graphite or diamond.

4) Whether the reaction was carried out in one step or whether the carbon was first converted to carbon monoxide and then to carbon dioxide

Answer:

4) Whether the reaction was carried out in one step or whether the carbon was first converted to carbon monoxide and then to carbon dioxide



Explanation:

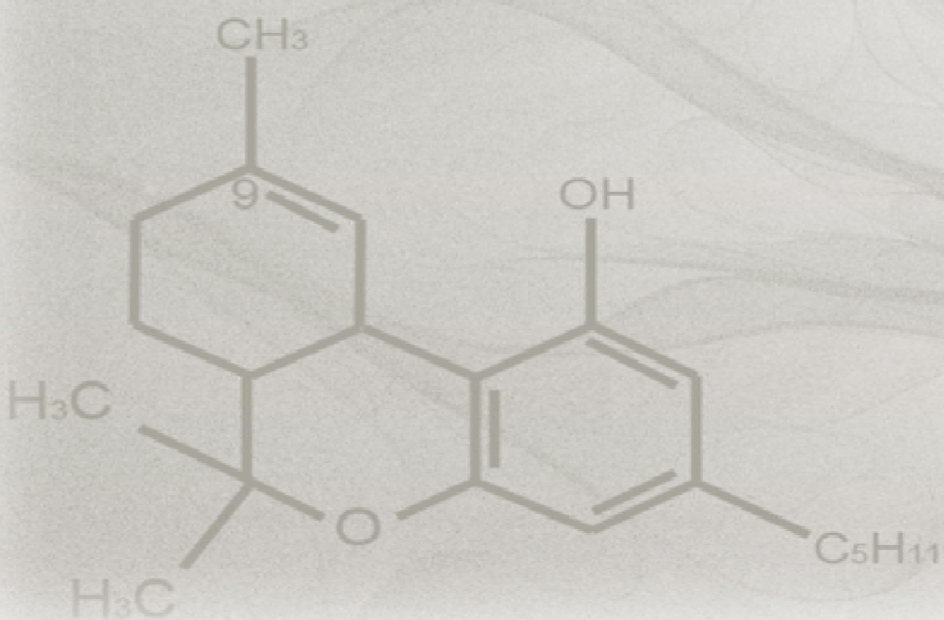
According to Hess's law of constant heat summation "The enthalpy change in a given reaction is the same whether the reaction takes place in one step or several steps.

17. ΔH=ΔE for the reaction

1) $N_{2(g)} + 3H_{2(g)} \leftrightarrow 2NH_{3(g)}$
2) $2SO_{2(g)} + O_{2(g)} \leftrightarrow 2SO_{3(g)}$
3) $PCl_{5(g)} \leftrightarrow PCl_{3(g)} + Cl_{2(g)}$
4) $N_{2(g)} + O_{2(g)} \leftrightarrow 2NO_{(g)}$

Answer:

4) $N_{2(g)} + O_{2(g)} \leftrightarrow 2NO_{(g)}$



Explanation:

W.K.T., $\Delta H=\Delta E+\Delta nRT$,

Where Δn=difference in number of moles of gaseous products and reactants.

$N_{2(g)} + O_{2(g)} \rightarrow 2NO_{(g)}$ $\quad$ $\Delta n=2-2=0$

$\therefore \Delta H=\Delta E$

18. Given $2C_{(s)} + 2O_{2(g)} \rightarrow 2CO_{2(g)}$; $\Delta H = -787 kJ$

$H_{2(g)} + \frac{1}{2}O_{2(g)} \rightarrow H_2O_{(l)}$; $\Delta H = -286 kJ$

$C_2H_{2(g)} + 2\frac{1}{2} O_{2(g)} \rightarrow 2CO_{2(g)} + H_2O_{(l)}$; $\Delta H = -1301 kJ$, heat of formation of acetylene is

1) -1802 kJ
2) +1802 kJ
3) -800 kJ
4) +228 kJ

Answer:

4) +228 kJ

Explanation:

$\Delta H = H_P - H_R$

$\Delta H = 2\Delta H_{fCO2} + \Delta H_{fH2O} - \Delta H_{fC2H2} - 2\frac{1}{2}\Delta H_{fO2}$

$-1301 = -787 - 286 - \Delta H_{fC2H2} - 2\frac{1}{2} \times 0$

$-1301 = -787 - 286 - \Delta H_{fC2H2} - 0$

$\Delta H_{fC2H2} = -787 - 286 + 1301$

$\Delta H_{fC2H2} = +228\ kJ$

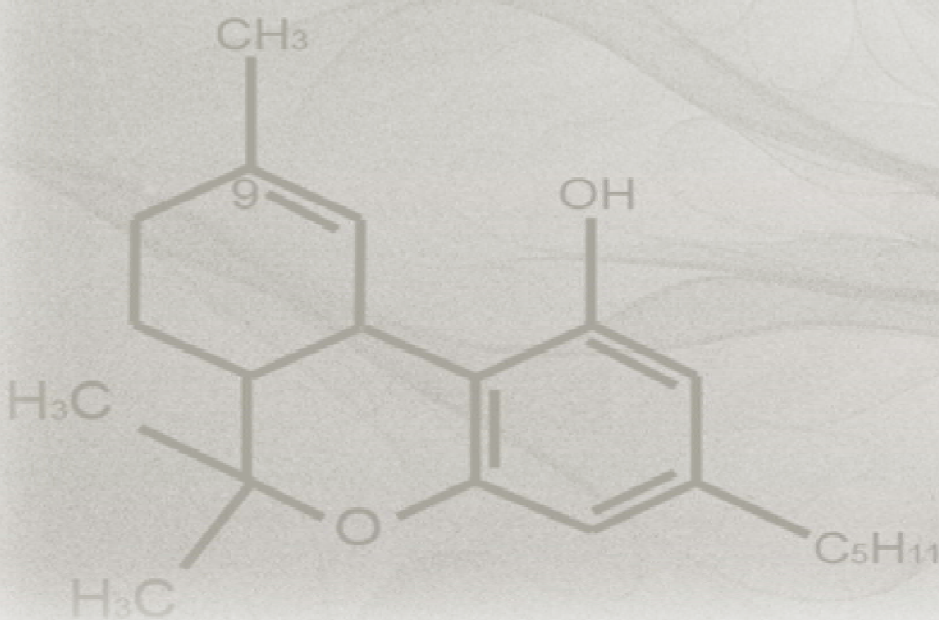
19. If the unit of K_c for the equilibrium $PCl_{5(g)} \leftrightarrow PCl_{3(g)} + Cl_{2(g)}$ is mol/m^3. the unit of K_p is

1) Jm^{-3}
2) Nm^{-3}
3) Jm^{-2}
4) Nm^{-2}

CHEMISTRY

Answer:

1) Jm^{-3}



Explanation:

$PCl_{5(g)} \Leftrightarrow PCl_{3(g)} + Cl_{2(g)}$

$\therefore \Delta n_g = n_p - n_r = 2 - 1 = 1$

Hence, $K_p = K_c \times RT$,

$$K_p = \frac{\cancel{mol}}{m^3} \times \left(J\ \cancel{mol^{-1}}\ \cancel{k^{-1}} \right) \cancel{k}$$

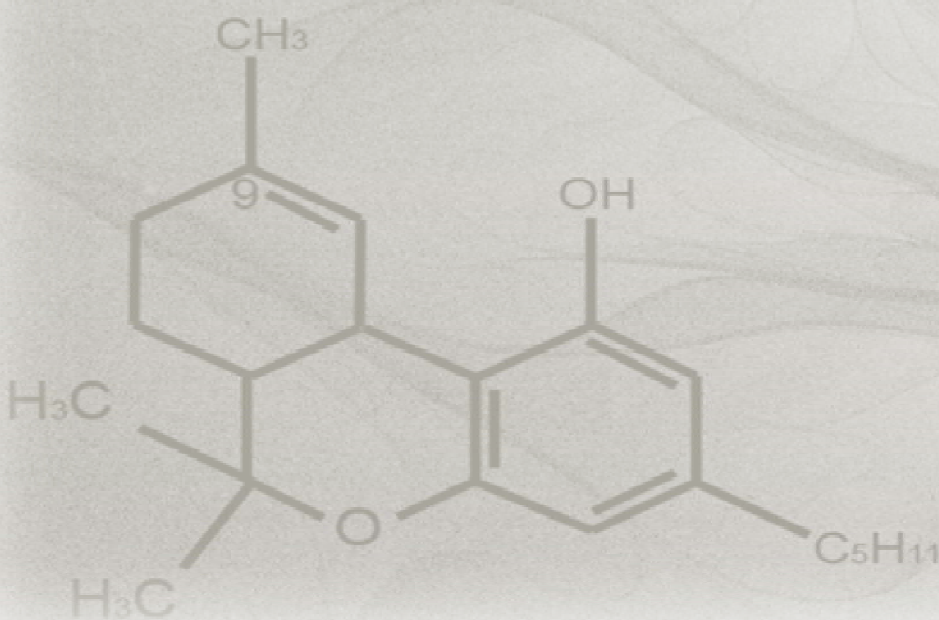
$$K_p = Jm^{-3}$$

20. $2SO_2 + O_2 \Leftrightarrow 2SO_3$ the forward reaction is favoured by

1) High temperature
2) Low pressure
3) Removal of sulphur dioxide
4) High pressure

Answer:

4) High pressure



Explanation:

In a reaction, If $\Delta n_g = n_p - n_r$ = -ve, high pressure is favoured for the reaction

$$2SO_{2(g)} + O_{2(g)} \Leftrightarrow 2SO_{3(g)}$$

In this reaction $\Delta n_g = 2 - 3 = -1$

If $\Delta n < 0$ high pressure favours forward reaction.

$\Delta n > 0$ high pressure favours backward reaction.

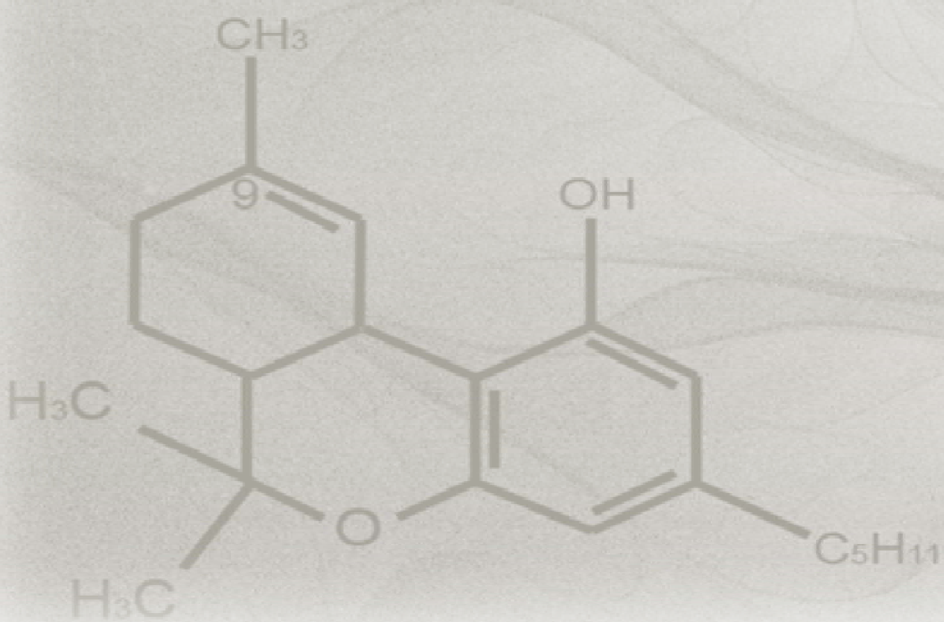
$\Delta n = 0$ pressure has no effect on the reaction at equilibrium.

21. The equilibrium $N_2 + O_2 \Leftrightarrow 2NO$ is established in a reaction vessel of 2.5 litres capacity. The amounts of nitrogen and oxygen taken at the start were respectively 2 moles and 4 moles. Half a mole of nitrogen has been used up at equilibrium. The molar concentration of nitric oxide is

1) 0.2 2) 0.4 3) 0.6 4) 0.1

Answer:

2) 0.4



Explanation:

$N_2 + O_2 \Leftrightarrow 2NO$

No. of moles at t=0 in 2.5 litres } 2 4 0

No. of moles at equilibrium } (2 – 0.5) (4 – 0.5) (2×0.5)

∴ [NO] = No. moles / volume = 1 / 2.5 = 0.4

22. One mole of hydrogen iodide is heated in a closed container of capacity 2 litres. At equilibrium half a mole of hydrogen iodide has dissociated. The equilibrium constant is

1) 1.00

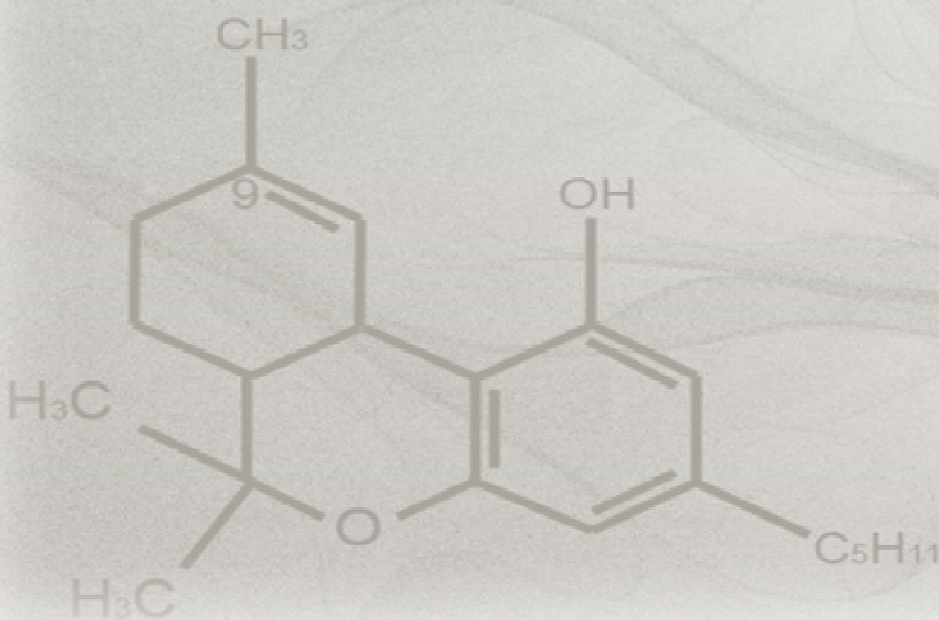
2) 0.50

3) 0.25

4) 0.75

Answer:

