Sumário

Fontes bibliográficas:

Química Orgânica – Volume 4: Feltre – Setsuo
Química Orgânica – Volumes 1 e 2: McMurry.

1) Alcanos ou parafinas

Halogenação

$$R-CH_3 + Cl-Cl \xrightarrow{Luz} H-Cl + R-CH_2-Cl$$
$$R-CH_3 + Br-Br \xrightarrow{Luz} H-Br + R-CH_2-Br$$

A substituição do H ocorre no C 1^a, 2^a ou 3^a.

Cracking

$$R-CH_2-CH_2-CH_2-CH_2-R' \xrightarrow{\Delta} R-CH=CH_2 + H_3C-CH_2-R'$$

Combustão

$$1C_nH_{2n+2} + \frac{3n+1}{2}O_2 \rightarrow nCO_2 + (n+1)H_2O$$

Nitração

$$R-H + \underbrace{HO-NO_2}_{HNO_3\ (concentrado)} \xrightarrow{\Delta} H-OH + R-NO_2$$

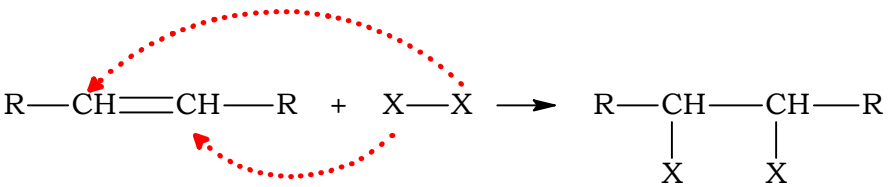
Sulfonação

$$R-H + \underbrace{HO-SO_3H}_{H_2SO_4\ (concentrado)} \xrightarrow{\Delta} H-OH + R-SO_3H$$

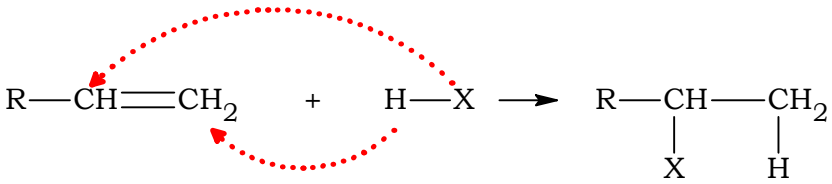
2) Alcenos ou alquenos ou olefinas

Reação com halogênios

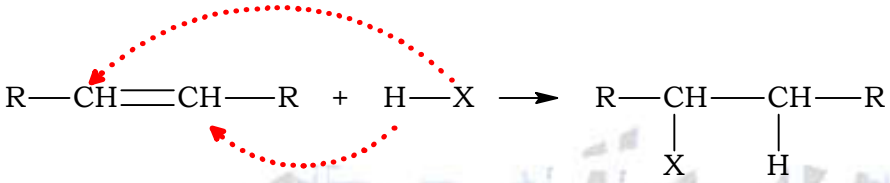
X: Cl, Br ou I.



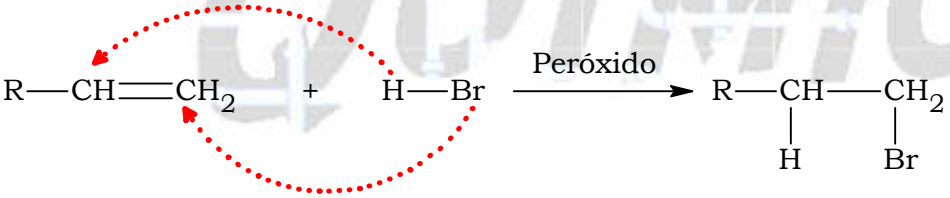
Reação com HX



Regra de Markownikoff: o "H" entra no carbono mais hidrogenado

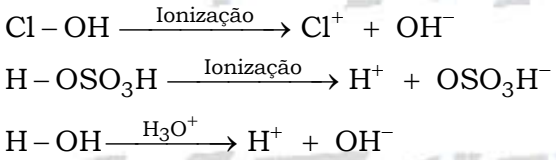


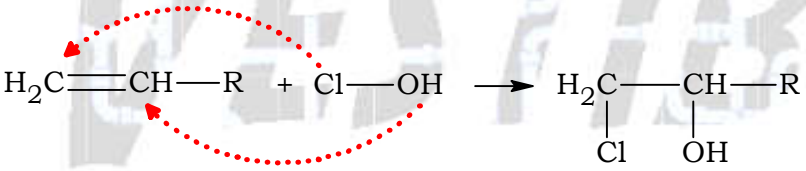
Reação de Karasch: em presença de peróxidos

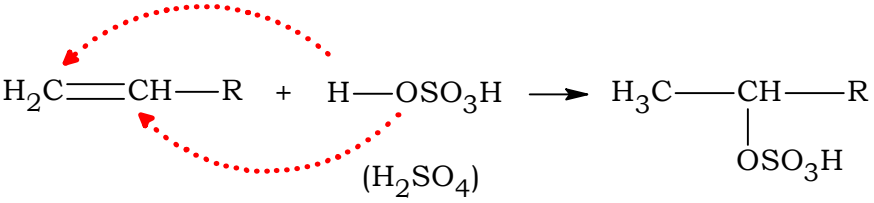


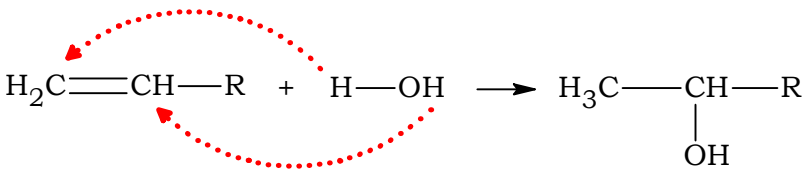
O "H" entra no carbono menos hidrogenado.

Rações com HClO, H_2SO_4 e H_2O





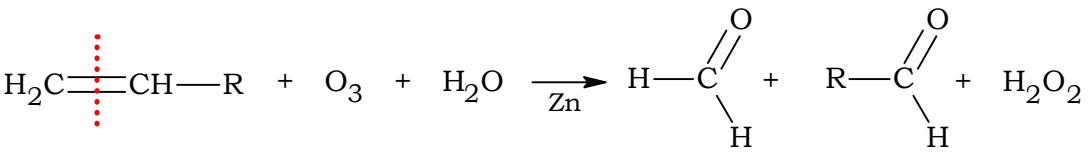


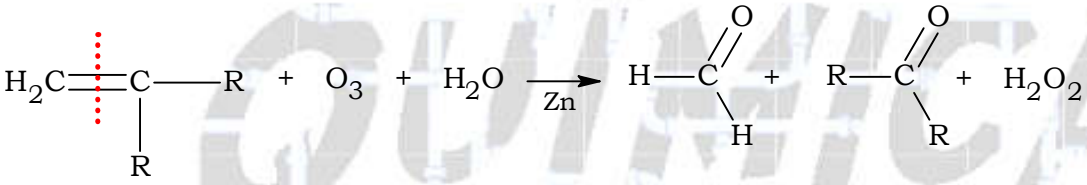


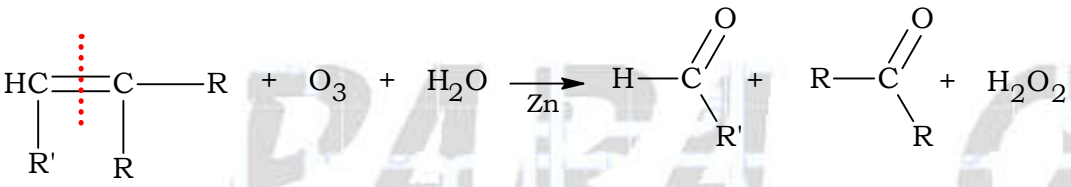
Combustão

$$1C_nH_{2n} + \frac{3n}{2}O_2 \rightarrow nCO_2 + nH_2O$$

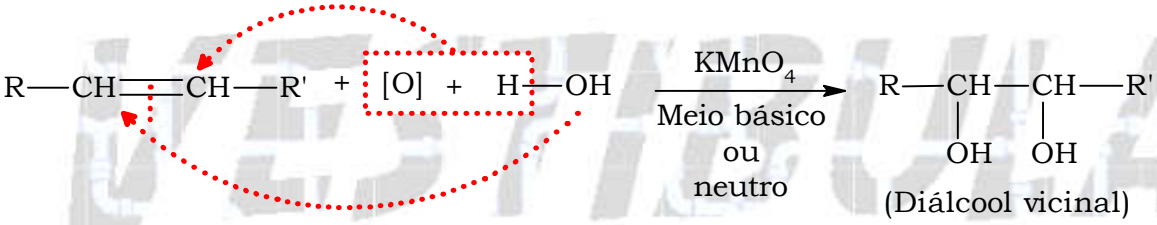
Ozonólise seguida de hidrólise (Reações globais)





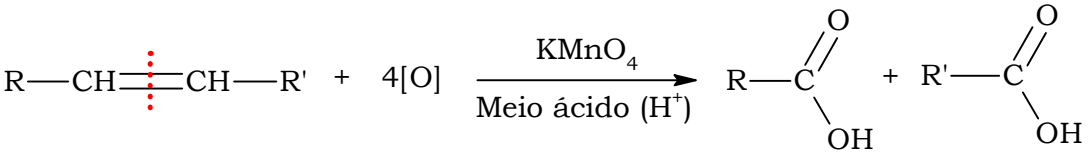


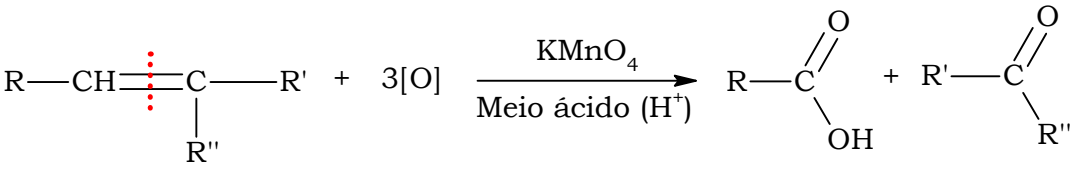
Reação com $KMnO_4$ em meio básico ou neutro – Oxidação branda

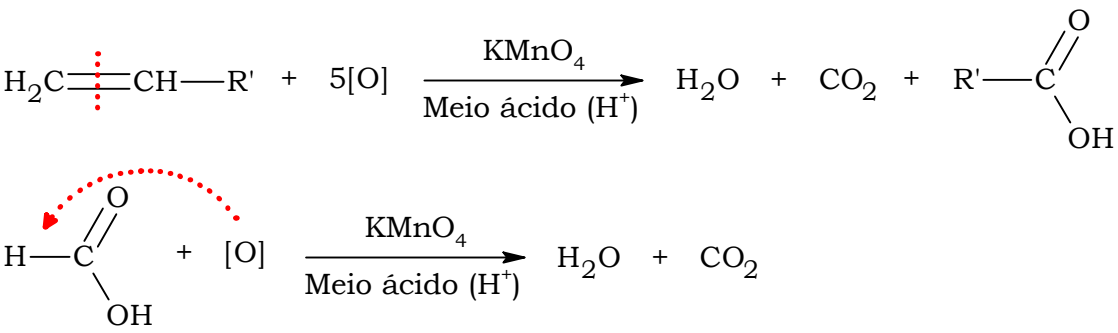


(Diálcool vicinal)