3) 0.25



Explanation: $2HI \Leftrightarrow H_2 + I_2$

	$2HI$	H_2	I_2
No. of moles at t=0 in 2 litres	1	0	0
No. of moles at equilibrium	(1 – 0.5)	(0.25)	(0.25)

$\therefore$ $[H_2]$=No. moles at eq./volume=0.25 / 2=0.125

$[I_2]$=No. moles at eq./volume=0.25 / 2=0.125

[HI]=No. moles at eq./volume=0.5 / 2= 0.25

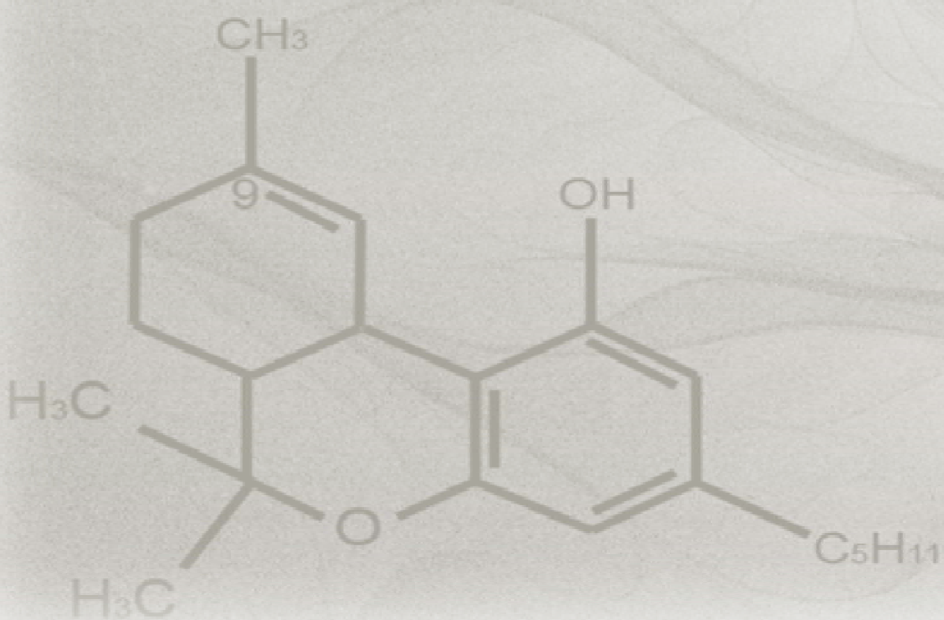
$$K = \frac{[H_2][I_2]}{[HI]^2} = \frac{0.125 \times 0.25}{(0.25)^2} = 0.25$$

23. A and B are gaseous substances which react reversibly to give two gaseous substances C and D, accompanied by liberation of heat. When the reaction reached equilibrium it is found that $K_c = K_p$. The equilibrium cannot be disturbed by

1) Adding A
2) Adding D
3) Raising the temperature
4) Increasing the pressure

Answer:

4) Increasing the pressure



Explanation:

$A_{(g)} + B_{(g)} \Leftrightarrow C_{(g)} + D_{(g)}$ + Heat

Here, $\Delta n = n_p - n_r = 2-2=0$

$K_p = K_c(RT)^{\Delta n}$

If $\Delta n=0$, $K_p = K_c$

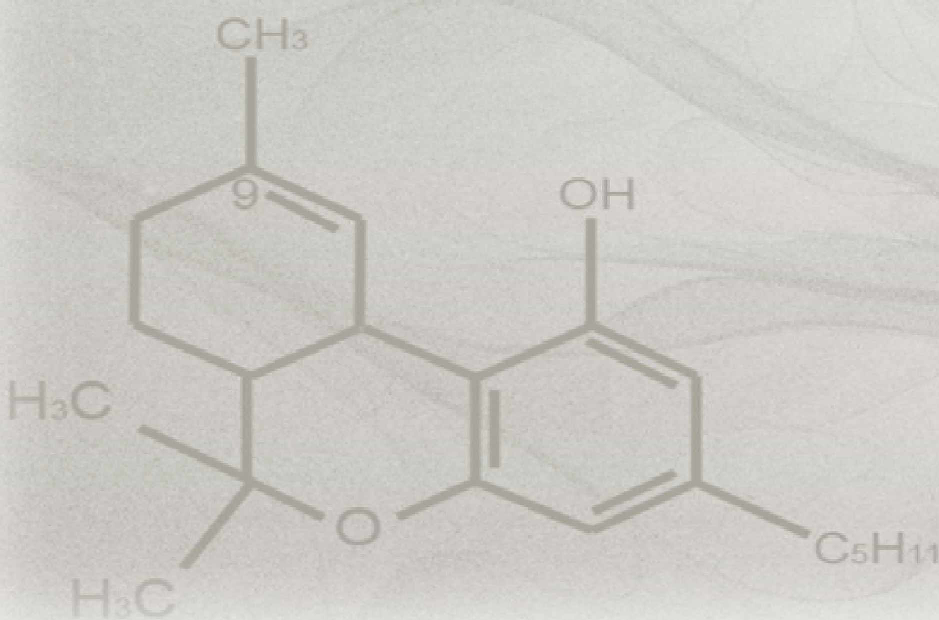
In such cases pressure has no effect on the equilibrium

24. In a reaction $A+B \Leftrightarrow C+D$ the initial concentration of A and B were 0.9 mol dm^{-3} each. At equilibrium the concentration of D was found to be 0.6 mol dm^{-3}. What is the value of equilibrium constant for the reaction?

1) 8
2) 4
3) 9
4) 3

Answer:

2) 4



Explanation:

	A	+	B	$\Leftrightarrow$	C	+	D
Initial Concentration equilibrium at t=0	0.9		0.9		0		0
No. of moles at equilibrium	(0.9–0.6)		(0.9–0.6)		0.6		0.6

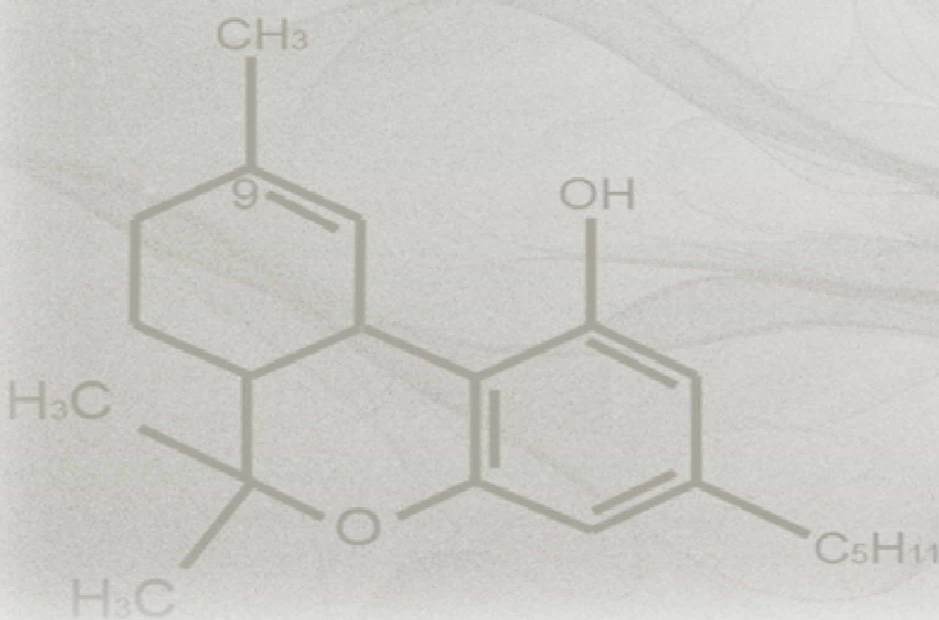
$$K=[C][D] \div [A][B] = (0.6)(0.6)\div(0.3)(0.3)=2\times2=4$$

25. 5 moles of SO_2 and 5 moles of O_2 are allowed to react to form SO_3 in the closed vessel. At equilibrium state, 60% of SO_2 is used. The total number of moles of SO_2, O_2 and SO_3 in the vessel now is

1) 10·0
2) 8·5
3) 10·5
4) 3·9

Answer:

2) 8·5



Explanation:

	$2SO_2$	+ $O_2 \Leftrightarrow$	$2SO_3$
Initial Concentration equilibrium at t=0	5	5	0
No. of moles at equilibrium	(5 –3)	(5 – 1.5)	3

Total Number of moles = 2+3.5+3

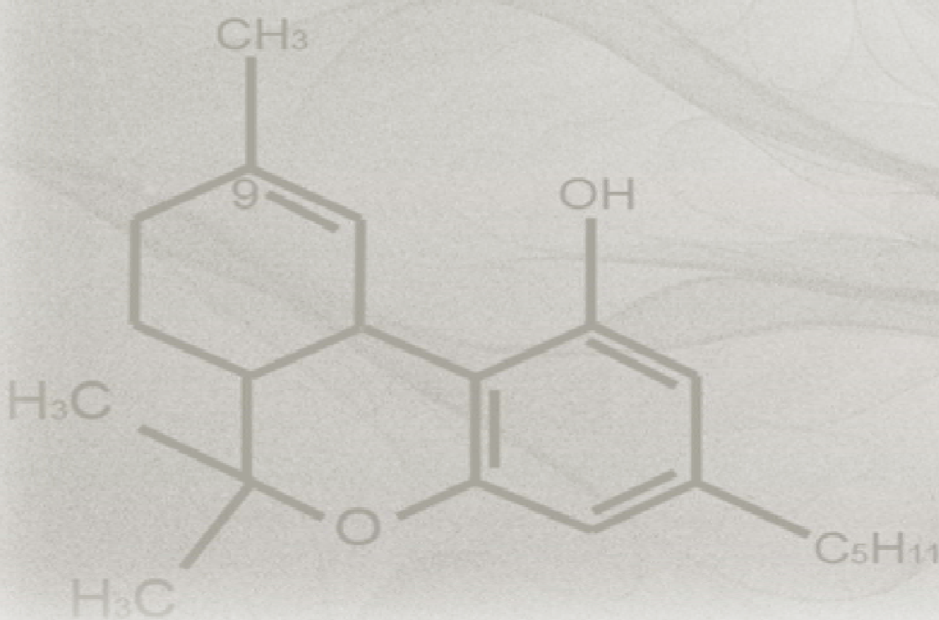
= 8.5 mol

26. The rate of forward reaction is twice the rate of reverse reaction at a given temperature and identical concentration K_{eq} is

1) 0.5
2) 1.5
3) 2.5
4) 2.0

Answer:

4) 2.0

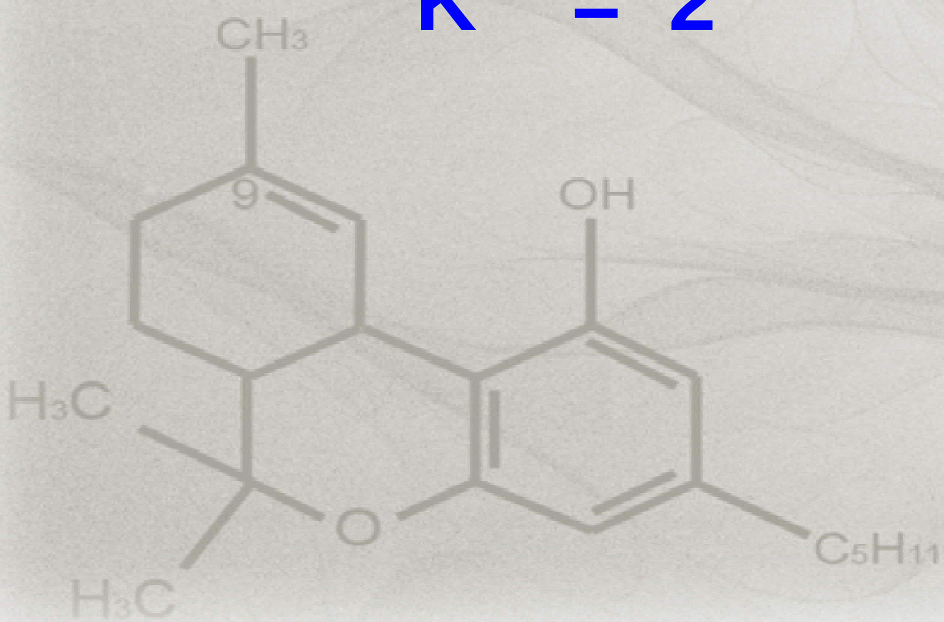


Explanation:

$$K = K_f / K_b$$

$$K = 2.0 / 1.0$$

$$K = 2$$

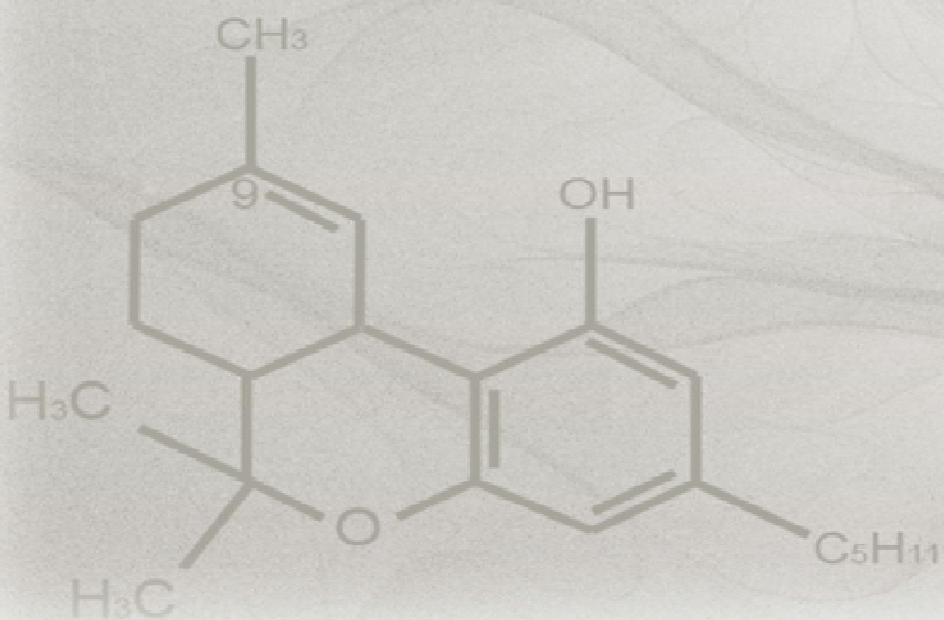


27. $2HI \leftrightarrow H_2 + I_2$ Here the relation between K_P and K_C is

1) $K_P > K_C$
2) $K_P < K_C$
3) $K_P = K_C$
4) $K_P \neq K_C$

Answer:

3) $K_P = K_C$



Explanation:

W.K.T., $K_p = K_c(RT)^{\Delta n}$

$2HI_{(g)} \leftrightarrow H_{2(g)} + I_{2(g)}$; $\Delta n = 2 - 2 = 0$

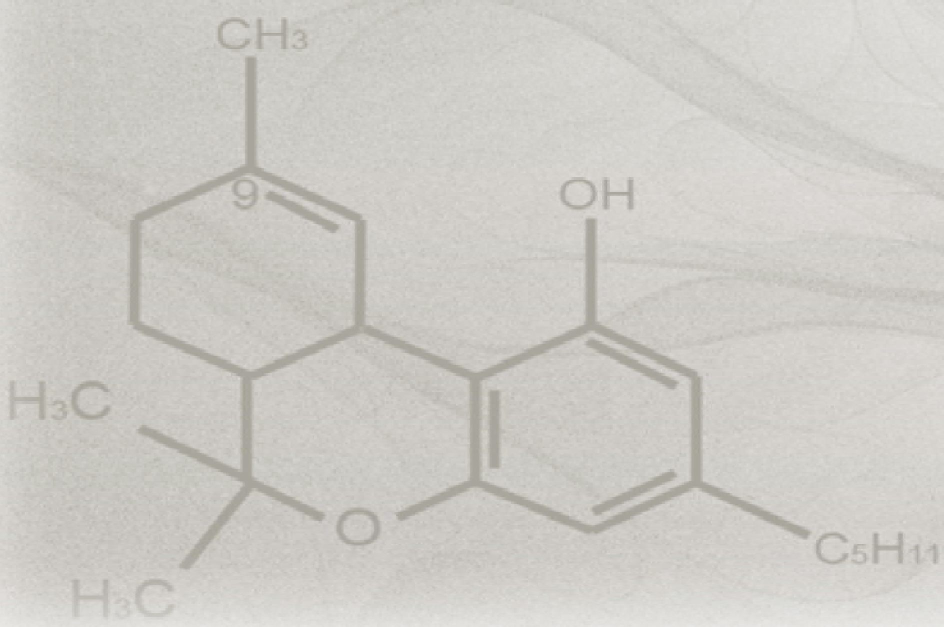
$\therefore \; K_p = K_c$

28. $N_2 + 3H_2 \leftrightarrow 2NH_3$ + Heat. What is the effect of increase of temperature on the equilibrium of the reaction?

1) Equilibrium is shifted to the left
2) Equilibrium is shifted to the right
3) Equilibrium is unaltered
4) Reaction rate does not change

Answer:

1) Equilibrium is shifted to the left



Explanation:

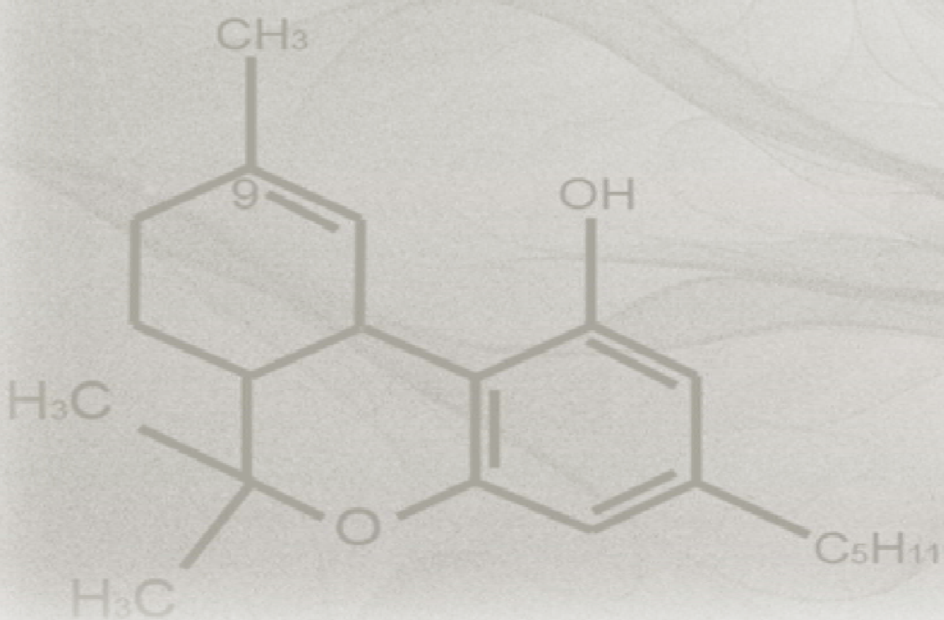
According Le-chatelier's principle all exothermic reactions are favoured by low temperature. Since the forward reaction is exothermic. If we increase the temperature backward reaction takes place. Hence equilibrium shifted to left.

29. The reaction in which the yield of the product cannot be increased by the application of high pressure is

1) $PCl_3 + Cl_2 \leftrightarrow PCl_5$
2) $N_2 + O_2 \leftrightarrow 2NO$
3) $N_2 + 3H_2 \leftrightarrow 2NH_3$
4) $2SO_2 + O_2 \leftrightarrow 2SO_3$

Answer:

2) $N_2 + O_2 \leftrightarrow 2NO$



Explanation:

If $\Delta n=0$, then the pressure has no effect on the equilibrium.

In this reaction

$$N_{2(g)} + O_{2(g)} \leftrightarrow 2NO_{(g)};\ \Delta n=2-2=0$$

30. At any moment before a reversible reaction attains equilibrium it is found that

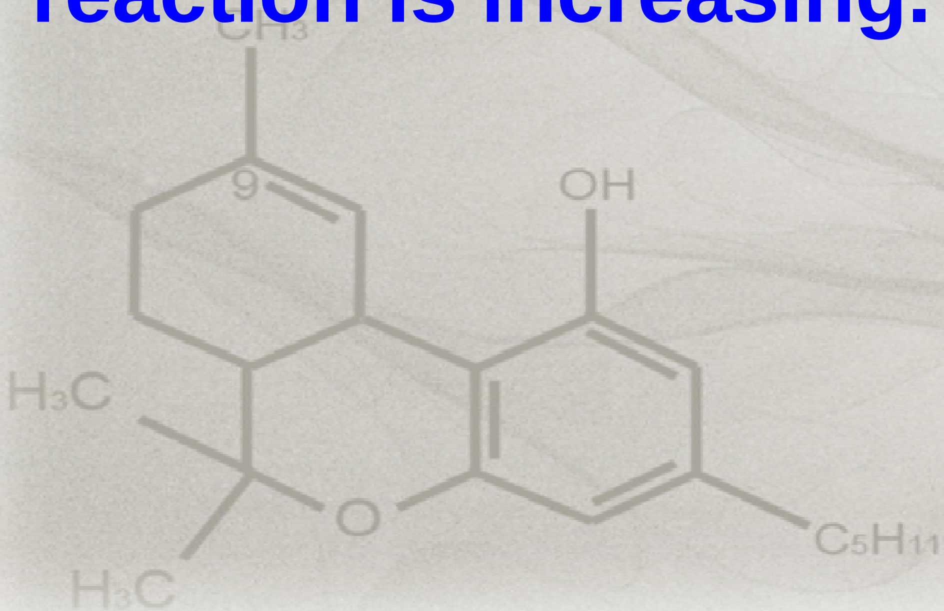
1) **The velocity of the forward reaction is increasing and that of the backward reaction is decreasing.**
2) **The velocity of the forward reaction is decreasing and that of the backward reaction is increasing.**

3) The velocities of both the forward reaction and backward reaction are increasing.

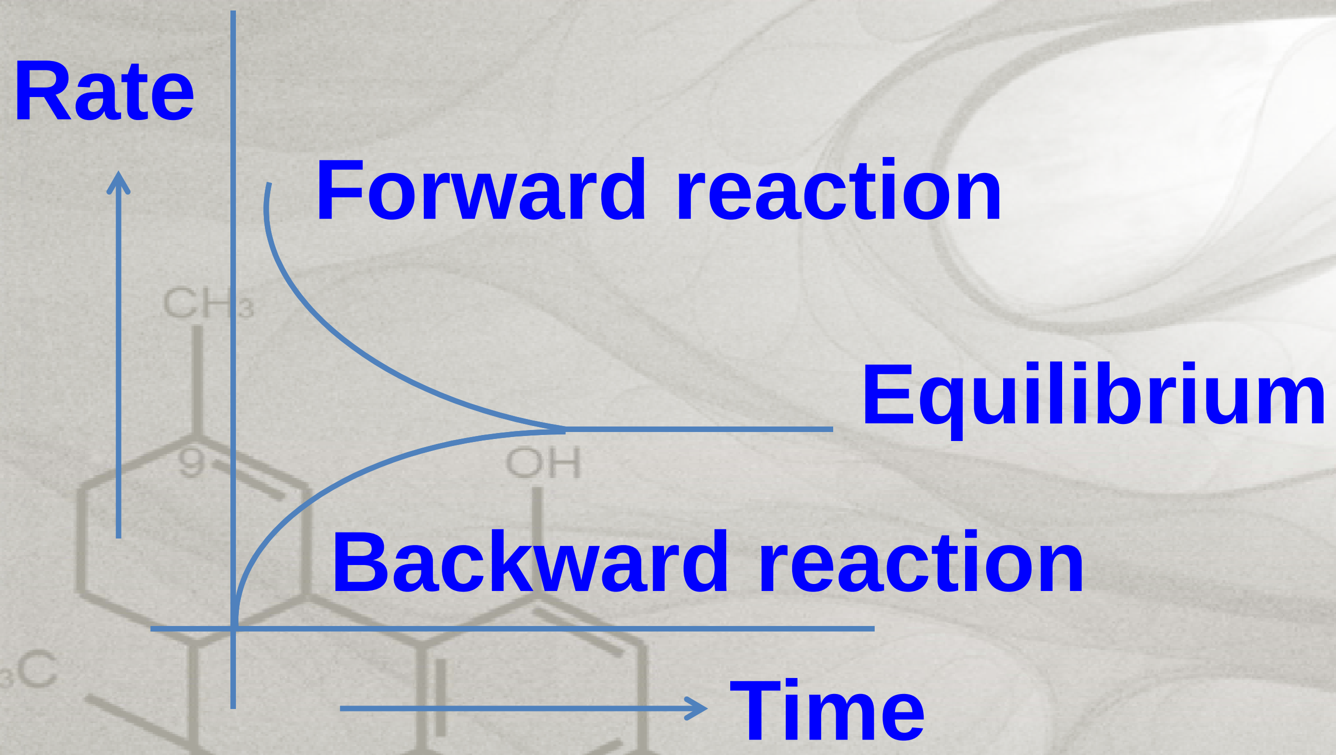
4) The velocities of both the forward reaction and backward reaction are decreasing.

Answer:

2) The velocity of the forward reaction is decreasing and that of the backward reaction is increasing.



Explanation:



31. In a catalytic conversion of N_2 to NH_3 by Haber process the rate of a reaction was expressed as change in the concentration of ammonia per time is 40×10^{-3} mol $l^{-1}s^{-1}$. If there are no side reactions the rate of the concentration as expressed in terms of hydrogen is

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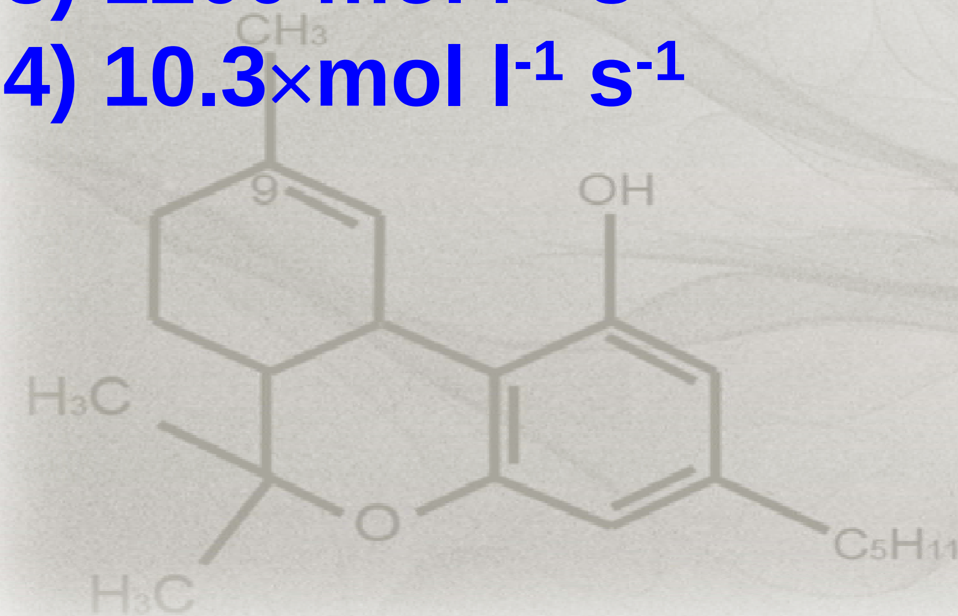
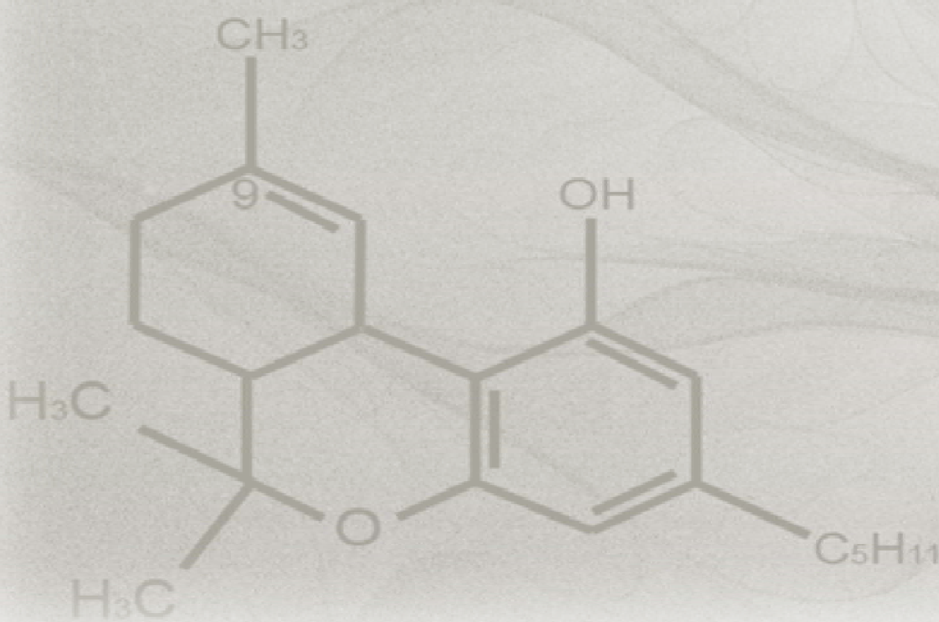
1) 60×10^{-3} mol l^{-1} s^{-1}
2) 20×10^{-3} mol l^{-1} s^{-1}
3) 1200 mol l^{-1} s^{-1}
4) $10.3 \times$mol l^{-1} s^{-1}