Reação com $KMnO_4$ em meio ácido – Oxidação enérgica ou energética

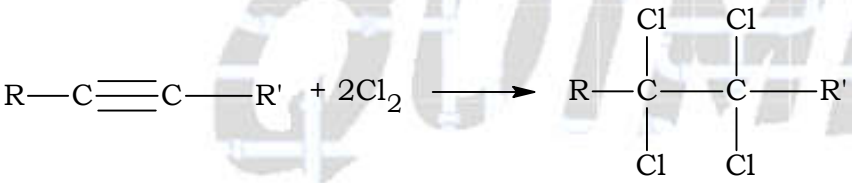




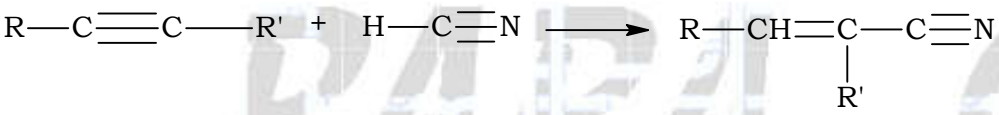


3) Alcinos ou alquinos

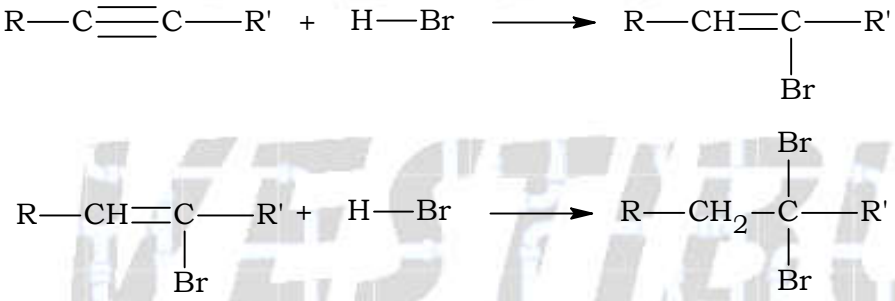
Cloração (Adição)



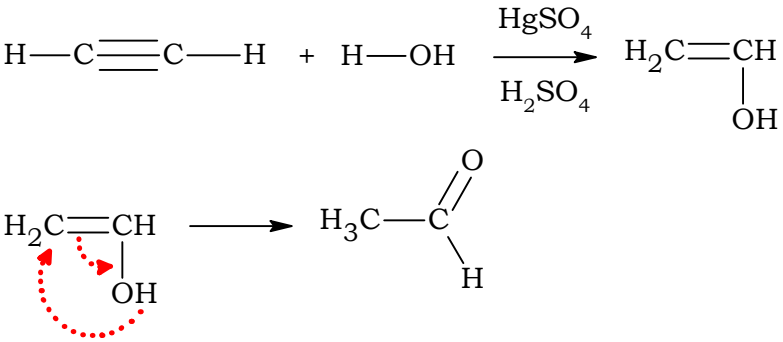
Reação com HCN (Adição)



Reações com HX

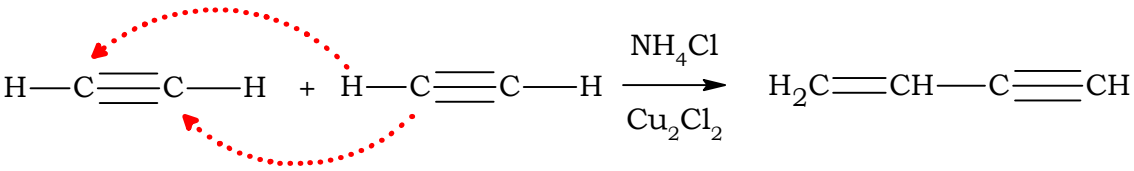


Hidratação de alcinos

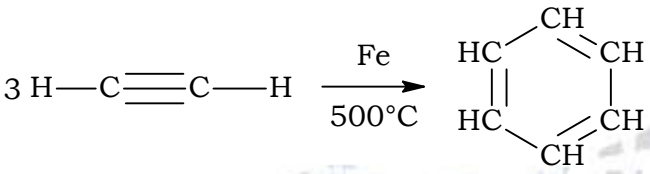


Polimerização $xC_nH_{2n-2} \longrightarrow (C_nH_{2n-2})_x$

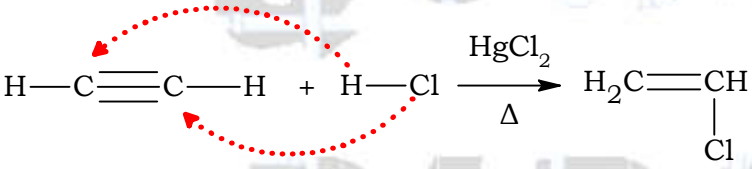
Dimerização



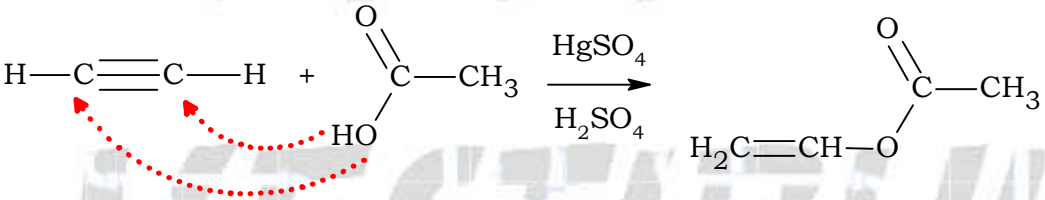
Trimerização



Obtenção do cloreto de vinila (monômero na obtenção do PVC)



Obtenção do acetato de vinila (monômero na obtenção do PVA)



Reações com alcinos verdadeiros e falsos

$$\underbrace{R-C\equiv C-H}_{\text{Alcino verdadeiro}} + Na \rightarrow R-C\equiv CNa + \tfrac{1}{2}H_2$$

$$\underbrace{R-C\equiv C-R'}_{\text{Alcino falso}} + Na \rightarrow \text{Não reage}$$

$$R-C\equiv C-H + AgNO_3 \xrightarrow{NH_4OH} R-C\equiv C-Ag + HNO_3$$

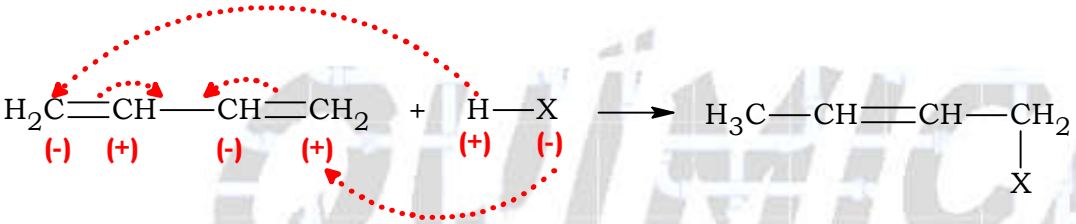
$$R-C\equiv C-R' + AgNO_3 \xrightarrow{NH_4OH} \text{Não reage}$$

$$2R-C\equiv C-H \;+\; Cu_2Cl_2 \xrightarrow{NH_4OH} 2R-C\equiv C-Cu \;+\; 2HCl$$

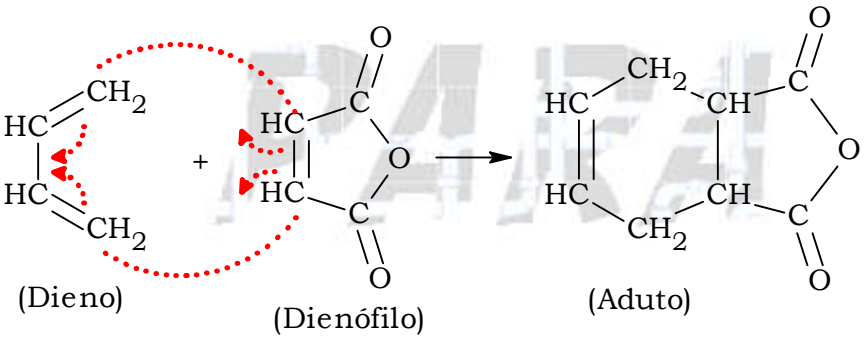
$$2R-C\equiv C-R' \;+\; Cu_2Cl_2 \xrightarrow{NH_4OH} \text{Não reage}$$

4) Alcadienos

Adição

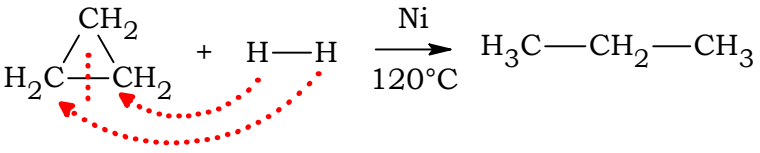


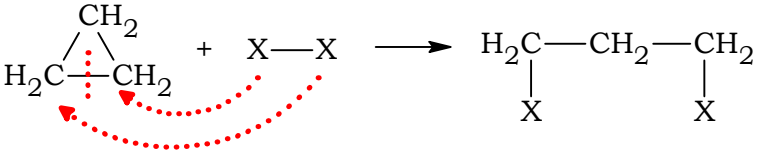
Reação de Diels-Alder

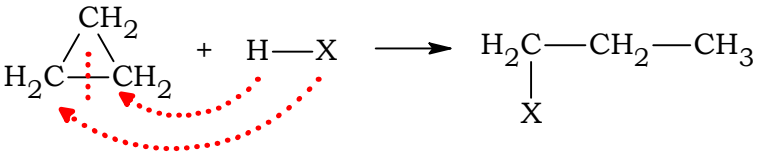


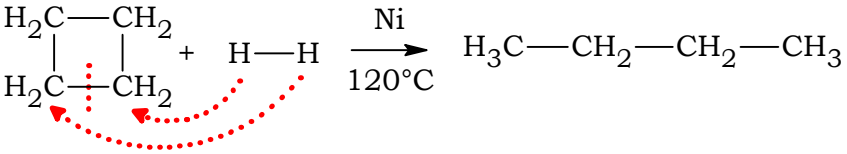
5) Cicloalcanos

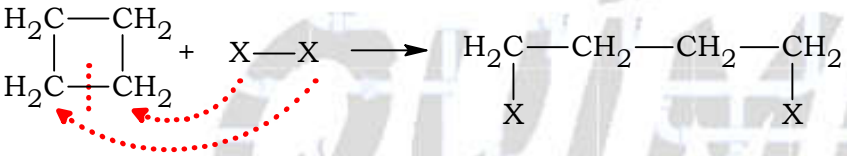
Adição

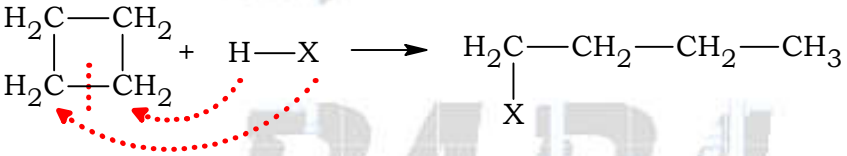


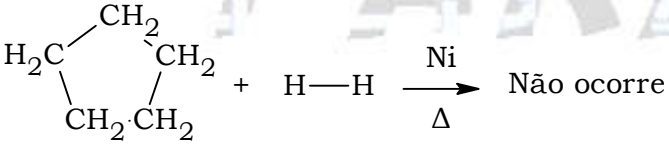




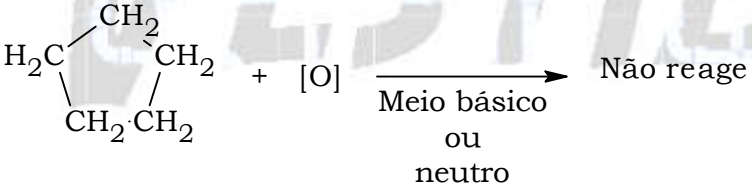




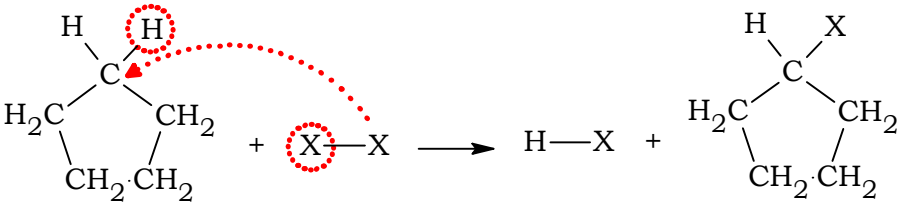




Oxidação

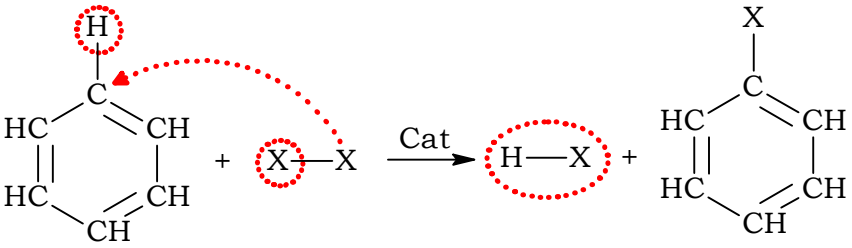


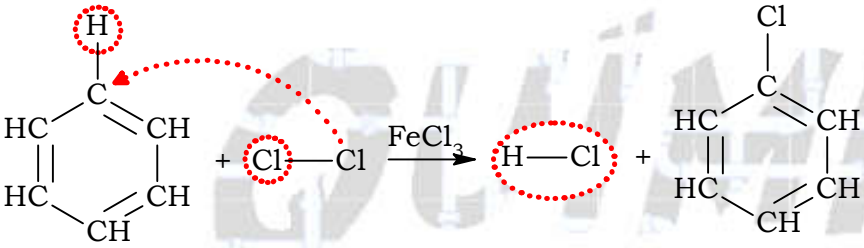
Substituição



6) Hidrocarbonetos aromáticos

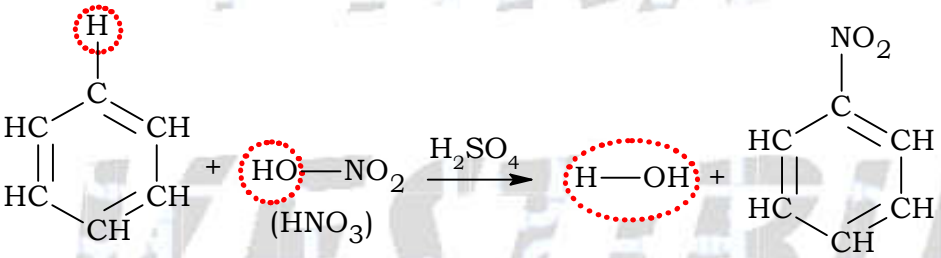
Halogenação



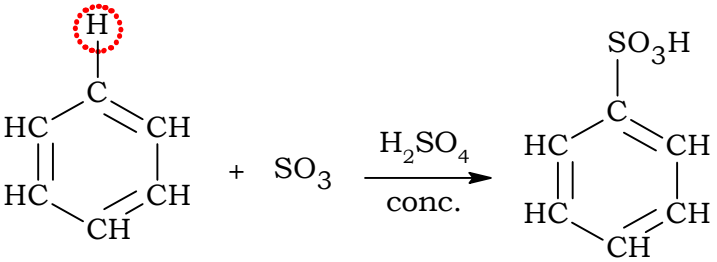


Nitração

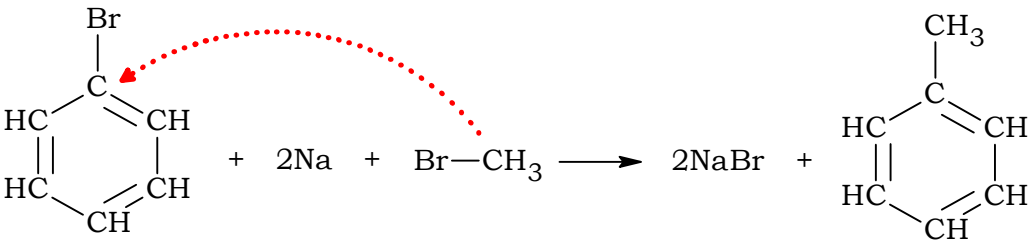
$$HNO_3 + H_2SO_4 \rightarrow H_2O + NO_2^+ + HSO_4^-$$



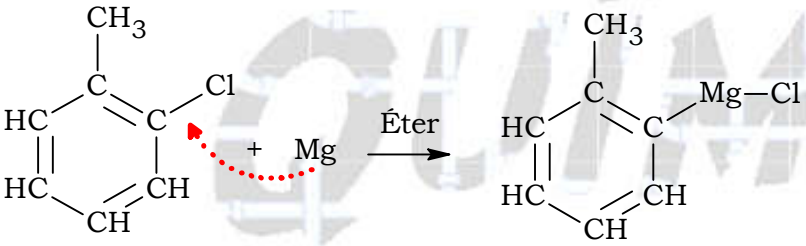
Sulfonação



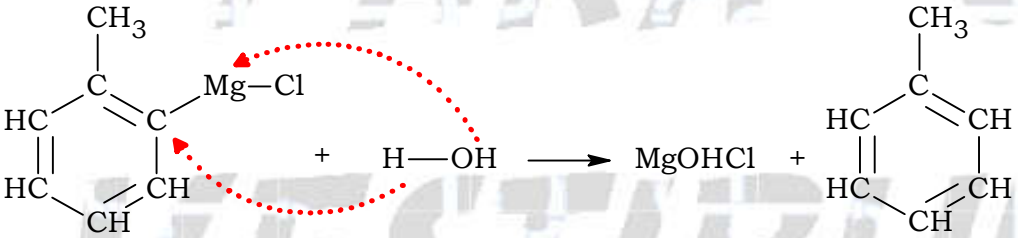
Síntese de Fittig-Wurtz



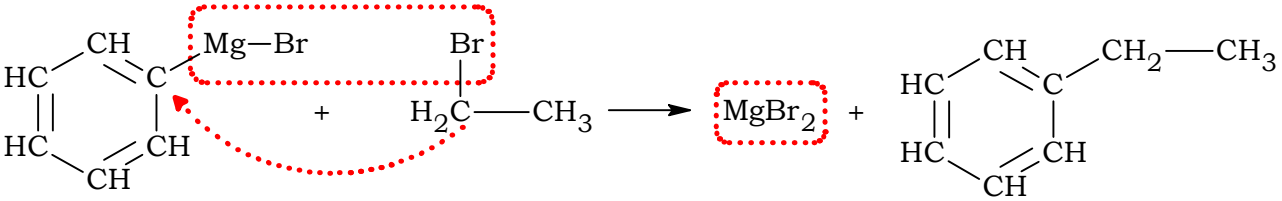
Síntese de Grignard



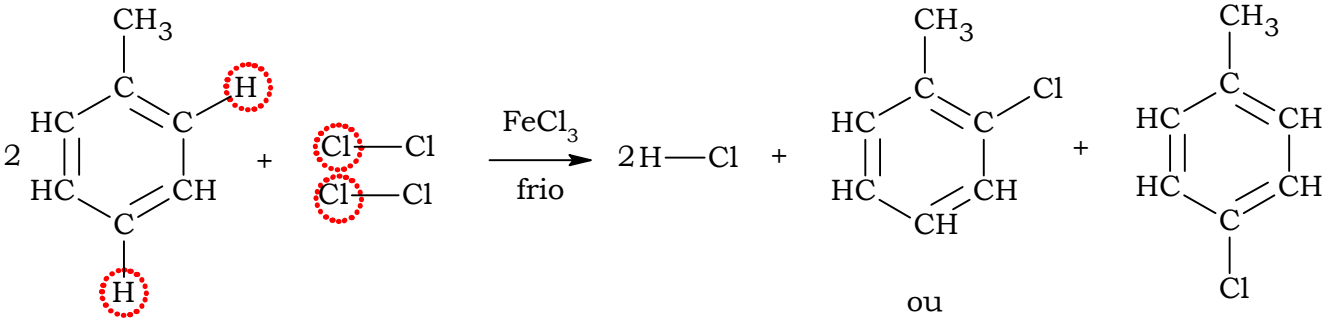
Hidrólise do Composto de Grignard



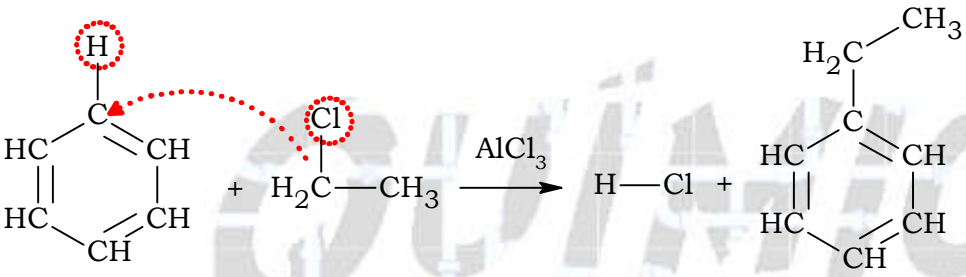
Reação de Composto de Grignard com Haleto