Answer:

1) 60×10^{-3} mol l^{-1} s^{-1}



Explanation:

$N_{2(g)} + 3H_{2(g)} \leftrightarrow 2NH_{3(g)}$

$-d[N_2] / dt = -1/3 d[H_2]/dt = 1/2 d[NH_3]/dt$

Given, $d[NH_3]/dt = 40 \times 10^{-3}$ mol l^{-1} s^{-1}

$d[H_2]/dt = ?$

W.K.T.,

$1/3 d[H_2]/dt = 1/2 d[NH_3]/dt$

$d[H_2]/dt = 3/2 d[NH_3]/dt$

$d[H_2]/dt = 3/2 \times 40 \times 10^{-3}$

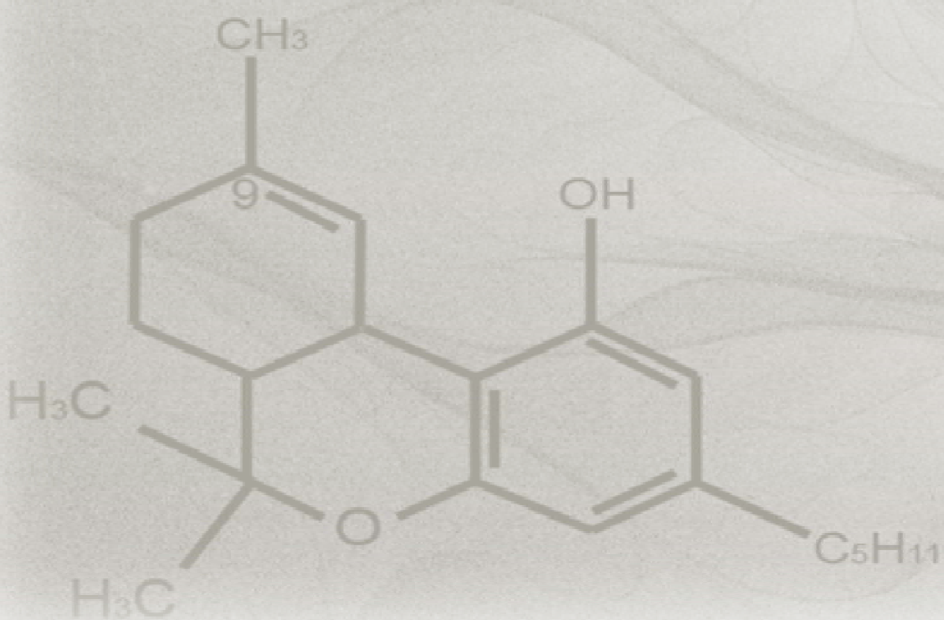
$d[H_2]/dt = 60 \times 10^{-3}$ mol l^{-1} s^{-1}

32. At a given temperature, the equilibrium constant for the reaction, $PCl_{5(g)} \leftrightarrow PCl_{3(g)} + Cl_{2(g)}$ is 2.4×10^{-3}. At the same temperature, the equilibrium constant for the reaction $PCl_{3(g)} + Cl_{2(g)} \leftrightarrow PCl_{5(g)}$ is

1) 2.4×10^{-3}
2) -2.4×10^{-3}
3) 4.2×10^{2}
4) 4.8×10^{-2}

Answer:

3) 4.2×10^{2}



Explanation:

Given, $K_f = 2.4\times10^{-3}$

$K_b = ?$

W.K.T.,

$K_b = 1/K_f$

$K_b = 1/2.4\times10^{-3}$

$K_b = 0.416\times10^{3}$

$K_b = 4.2\times10^{2}$

33. In a vessel containing SO_3, SO_2, and O_2 at equilibrium, some helium gas is introduced so that the total pressure increases while temperature and volume remains constant. According to Lechatelier principle, the dissociation of SO_3 is

1) Increases

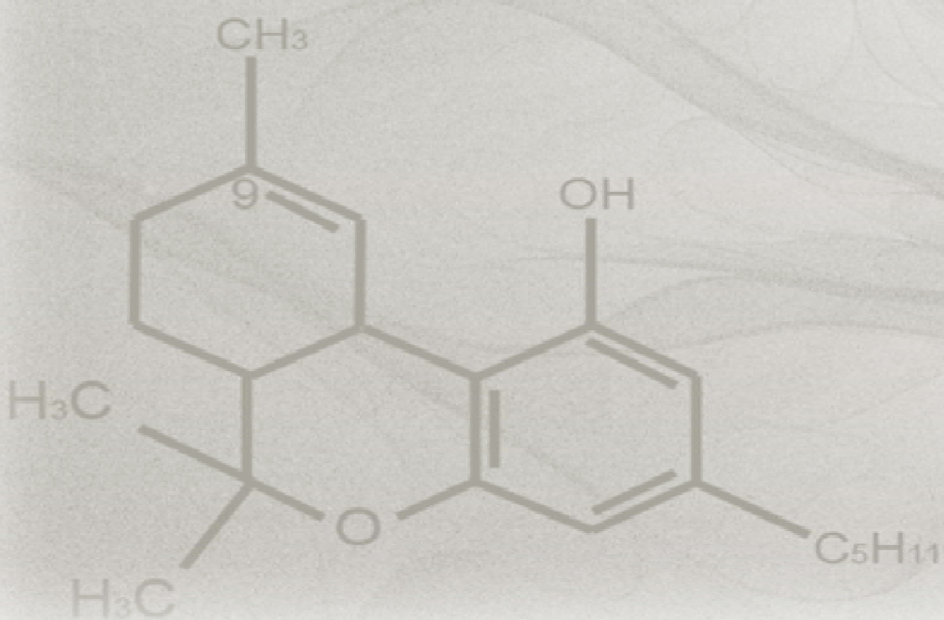
2) decreases

3) remains unaltered

4) changes unpredictably

Answer:

2) decreases



Explanation:

$2SO_{2(g)} + O_{2(g)} \leftrightarrow 2SO_{3(g)}$

$\therefore \Delta n_g = n_p - n_r = 2 - 3 = -1$

If $\Delta n_g = 0$, pressure has no effect on the equilibrium

If $\Delta n_g = +ve$, high pressure favours backward reaction.

If $\Delta n_g = -ve$, high pressure favours forward reaction.

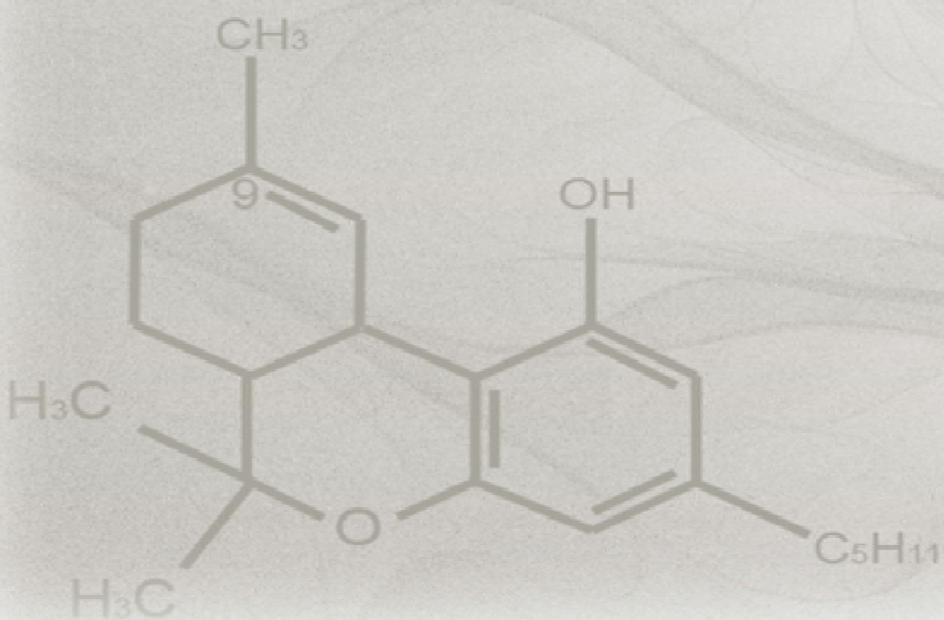
Hence rate of backward reaction decreases.

34. Which of the following types of metals form the most efficient catalysts?

1) Alkali metals
2) Alkaline earth metals
3) Transition metals
4) All of these

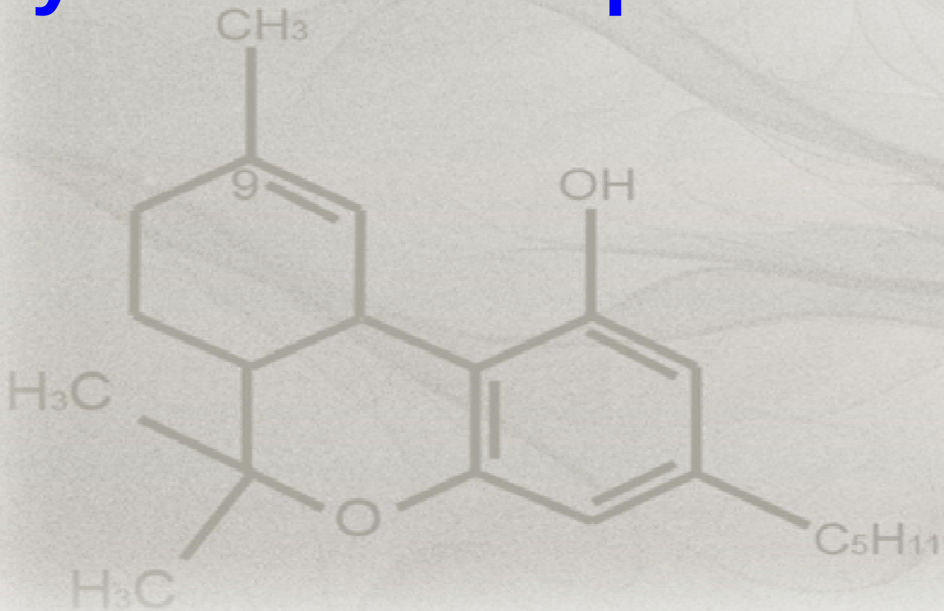
Answer:

3) Transition metals



Explanation:

This is because they can provide larger surface for the adsoprtion of reactants and they exhibit multiple oxidation state.

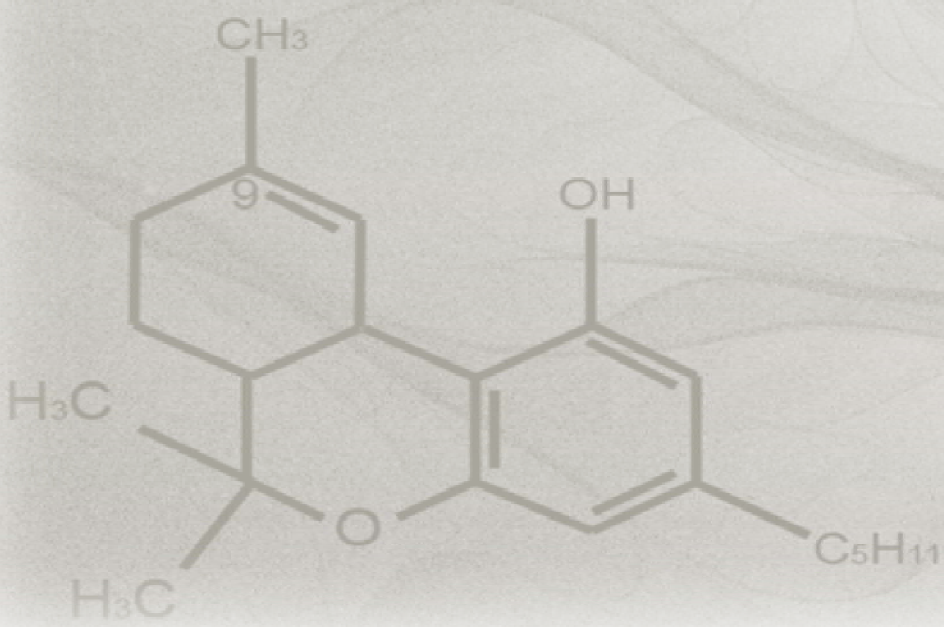


35. Which of the following statements is not true?

1) A catalyst alters the rate of a reaction
2) A catalyst is specific in nature
3) A catalyst initiates a reaction
4) A catalyst does not affect an equilibrium

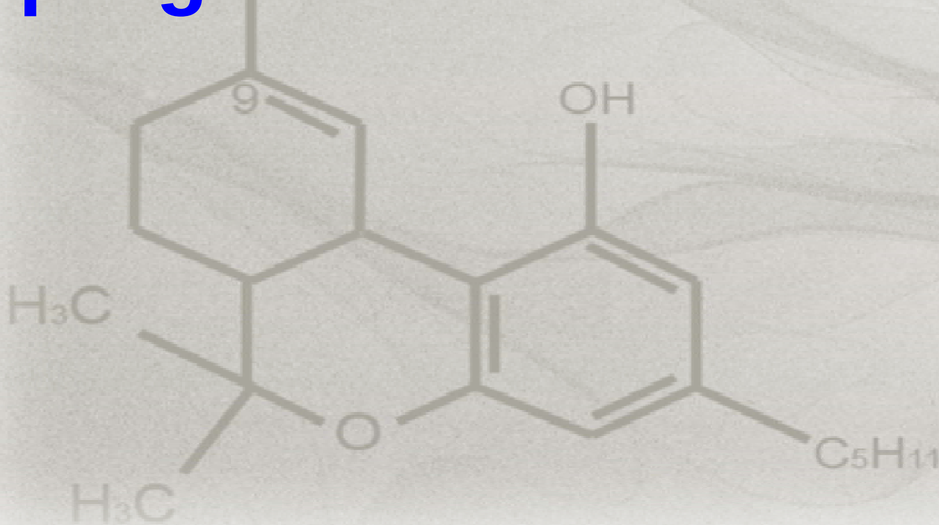
Answer:

3) A catalyst initiates a reaction



Explanation:

Catalyst does not initiate a reaction just it accelerates the reaction which is already in progress.