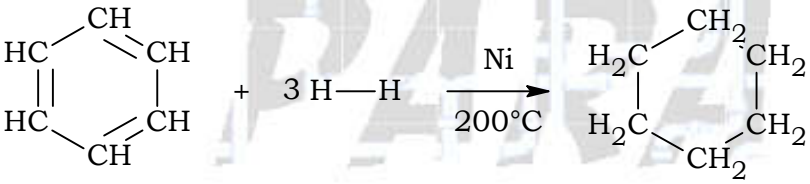
Substituição no anel benzênico



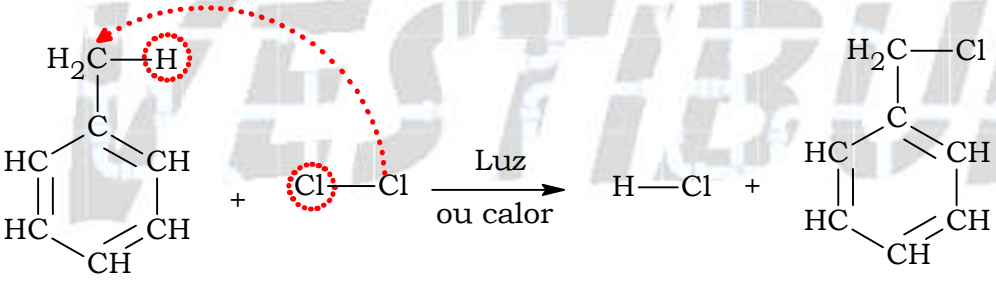
Síntese de Friedel-Crafts

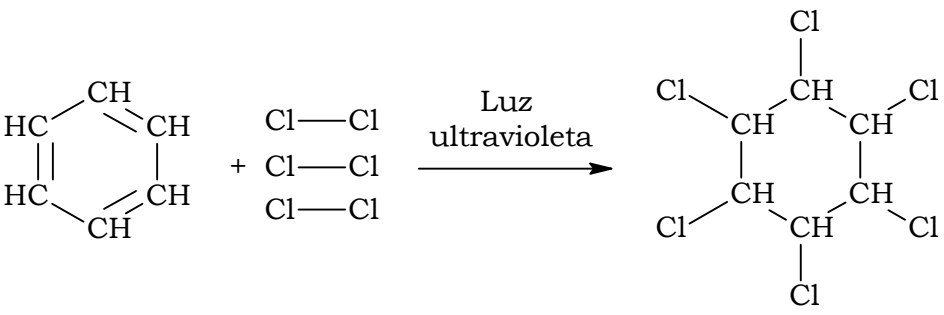


Hidrogenação

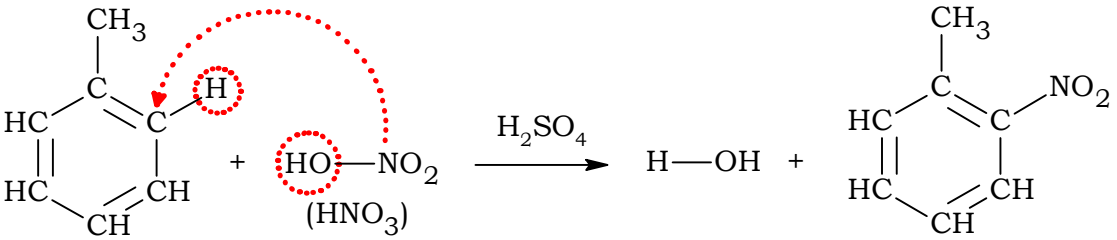


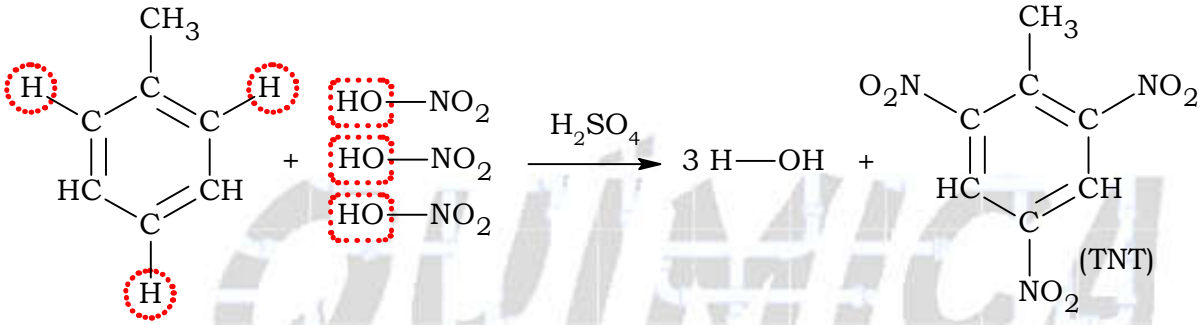
Halogenação



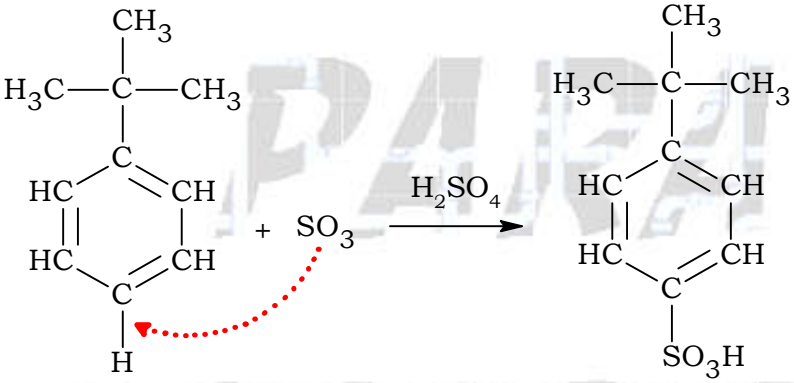


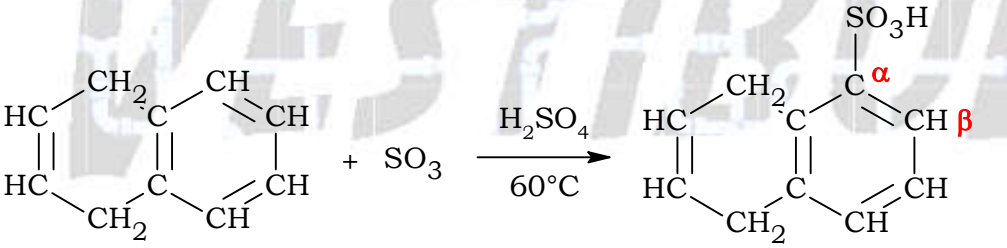
Nitração



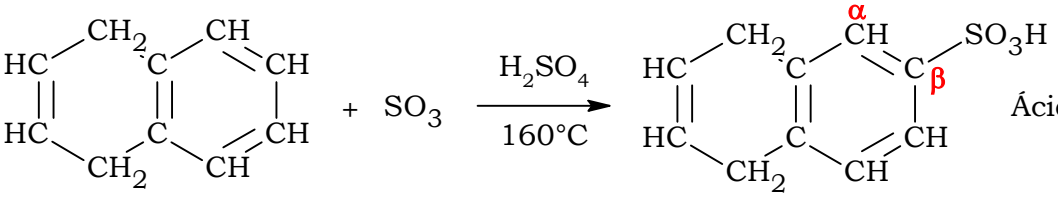


Sulfonação



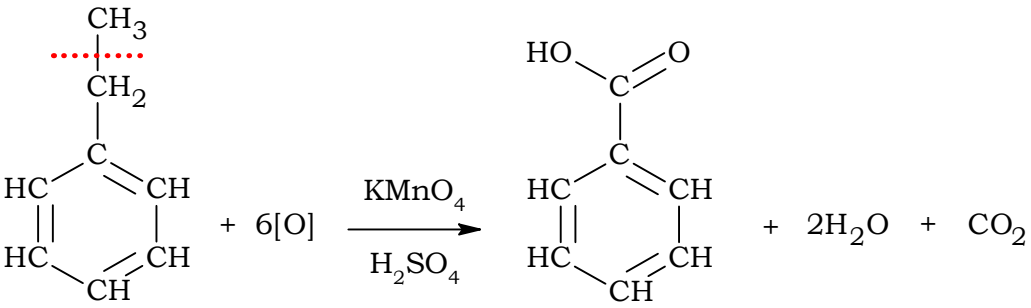


Ácido α - naftil sulfônico



Ácido β - naftil sulfônico

Oxidação

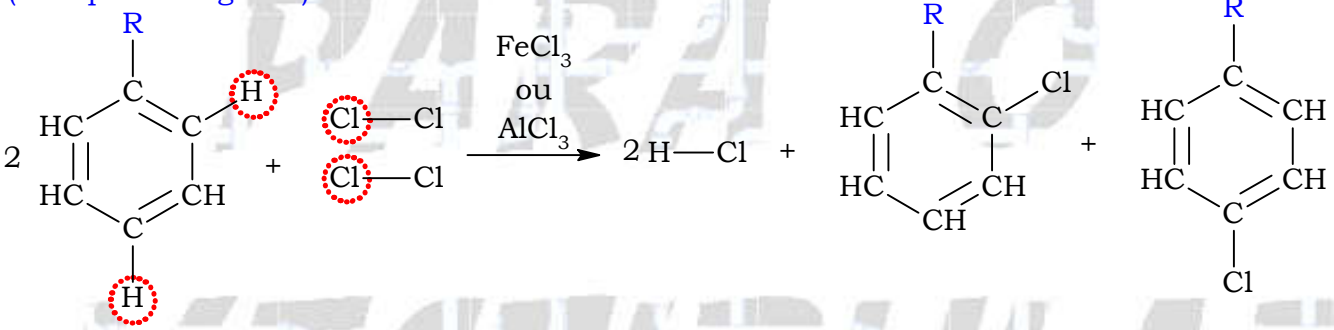


Combustão

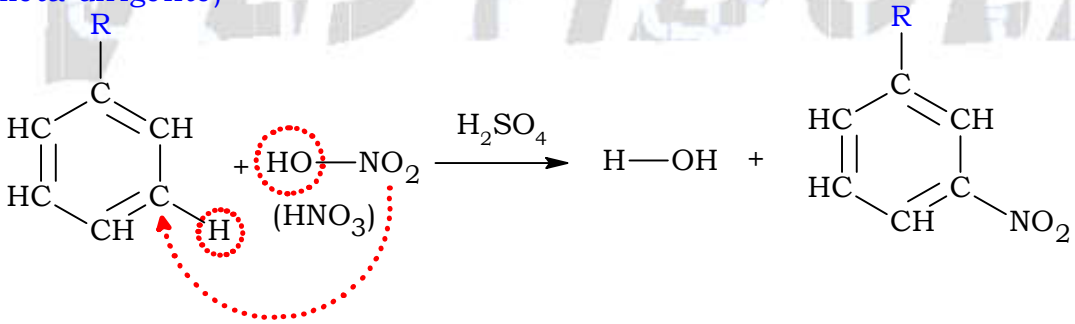
$$C_nH_{2n-6} + \frac{3n-3}{2} O_2 \rightarrow nCO_2 + (n-3)H_2O$$

Dirigência dos substituintes ou radicais

(orto-para-dirigente)



(meta-dirigente)

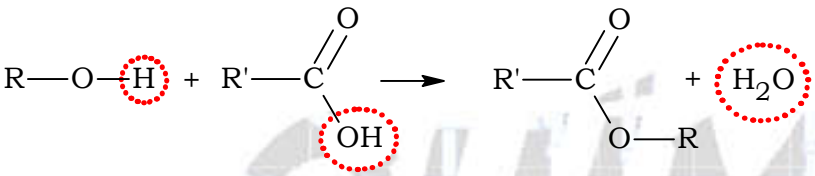


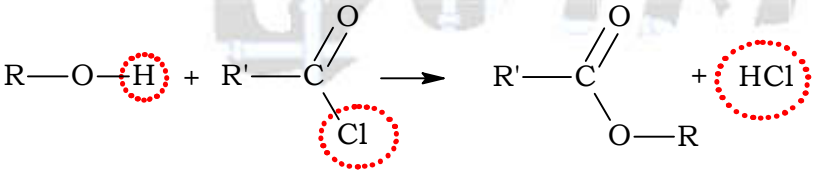
7) Alcoóis

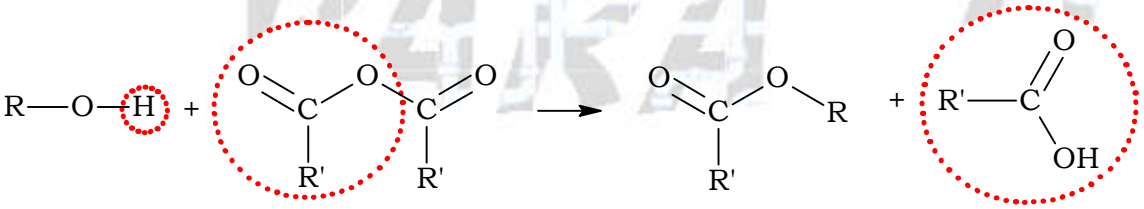
Reações de substituição do "H" do grupo "OH"

$$R-O-H + Na \longrightarrow R-ONa + \tfrac{1}{2}H_2\uparrow$$

$$R-O-H + R'-Mg-X \longrightarrow R-OMg-X + R'X$$







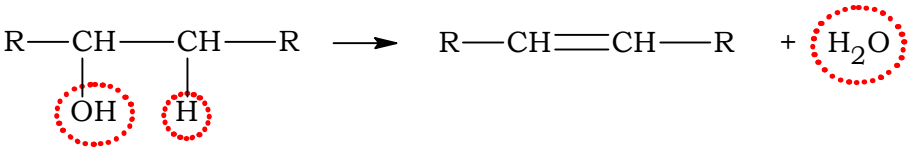
Reações de substituição do grupo "OH"

$$R-O-H \begin{cases} \text{Álcool primário: reação rápida} \\ \text{Álcool secundário: reação lenta} \\ \text{Álcool terciário: não reage} \end{cases} + H-X \xrightarrow{ZnCl_2} R-X + H_2O$$

$$3R-O-H + PX_3 \longrightarrow 3R-X + H_3PO_3$$

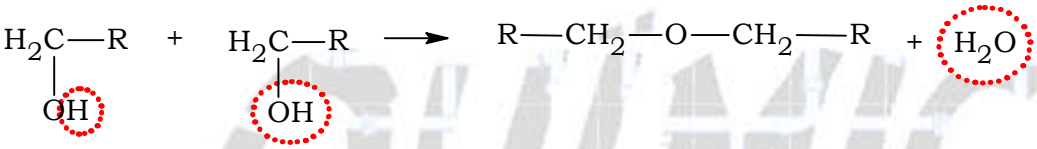
$$R-O-H + PCl_5 \longrightarrow R-Cl + POCl_3 + HCl$$

Reações de eliminação intramolecular



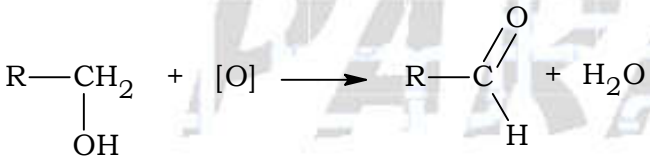
$$H_3C - CH_2 - OH \xrightarrow[170\ ^oC]{H_2SO_4\ (conc.)} H_2C = CH_2 + H_2O$$

Reações de eliminação intermolecular

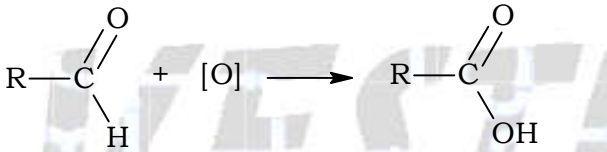


$$H_3C - CH_2 - OH + H_3C - CH_2 - OH \xrightarrow[140\ ^oC]{H_2SO_4\ (conc.)} H_3C - CH_2 - O - CH_2 - CH_3 + H_2O$$

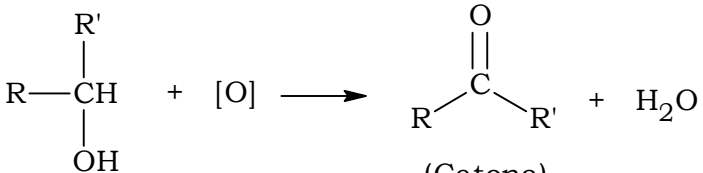
Reações de oxidação



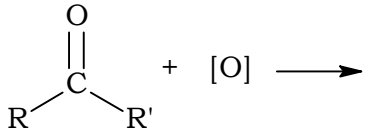
(Álcool primário) (Aldeído)



(Aldeído) (Ácido carboxílico)

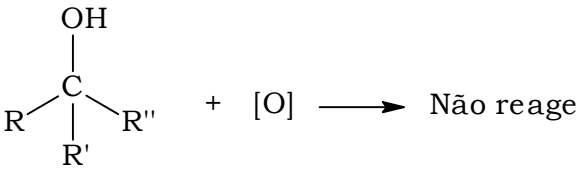


(Álcool secundário) (Cetona)



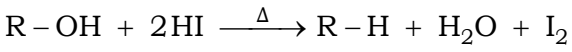
(Cetona)

Reações de oxidação

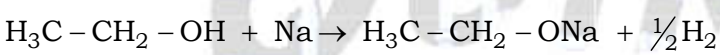


(Álcool terciário)

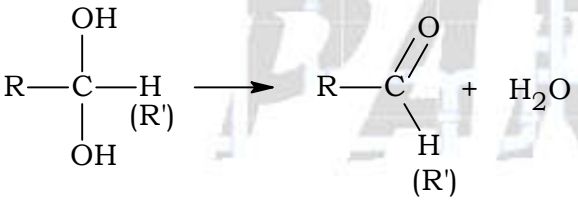
Reação de redução (Reação de Berthelot)



Reação com sódio metálico (Na)

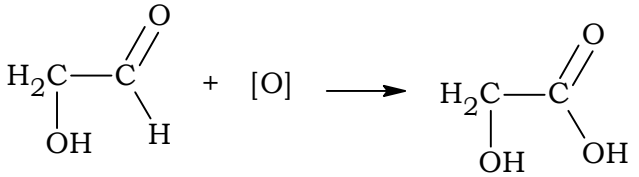


Decomposição espontânea de glicóis em aldeídos e/ou cetonas



Oxidação do Glicol

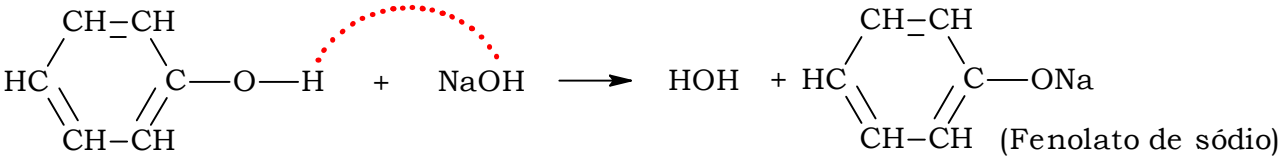
(Glicol) (Aldeído glicólico)

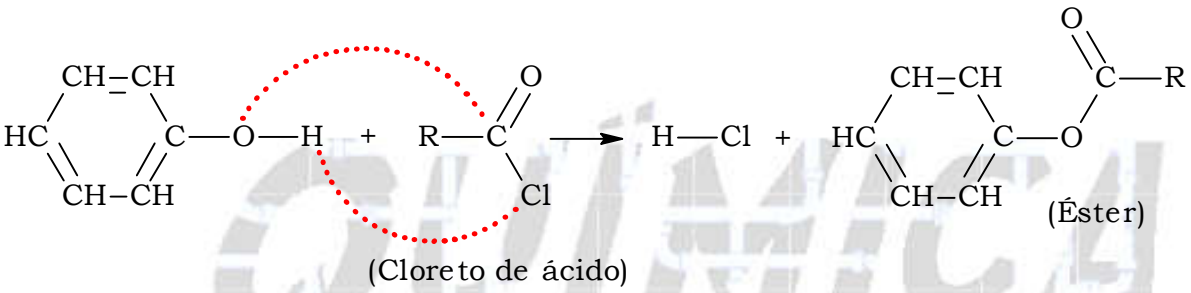


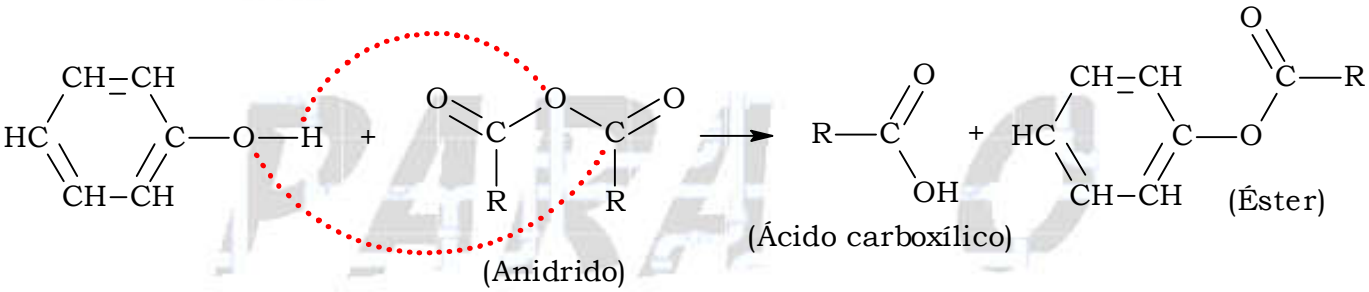
(Aldeído glicólico) (Ácido glicólico)