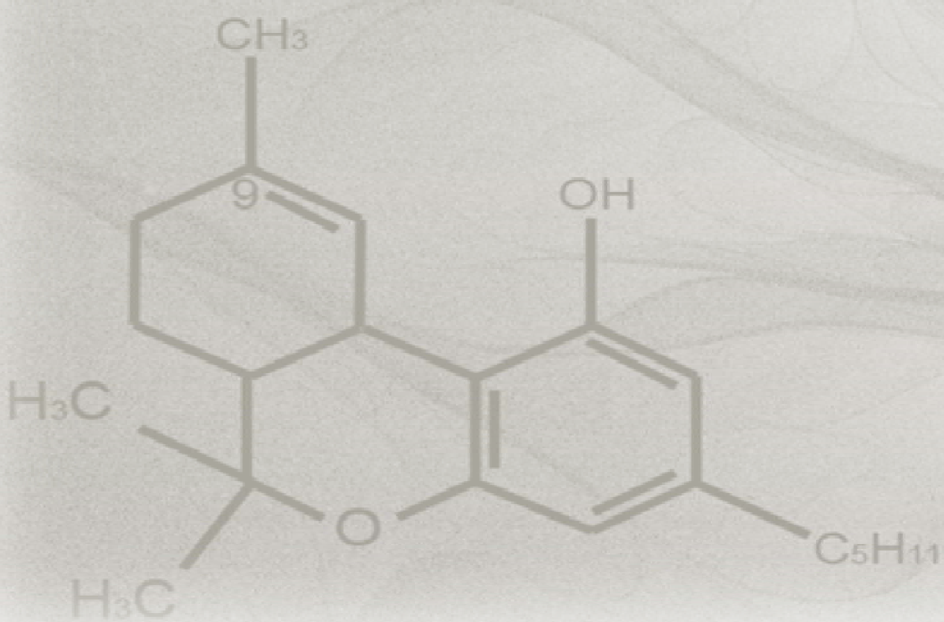


36. Mark the correct statement, in a reversible reaction.

1) The catalyst catalyses the forward reaction
2) The catalyst catalyses the backward reaction
3) The catalyst influences the direct and the reverse reaction to the same extent
4) The catalyst increases the rate of forward reaction and decreases the rate of backward reaction.

Answer:

3) The catalyst influences the direct and the reverse reaction to the same extent.



Explanation:

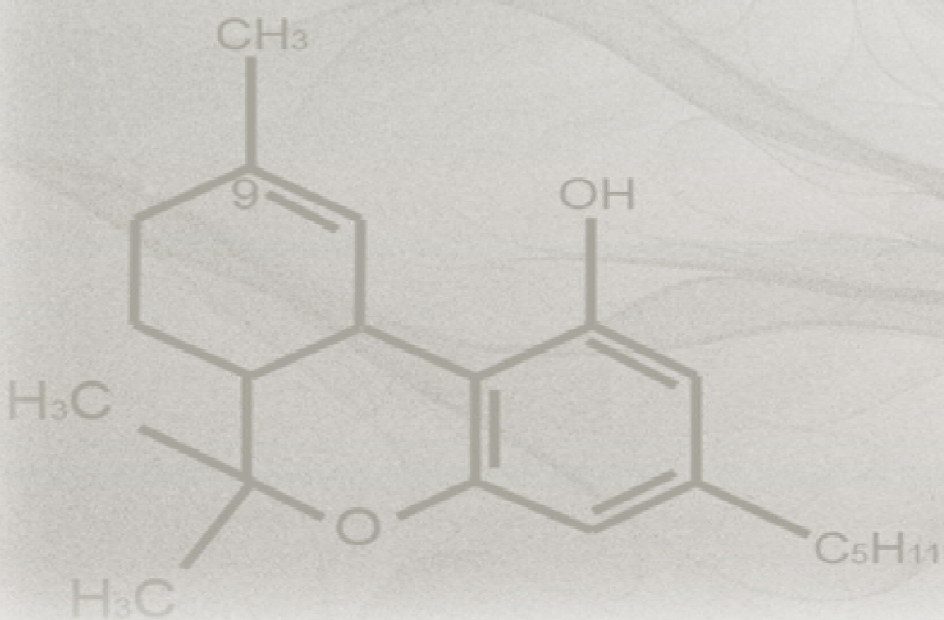
The catalyst helps to attain the equilibrium quickly by accelerating both forward and backward reaction equally.

37. Which of the statements is wrong among the following?

1) Haber's process of NH_3 requires iron as catalyst
2) Friedel-Craft's reaction uses iron as catalyst.
3) Hydrogenation of oils uses iron as catalyst
4) Oxidation of SO_2 to SO_3 requires V_2O_5

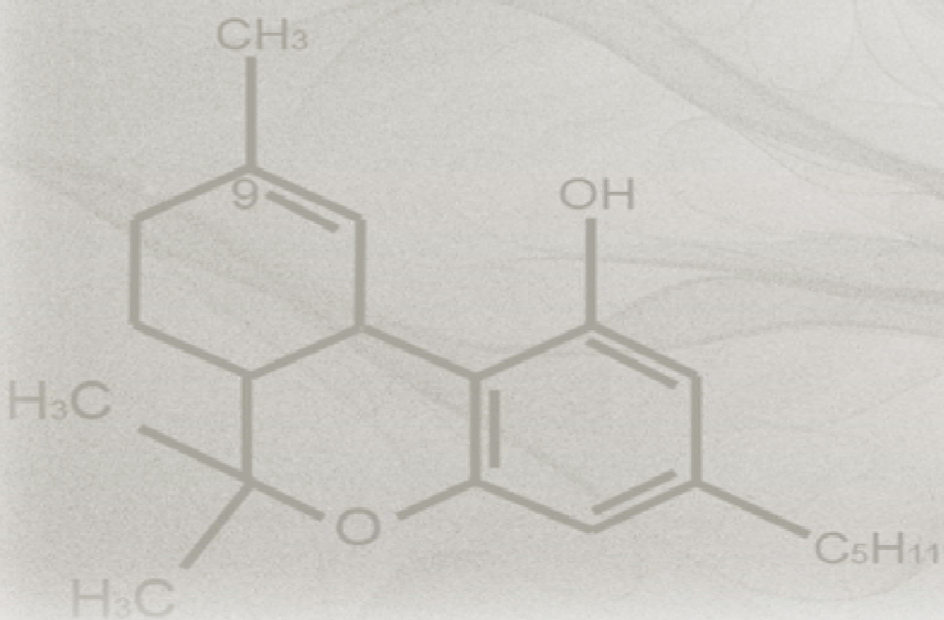
Answer:

3) Hydrogenation of oils uses iron as catalyst



Explanation:

In the hydrogenation of oil nickel is used as catalyst.

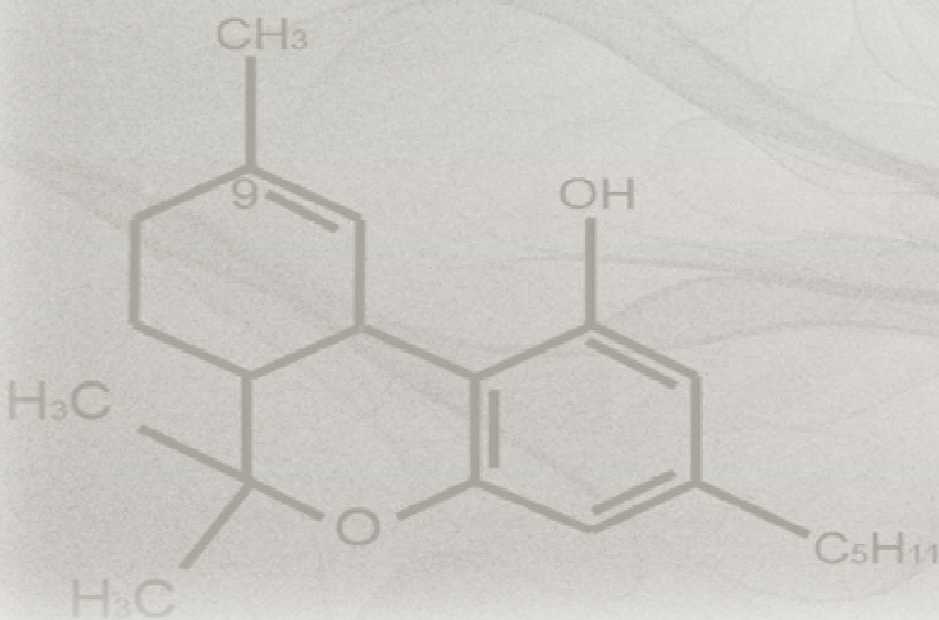


38. Which one of the following is a homogeneous catalysis?

1) Hydrogenation of oils
2) Synthesis of ammonia by Haber’s process
3) Manufacture of sulphuric acid by lead chamber process
4) Manufacture of sulphuric acid by contact process

Answer:

3) Manufacture of sulphuric acid by lead chamber process



Explanation:

In Lead chamber process following reaction takes place, Here reactants and catalysts are in same phase.

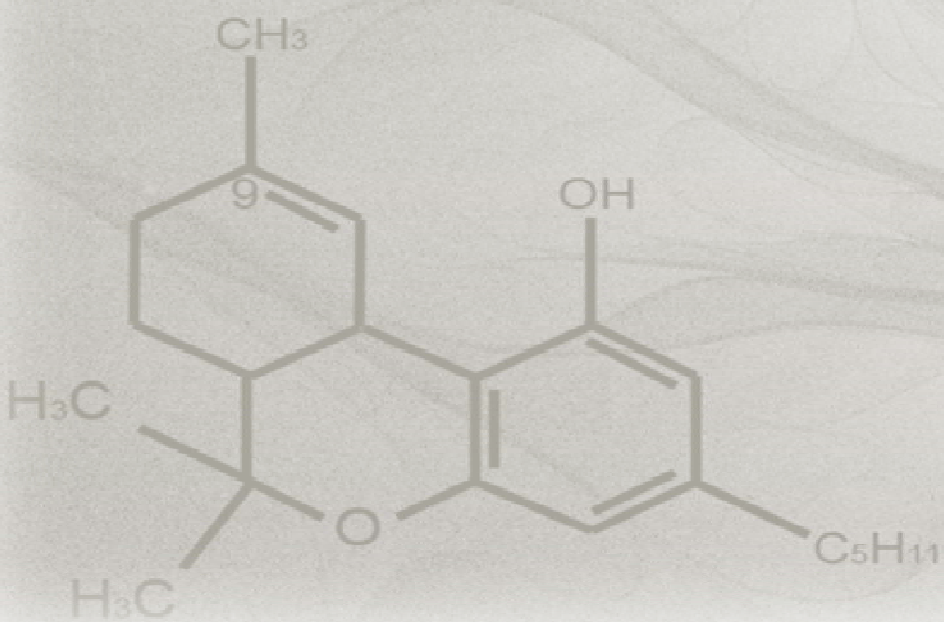
$$2SO_{2(g)} + O_{2(g)} \overset{NO_{(g)}}{\Leftrightarrow} 2SO_{3(g)}$$

39. The adsorption of inert gases on the surface of activated charcoal increases with

1) Decrease of both atomic mass and temperature
2) Increase of both atomic mass and temperature
3) Increase of atomic mass and decrease in temperature
4) Decrease of atomic mass and increase in temperature

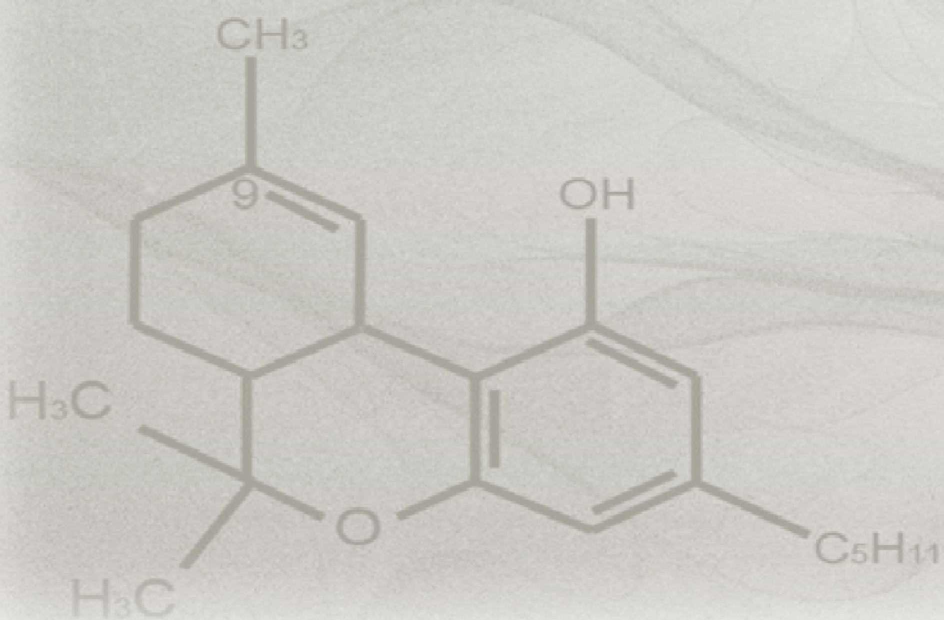
Answer:

3) Increase of atomic mass and decrease in temperature



Explanation:

Increase in atomic mass and decrease in temperature are favourable for adsorption.

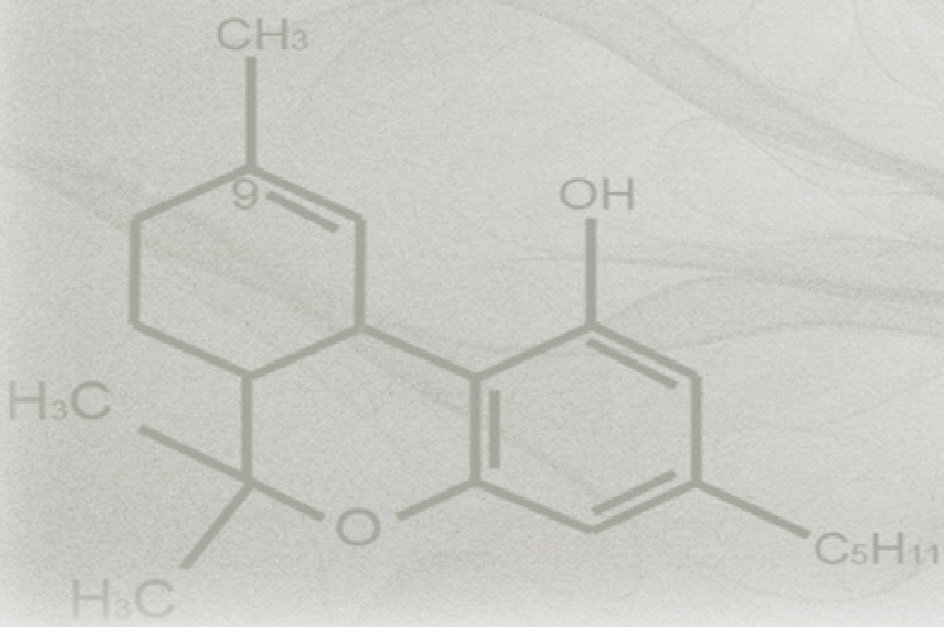


40. A small amount of silica gel and that of anhydrous $CaCl_2$ are placed separately in two corners of room containing water vapour. What phenomena will occur in these two cases?

1) Adsorption in both
2) Absorption in both
3) Adsorption on silica gel and absorption on $CaCl_2$
4) Absorption on silica gel and adsorption on $CaCl_2$

Answer:

3) Adsorption on silica gel and absorption on $CaCl_2$



Explanation:

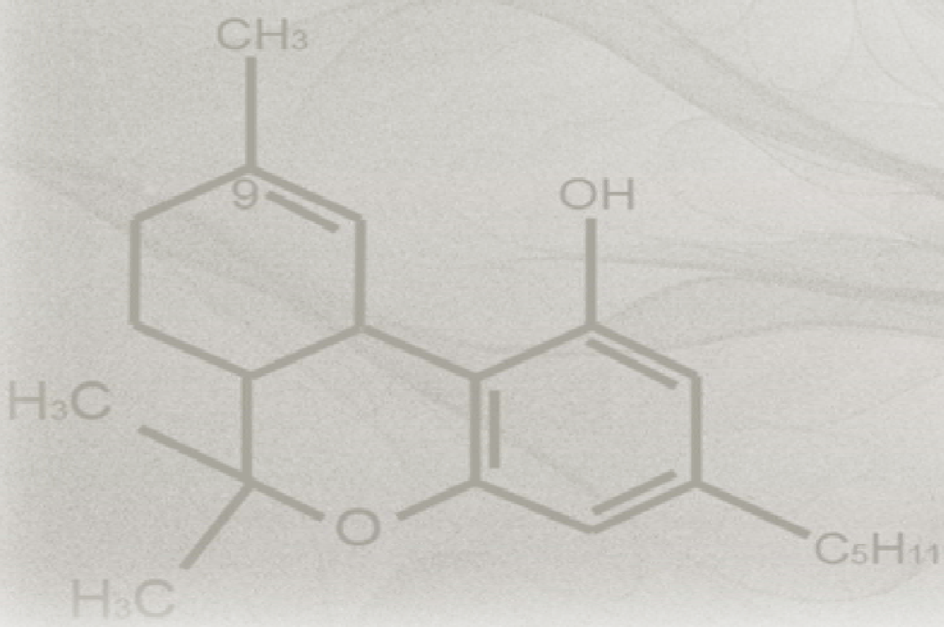
Adsorption is a surface phenomena and absorption is a bodily phenomena hence water vapours are adsorbed by silica gel and absorbed by anhydrous calcium chloride.

41. Rate of physisorption increases with

1) Decrease in temperature
2) Increase in temperature
3) Decrease in pressure
4) Decrease in surface area

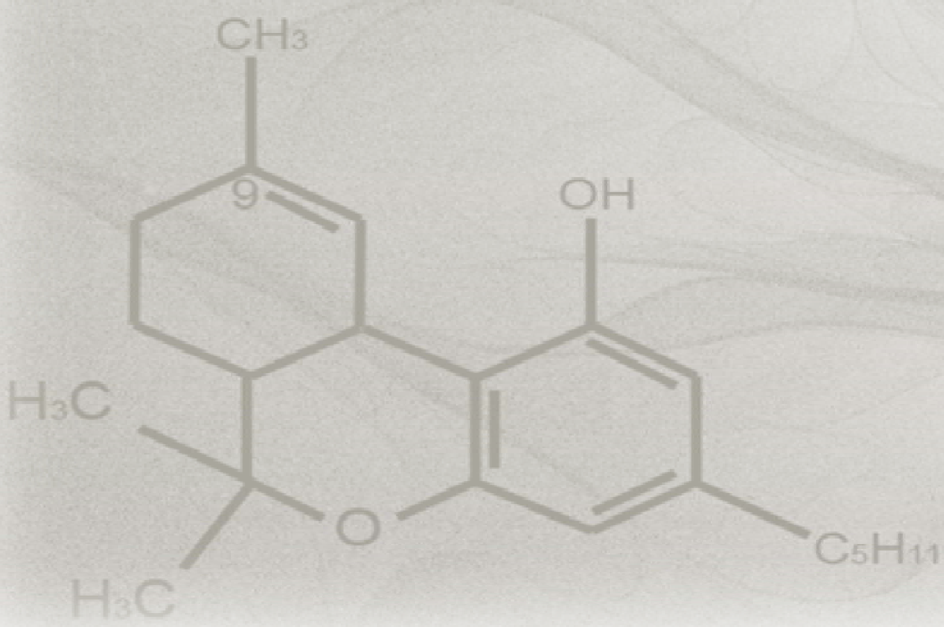
Answer:

1) Decrease in temperature



Explanation:

Physisorption is exothermic hence it is favoured by low temperature.

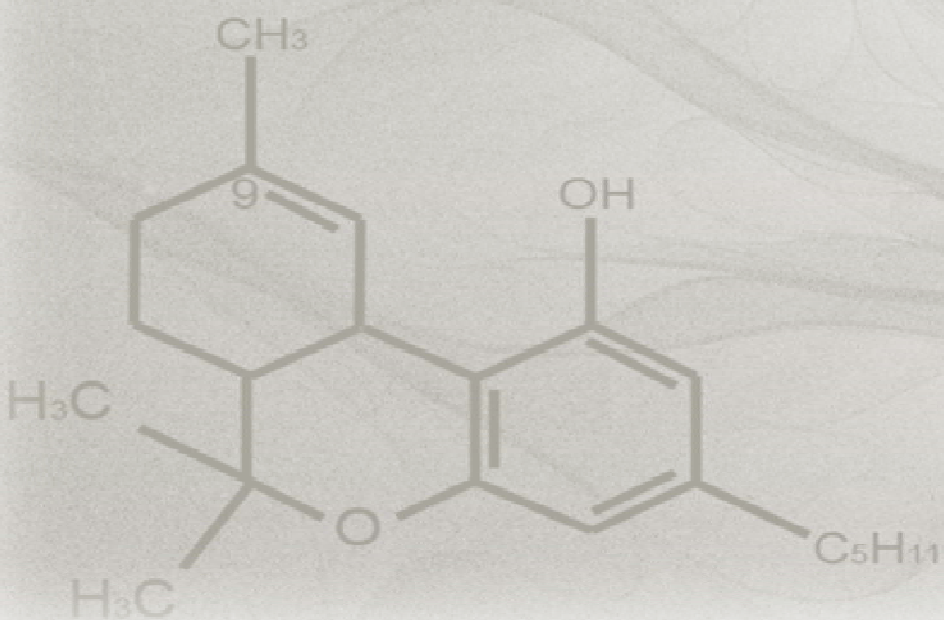


42. In chemisorption, as the pressure increases the rate of adsorption

1) Decreases
2) Increases
3) Increases up to certain pressure and later remains constant
4) Remains the same

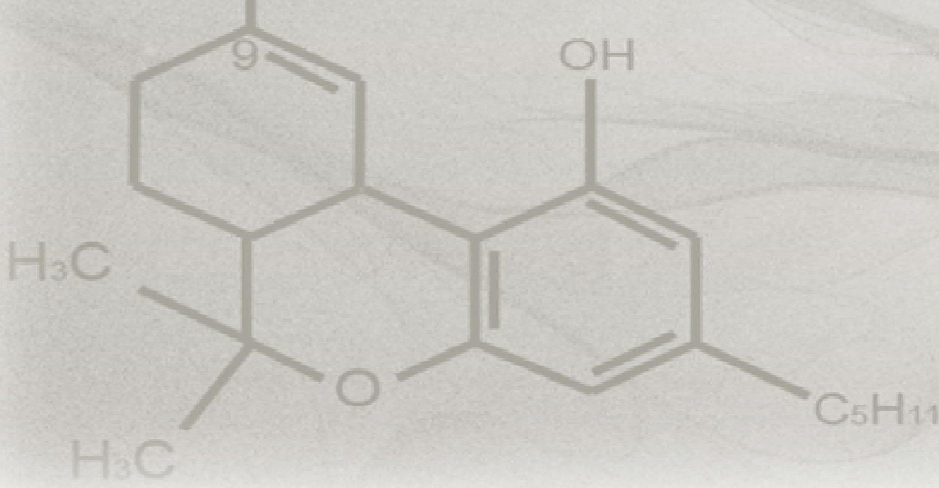
Answer:

3) Increases up to certain pressure and later remains constant



Explanation:

In chemisorption as pressure increases rate of adsorption also increases but pressure has no effect after the formation of unilayer.

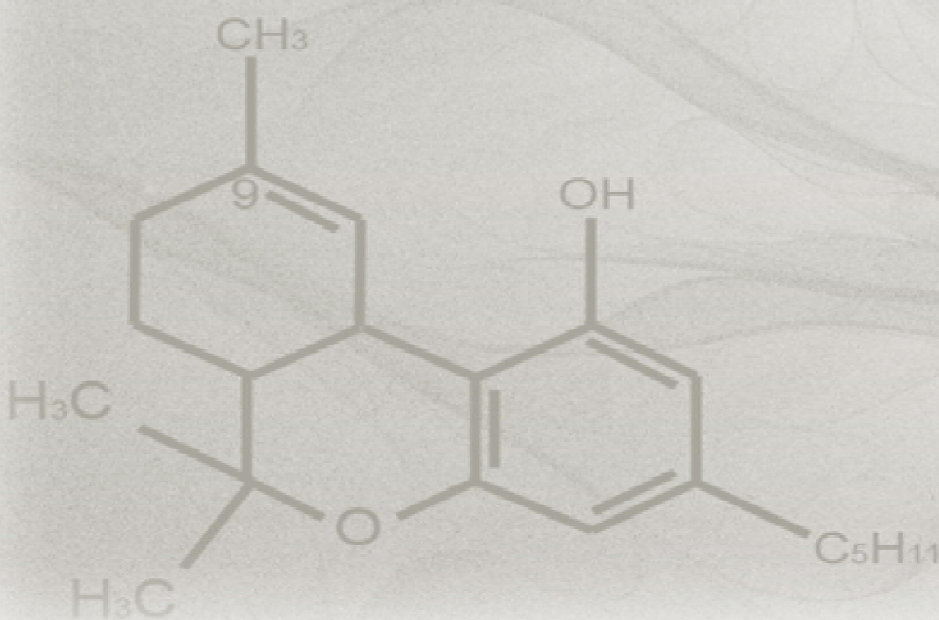


43. The decomposition of H_2O_2 increases in the presence of

1) Acetanilide
2) dil.H_2SO_4
3) Alcohol
4) MnO_2

Answer:

4) MnO_2



Explanation:

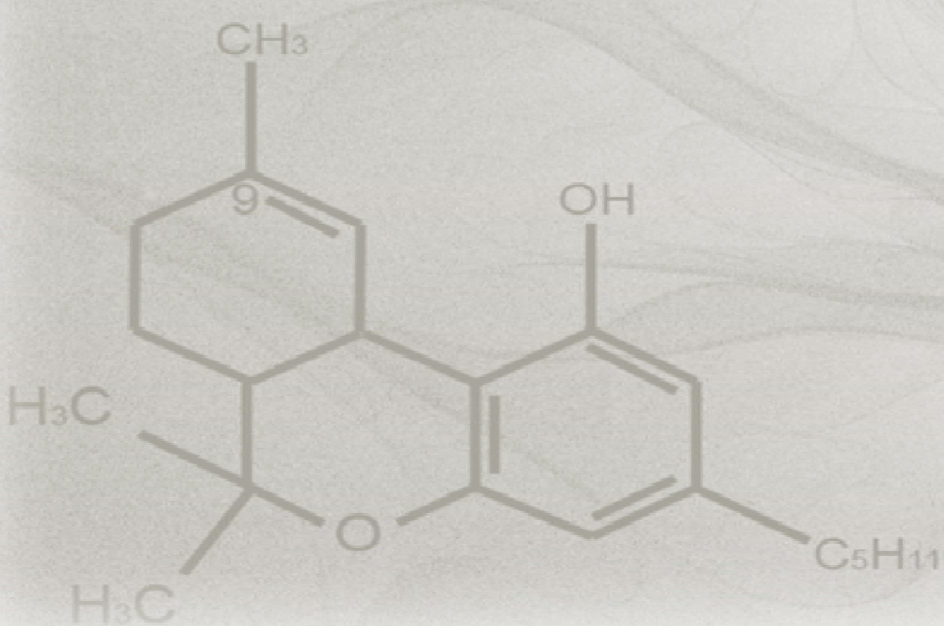
MnO_2 acts as positive catalyst acetanilide, dil.H_2SO_4, Alcohol acts as negative catalyst.