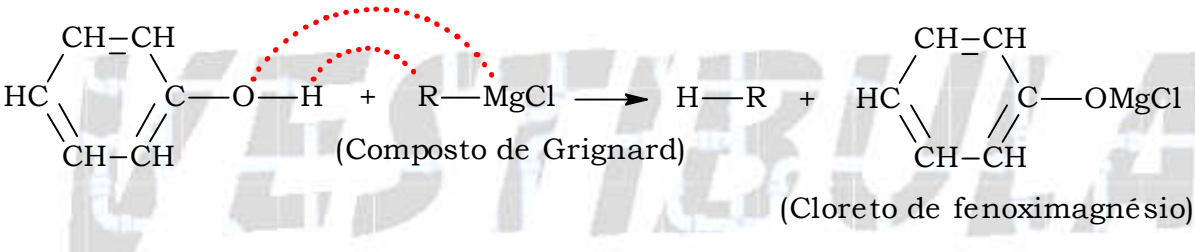
8) Fenóis

Substituição do "H" do grupo "OH"

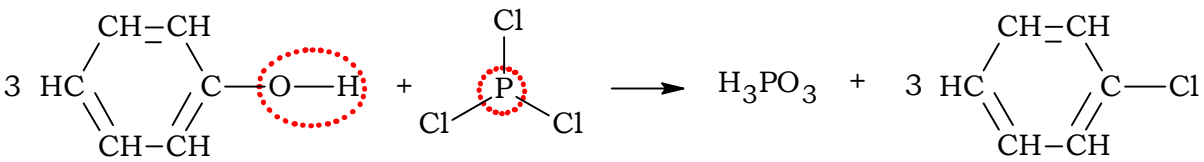




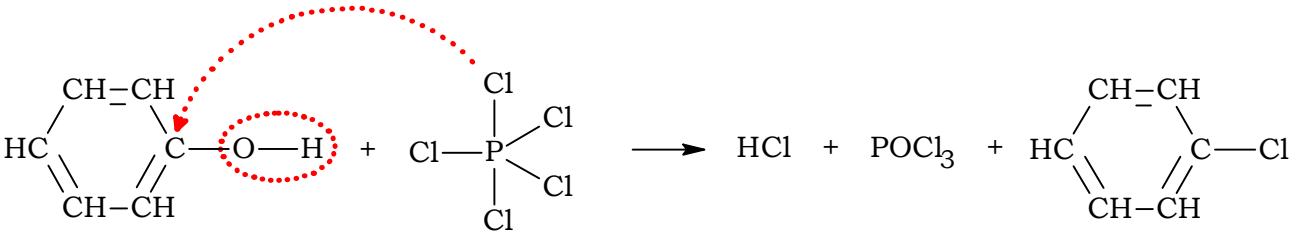


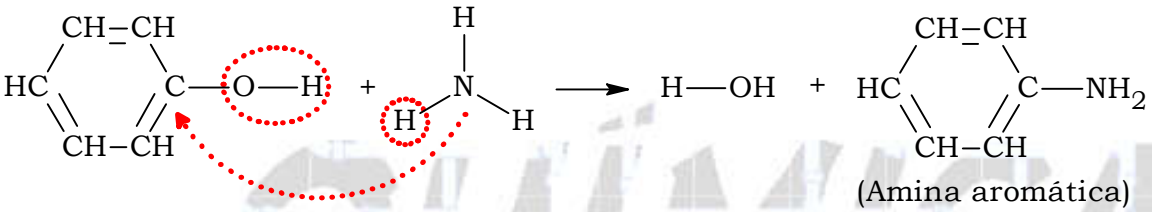


Substituições do grupo OH



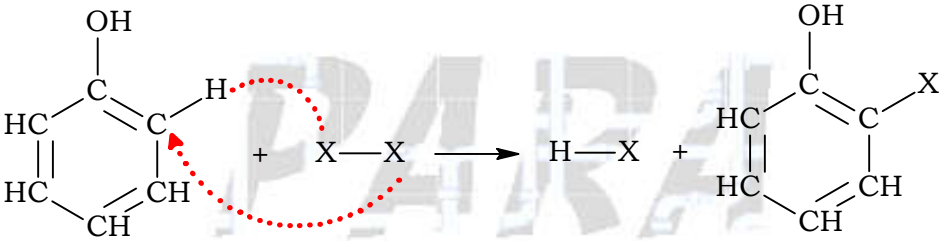
Substituições do grupo OH



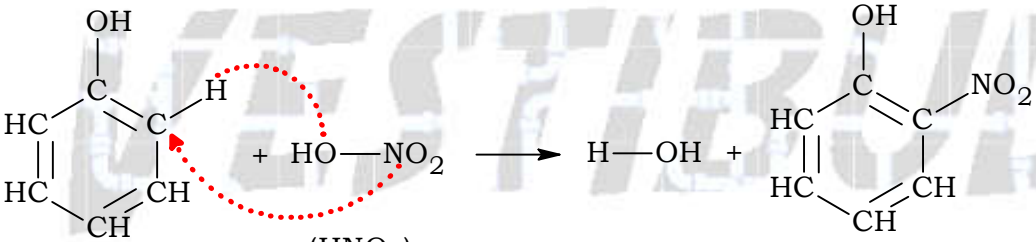


(Amina aromática)

Substituições do "H" do anel benzênico

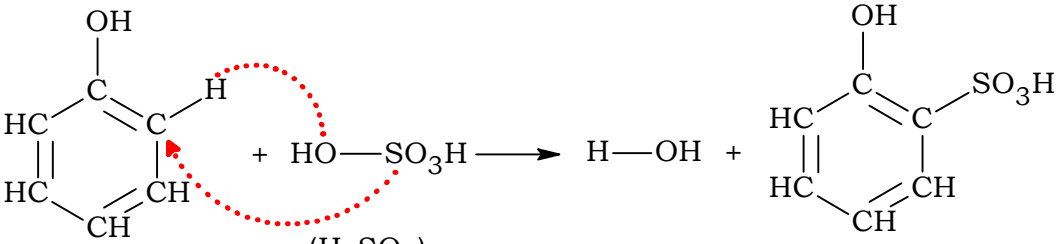


(Halogenofenol)



(HNO_3)

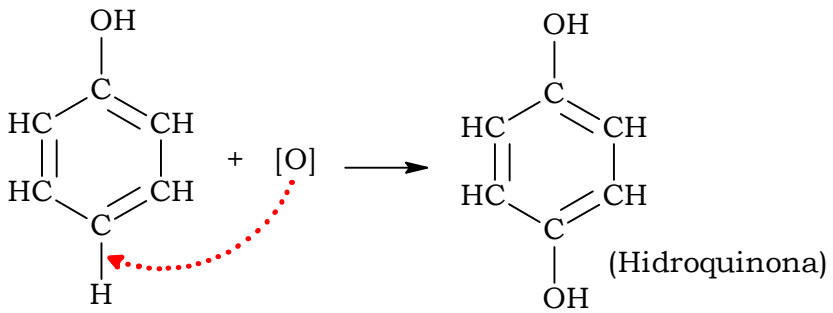
(Nitrofenol)



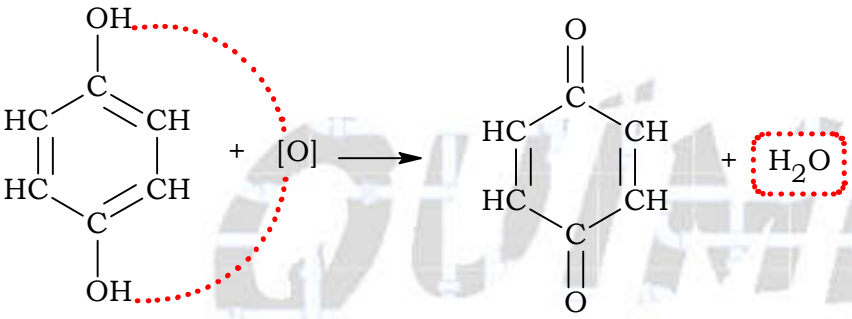
(H_2SO_4)

(Ácido hidroxissulfônico)

Reações de oxidação

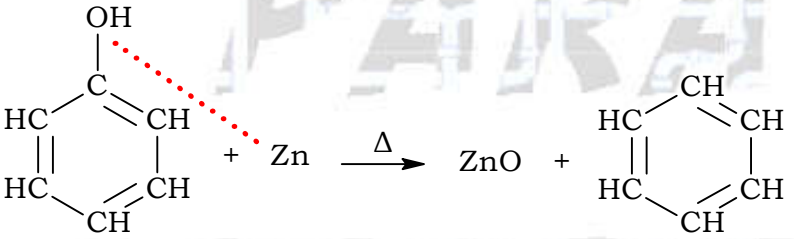


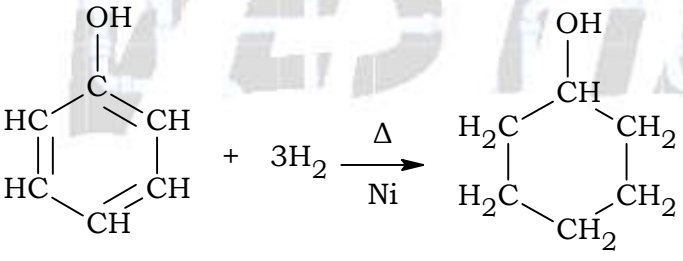
(Hidroquinona)



(Quinona)

Reações de redução

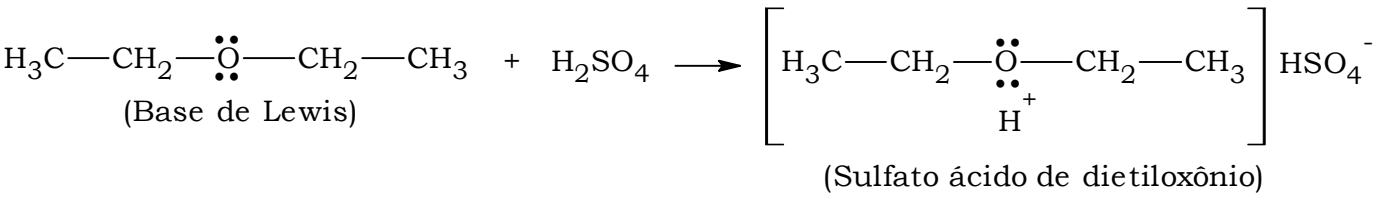


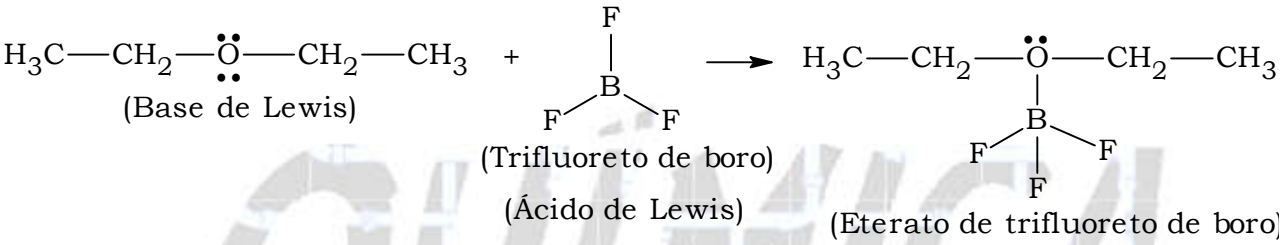


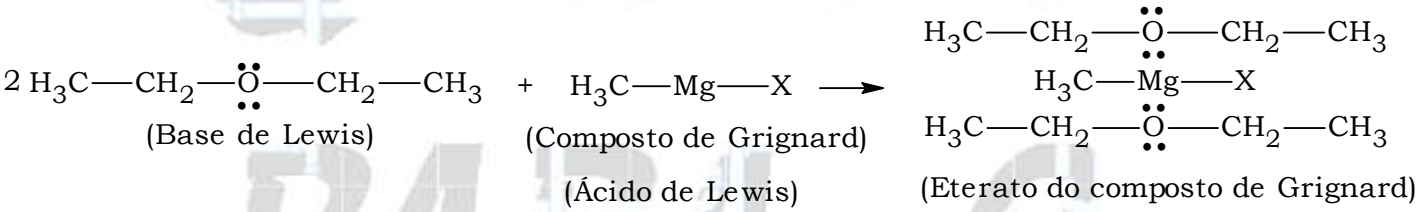
(Cicloexanol)

9) Éteres

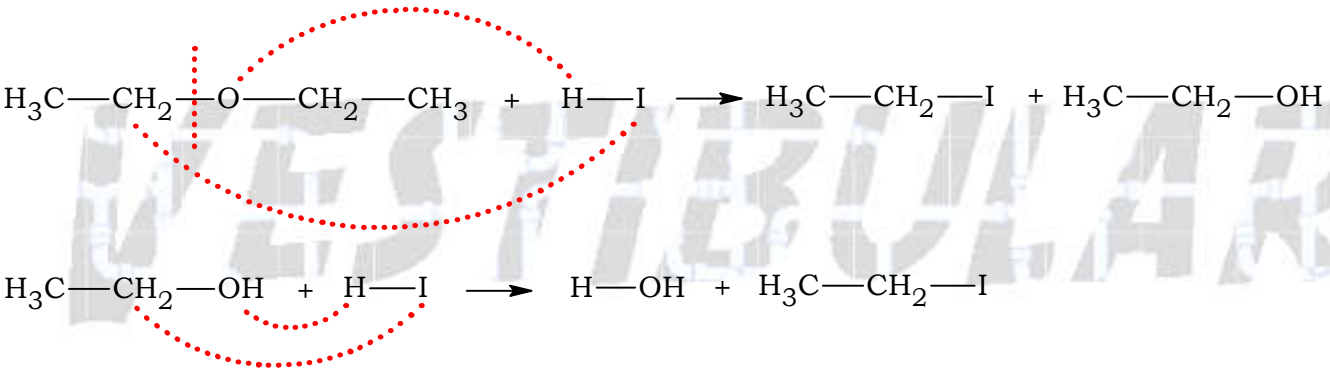
Caráter básico



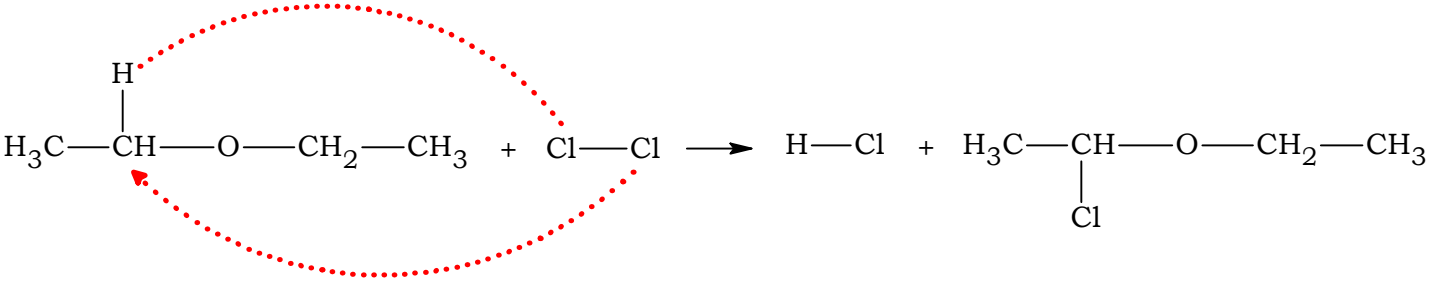




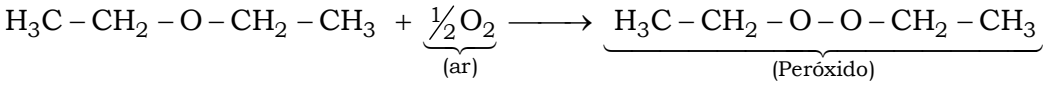
Cisão por ácidos



Reação com halogênio

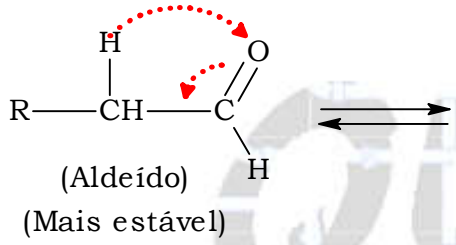


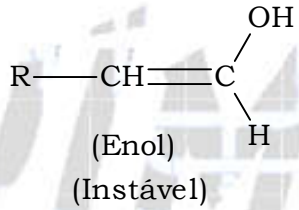
Oxidação

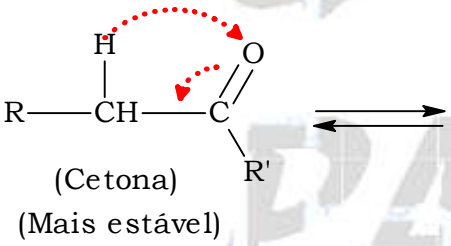


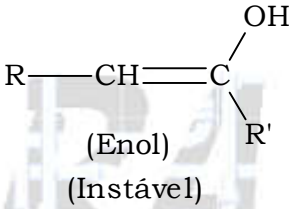
10) Aldeídos e Cetonas

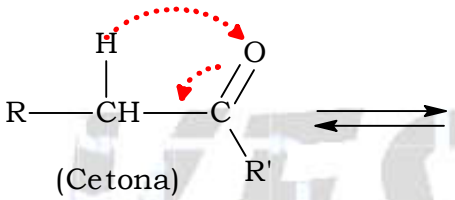
Tautomeria: equilíbrio Aldeído/Cetona e Enol

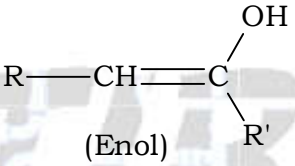


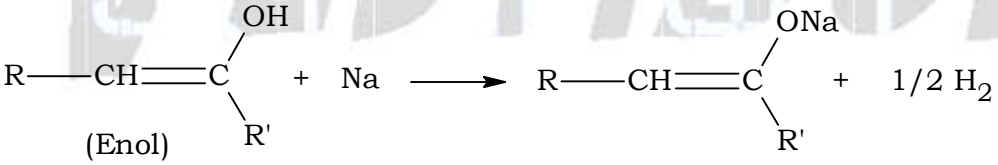




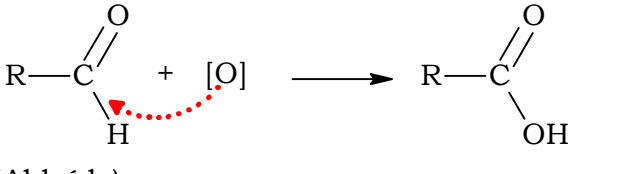




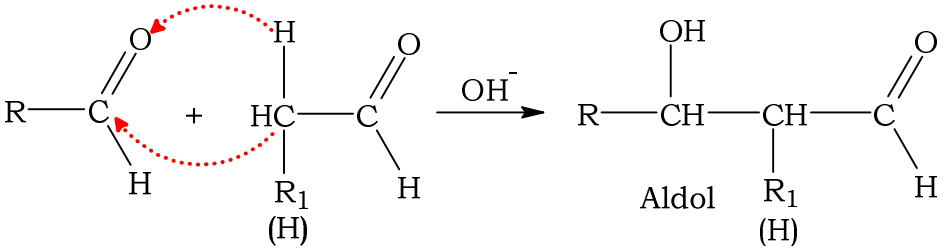




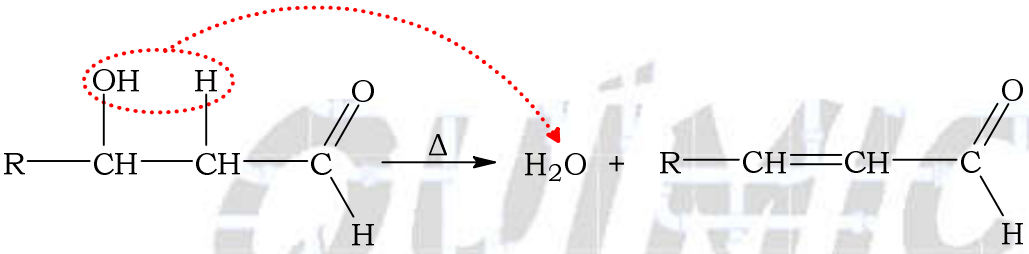
Oxidação de Aldeído



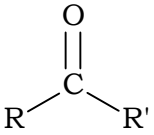
Condensação aldólica:



Desidratação do Aldol:



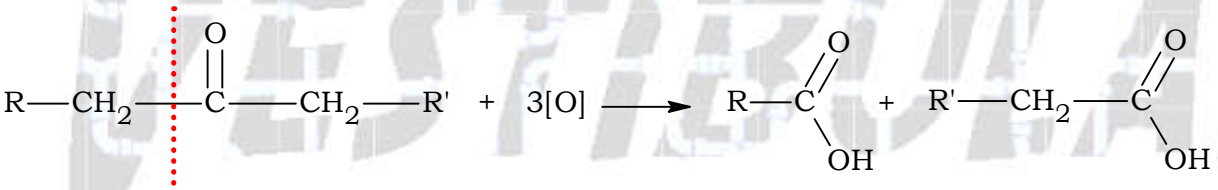
Oxidação de Cetona



(Cetona) + [O] ⟶ Não reage

(A cadeia pode "quebrar" na presença de fortes oxidantes)

Cetonas podem ser oxidadas na presença de fortes oxidantes enérgicos $(KMnO_4,\ K_2Cr_2O_7$, etc.) em condições especiais ("à força"). Neste caso ocorre a ruptura da cadeia:



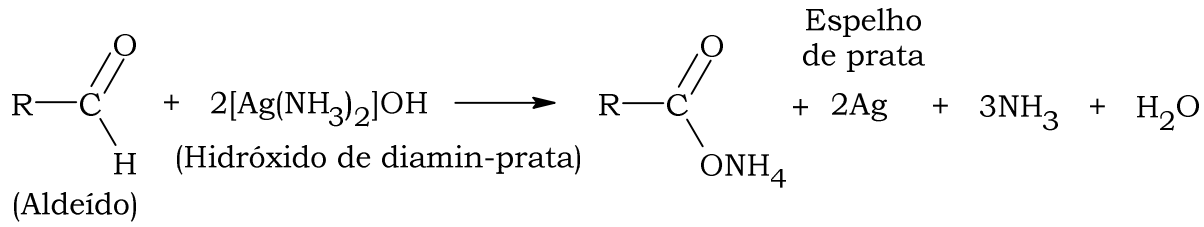
Reativo de Tollens:

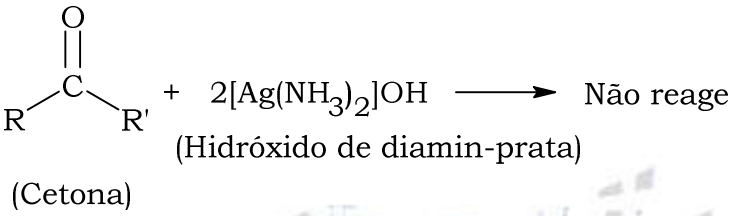
$$AgNO_3 + 3NH_4OH \longrightarrow \left[Ag(NH_3)_2\right]OH + NH_4NO_3 + 2H_2O$$

Trata-se de uma solução amoniacal de nitrato de prata ($AgNO_3$). Em presença de aldeído, os íons Ag^+ são reduzidos a Ag^0 (prata metálica) que pode se depositar nas paredes de um recipiente de vidro formando um "espelho de prata".