44. An inhibitor is

1) A homogeneous catalysis
2) A heterogeneous catalyst
3) A negative catalyst
4) An auto catalyst

Answer:

3) A negative catalyst



Explanation:

Negative catalyst is a catalyst which decreases the rate of reaction.

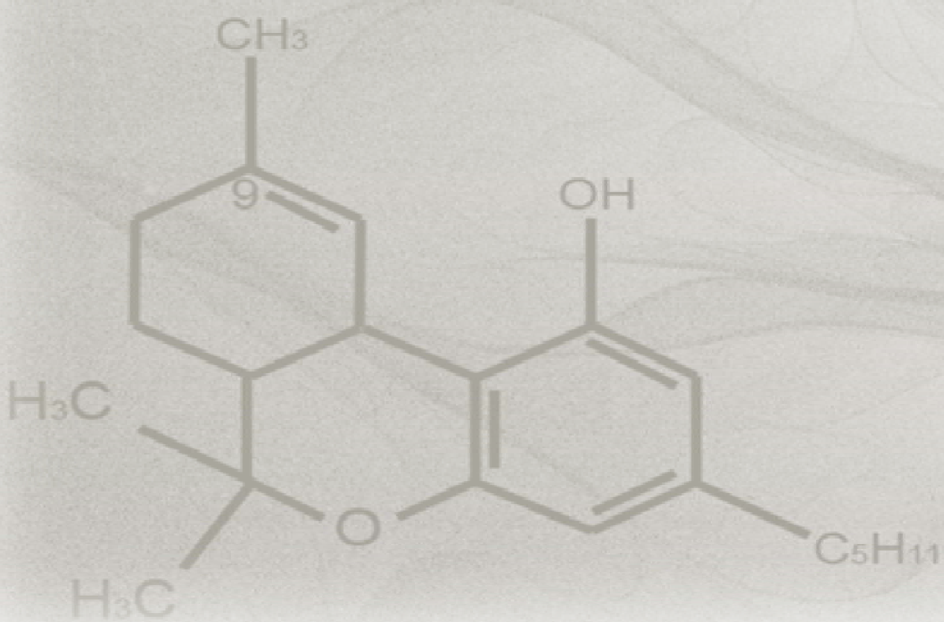
Catalytic inhibitor decreases the efficiency of catalyst by blocking the active centres and hence rate of reaction decreases.

45. Potassium metabisulphite used as a food preservative is

1) A homogeneous catalyst
2) A heterogeneous catalyst
3) A positive catalyst
4) A negative catalyst

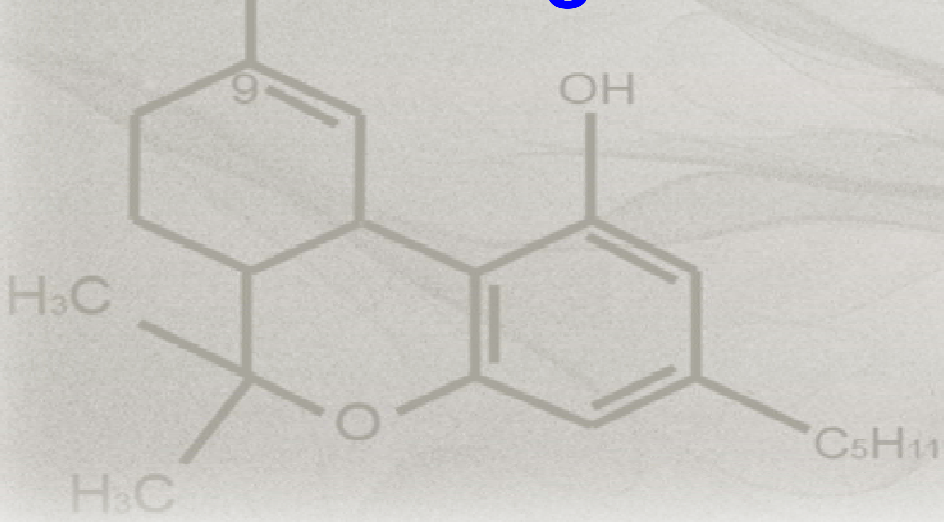
Answer:

4) A negative catalyst



Explanation:

Food preservative decreases the rate of spoiling of food hence it is taken as negative catalyst.

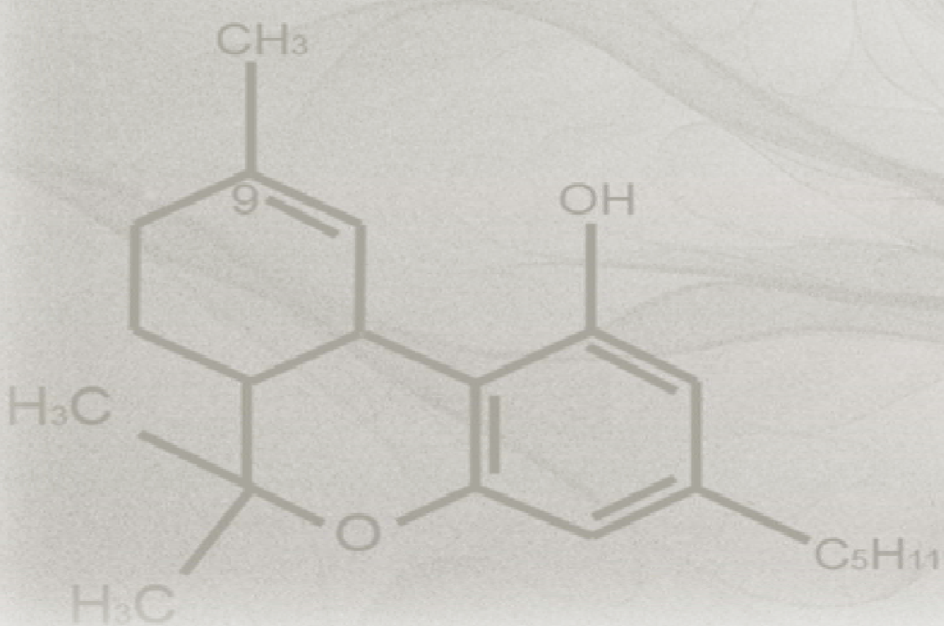


46. In the case of auto catalysis

1) Solvent catalyses
2) Product catalyses
3) Heat produced in the reaction catalyses
4) Reactant catalyses

Answer:

2) Product catalyses



Explanation:

Auto catalyst is a substance produced during a reaction and it self acts as catalyst.

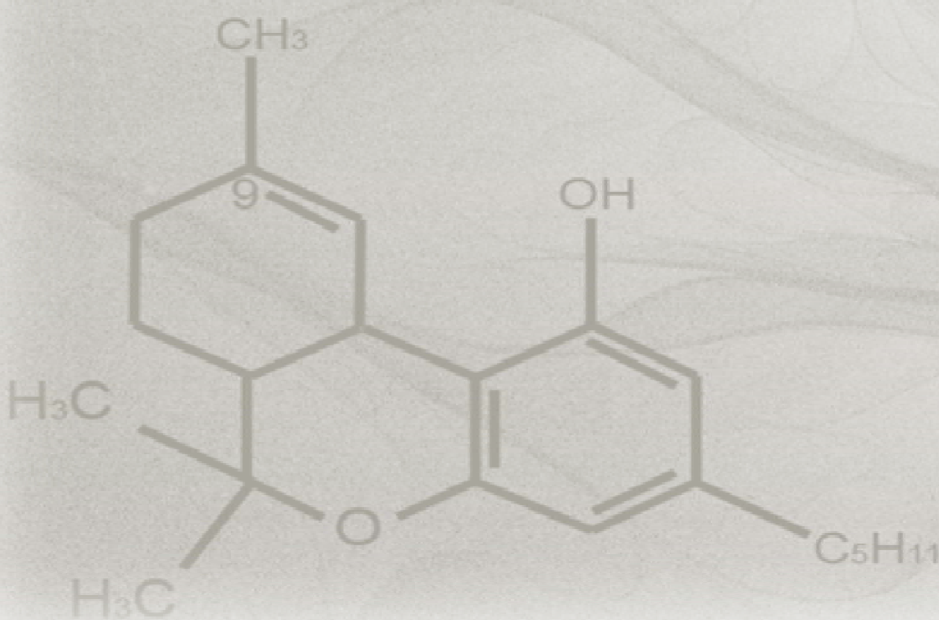
During the titrations using acidified $KMnO_4$, $MnSO_4$ formed as product and acts as an auto catalyst.

47. A catalytic poison destroys the activity of a catalyst by

1) **Forming a protective coating on the layer of the surface of the catalyst**
2) **Decreasing the activation energy of the reaction**
3) **Establishing weak Vander Waals forces at the active centres**
4) **Blocking active centres permanently**

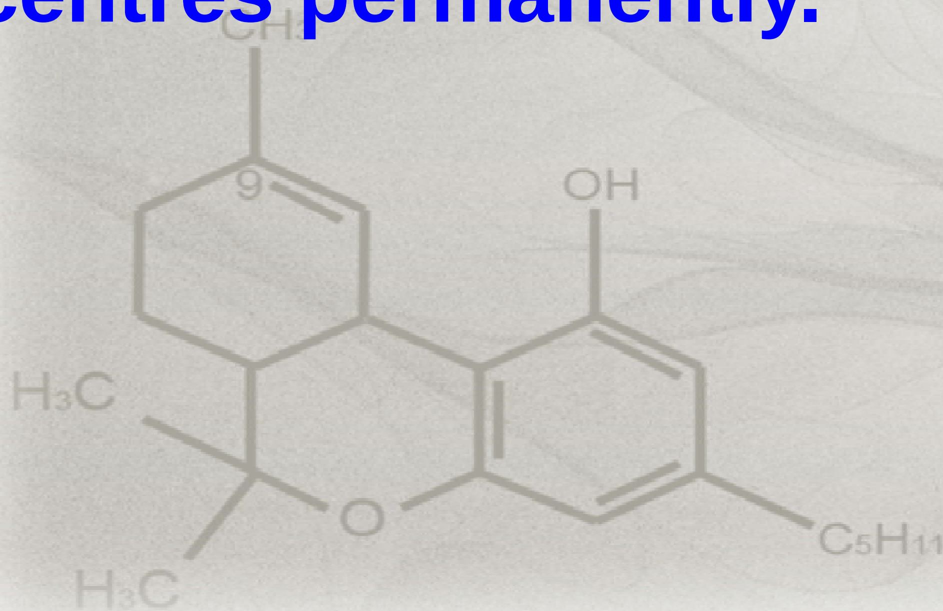
Answer:

4) Blocking active centres permanently



Explanation:

Catalytic inhibitor decreases the efficiency of catalyst by blocking the active centres permanently.

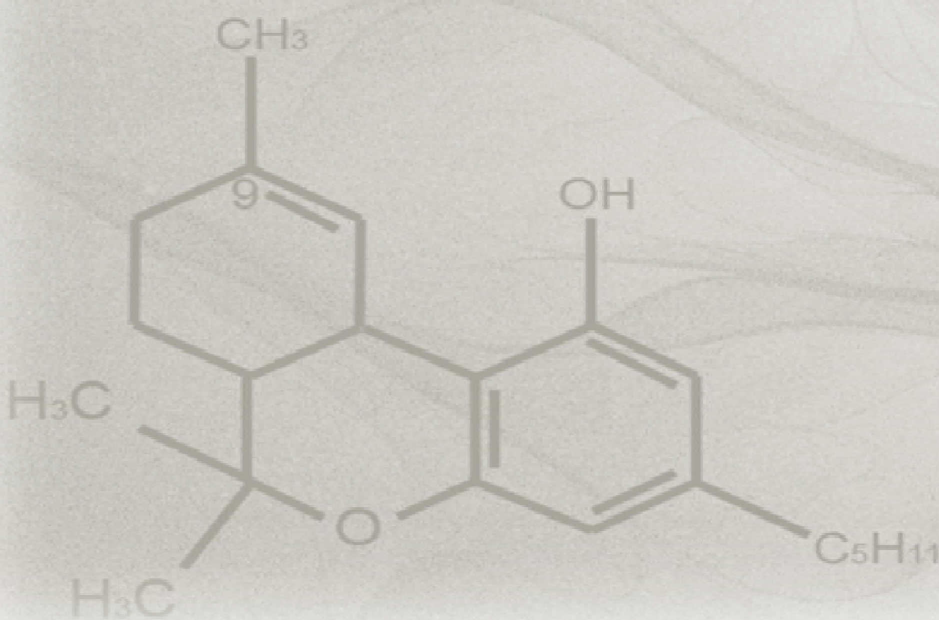


48. For adsorption of a gas on a solid, the plot of log x/m Vs log P is linear with slope equal to (n being whole number)

1) k
2) logk
3) n
4) 1/n

Answer:

4) 1/n



Explanation:

W.K.T., Freundlich adsorption isotherm is $x/m=kp^{1/n}$, where x/m is the mass of the gas adsorbed per unit mass of the adsorbent, P is the equilibrium pressure, k and n are constants.

Taking log

$\log x/m = \log k + 1/n \log p$ is similar to equation of the straight line with slope m

$y = c + m x$

$\therefore m = 1/n$

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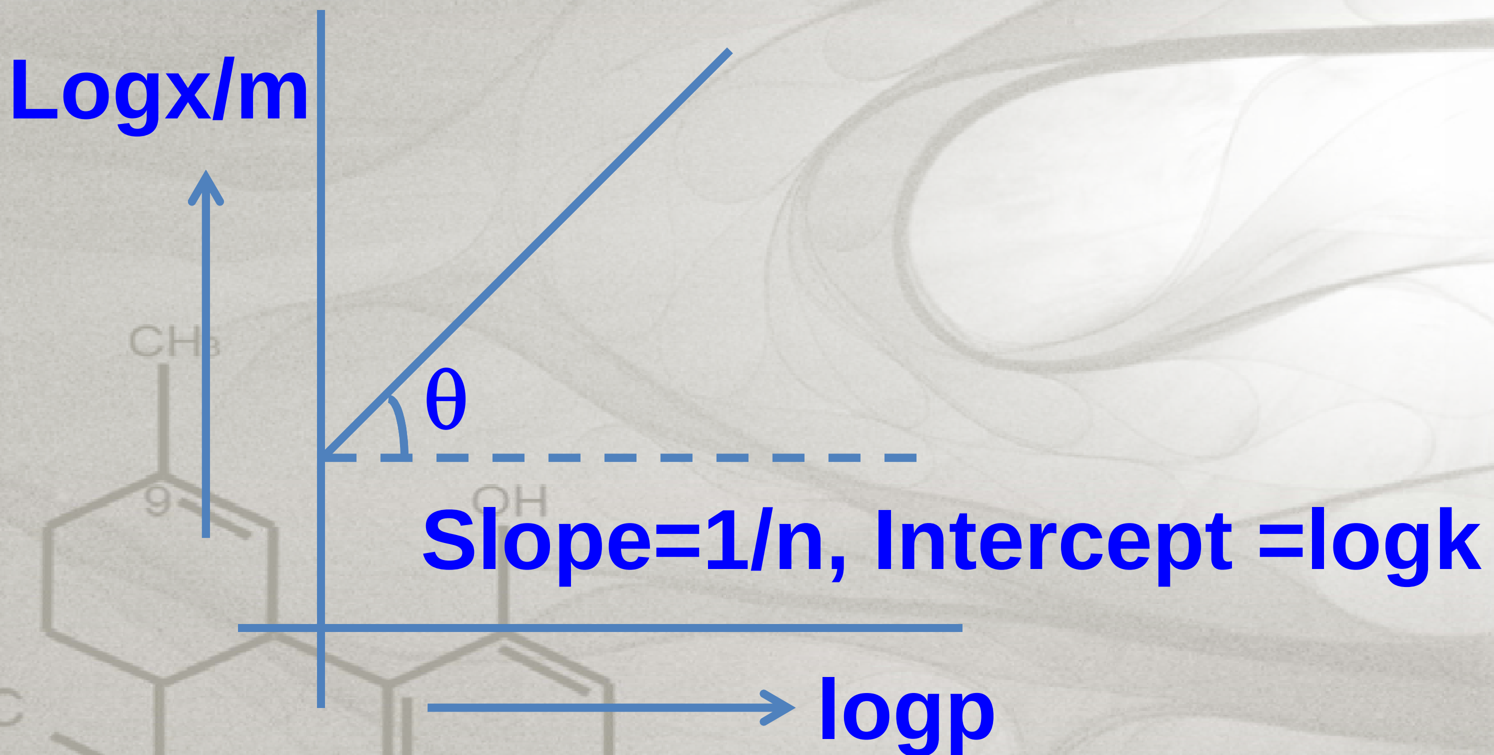
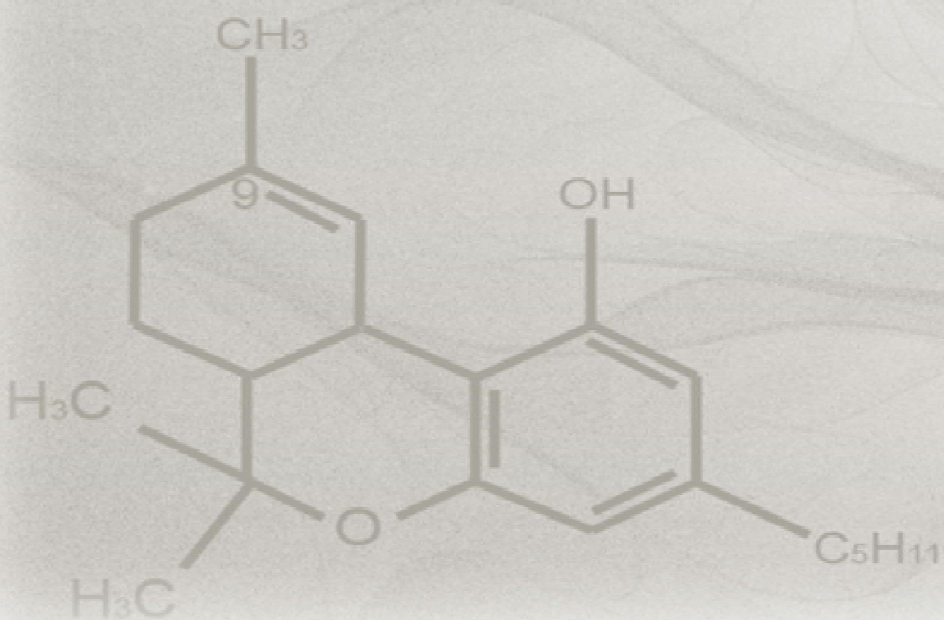


49. Which of the following is not correct regarding the physical adsorption of a gas on the solid surface?

1) On increasing temperature, adsorption increases continuously
2) Enthalpy and entropy changes are negative
3) Adsorption is more for specific substance
4) It is a reversible reaction

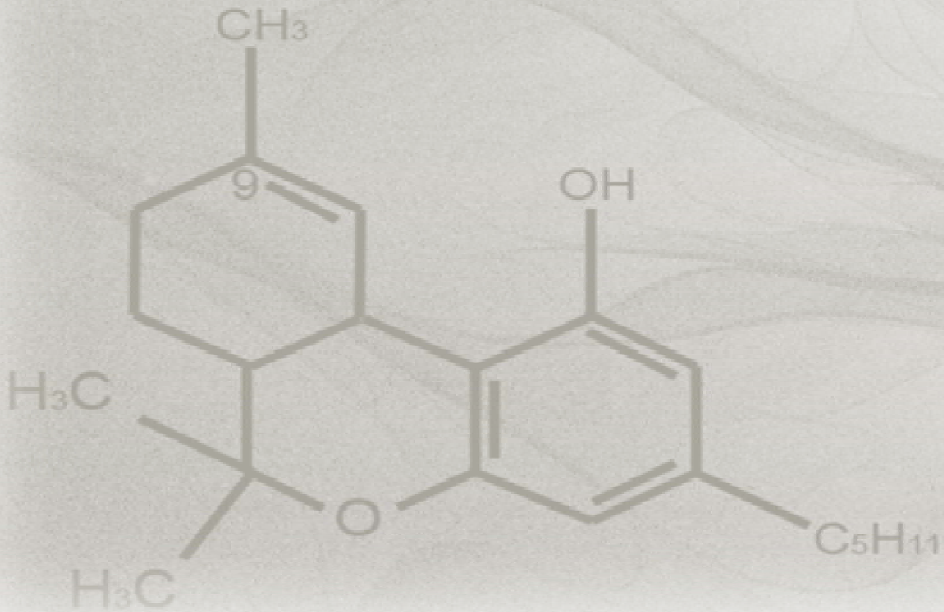
Answer:

1) On increasing temperature, adsorption increases continuously



Explanation:

Adsorption is exothermic hence it decreases with increasing temperature.



50. In Langmuir's model of adsorption of a gas on a solid surface

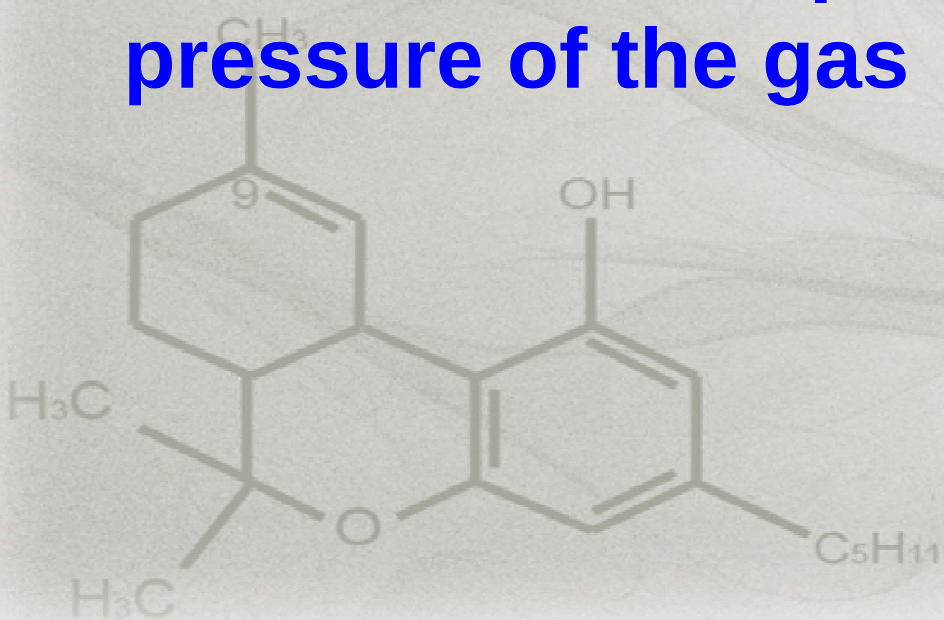
1) The rate of dissociation of adsorbed molecules from the surface does not depend on the surface covered
2) The adsorption at a single site on the surface may involve multiple molecules at the same time

3) The mass of gas striking a given area of surface is proportional to the pressure of the gas

4) The mass of gas striking a given area of surface is independent of the pressure of the gas

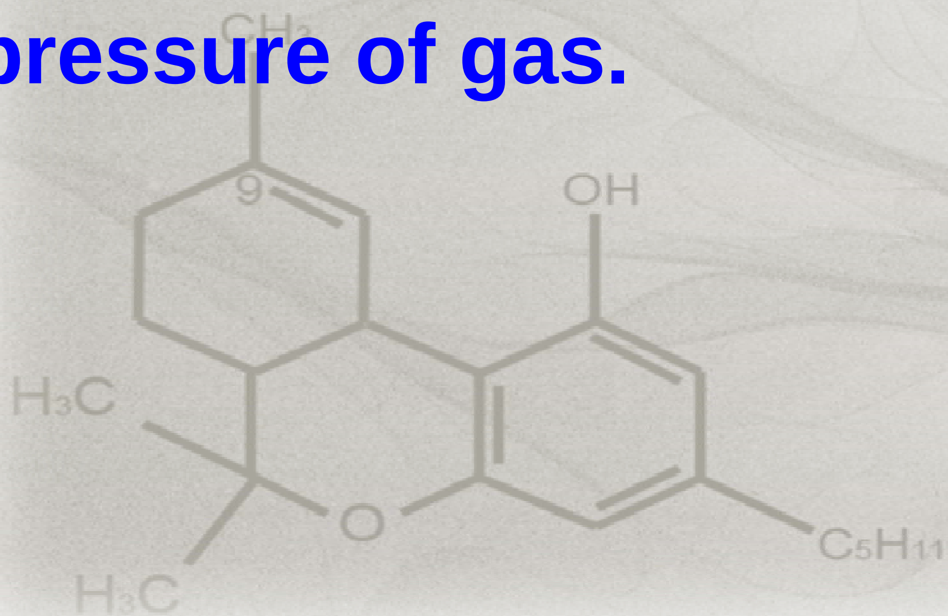
Answer:

3) **The mass of gas striking a given area of surface is proportional to the pressure of the gas**



Explanation:

The amount of gas striking a given surface area is directly proportional to the pressure of gas.



51. Freundlich equation for a adsorption of gases (in amount of X g) on a solid (in amount of m g) at constant temperature can be expressed as

1) $\log \frac{X}{m} = \log p + \frac{1}{n} \log k$

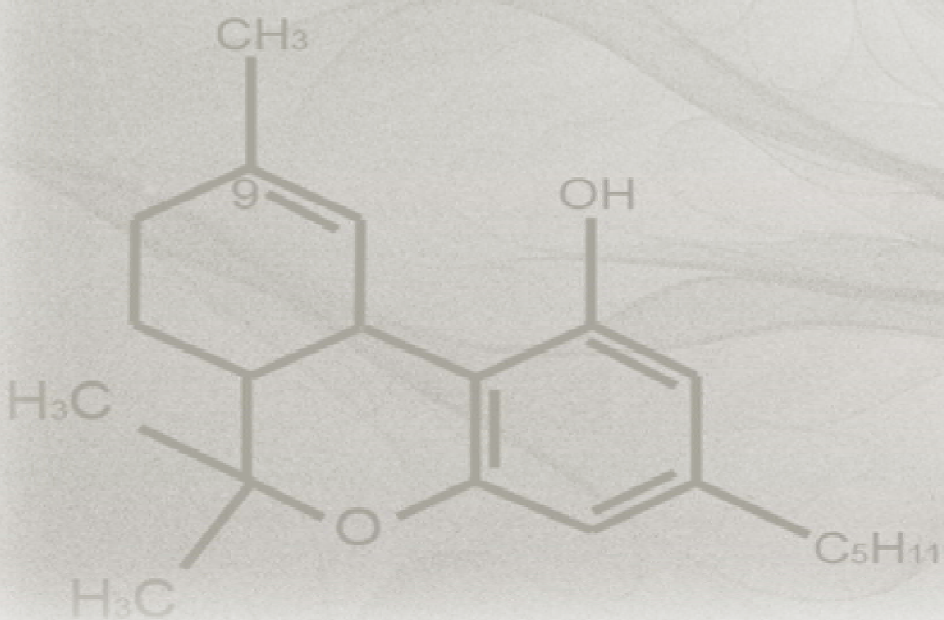
2) $\frac{X}{m} \propto p^{n}$

3) $\frac{x}{m} = \log p + \frac{1}{n} \log k$

4) $\log \frac{x}{m} = \log k + \frac{1}{n} \log p$

Answer:

4) $\log \frac{x}{m} = \log k + \frac{1}{n} \log p$



Explanation:

W.K.T., Freundlich adsorption isotherm is $x/m = kp^{1/n}$, where x/m is the mass of the gas adsorbed per unit mass of the adsorbent, P is the equilibrium pressure, k and n are constants.

Taking log

$$\log x/m = \log k + 1/n \log p$$

Thank You