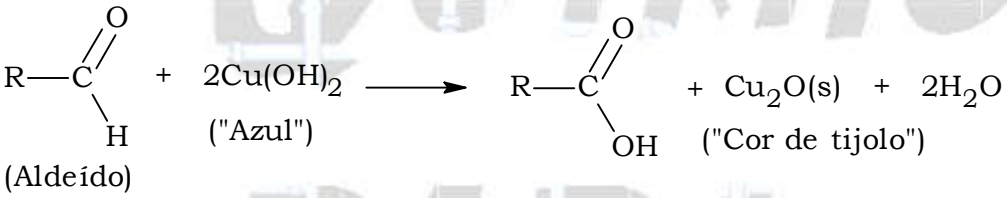
Isto <u>não ocorre</u> com as <u>Cetonas</u>!

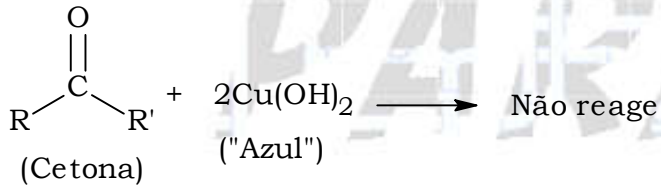
Grande incidência nos vestibulares!!



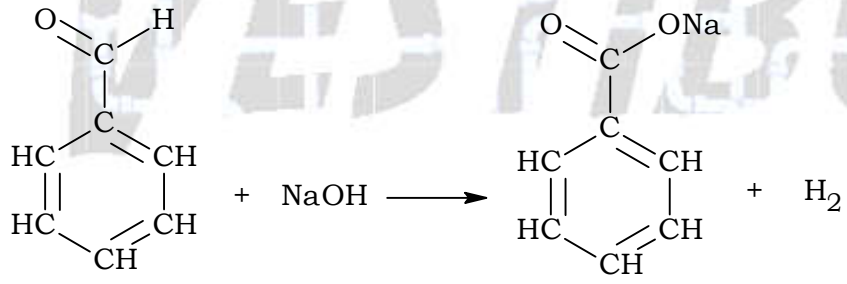


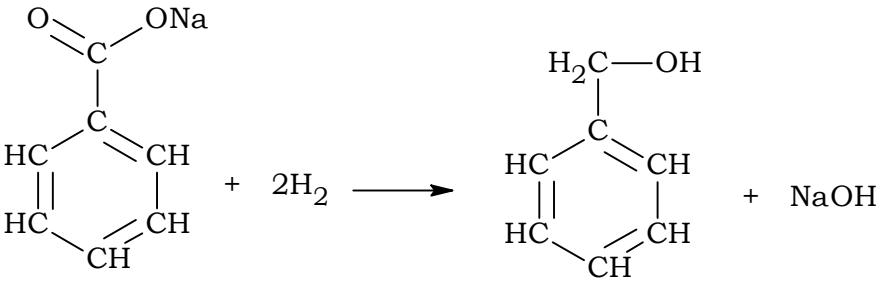
Reativo de Fehling (ou licor de Fehling):



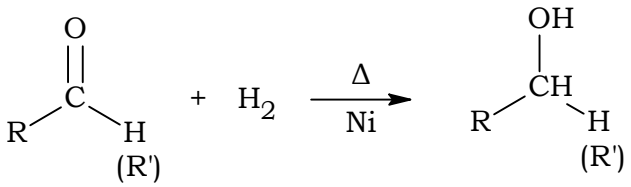


Auto-oxirredução do benzaldeído



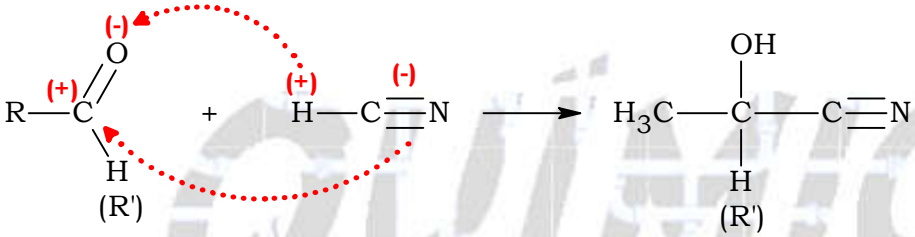


Reações de redução

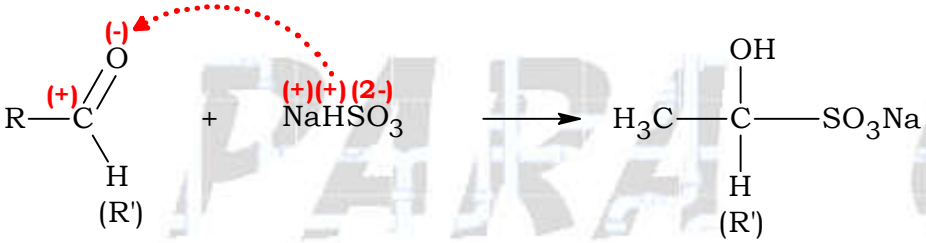


(Aldeído ou Cetona) (Álcool primário ou secundário)

Reações de adição ao grupo carbonila (C = O)

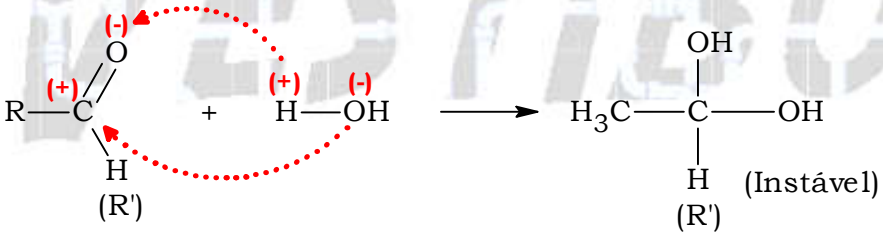


(Aldeídos ou Cetonas)

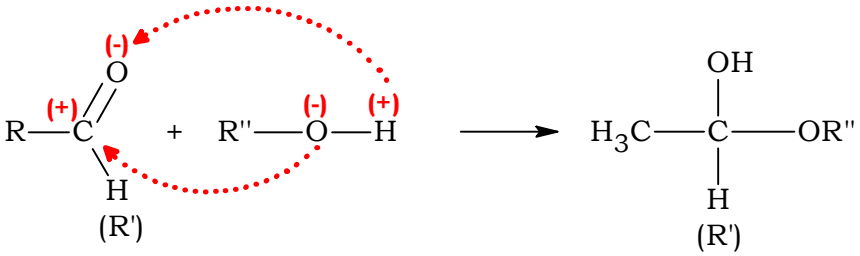


(Aldeídos ou Cetonas)

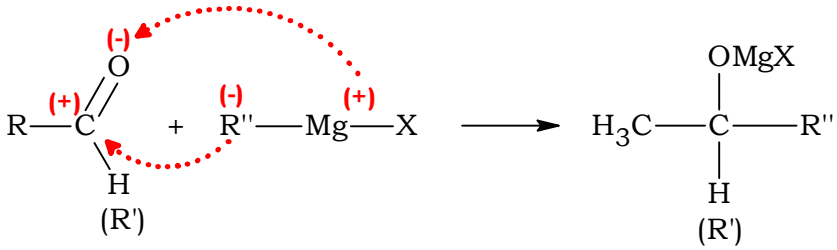
Reações de adição ao grupo carbonila (C = O)



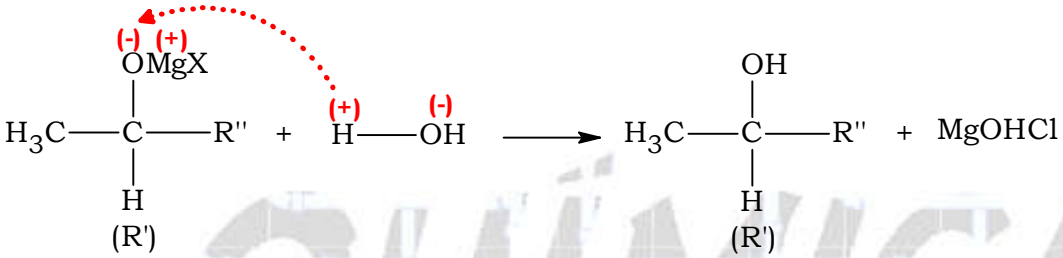
(Aldeídos ou Cetonas)



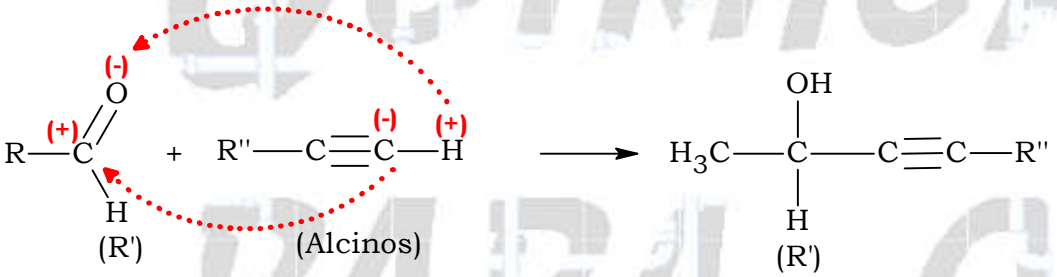
(Aldeídos ou Cetonas)



(Aldeídos ou Cetonas)

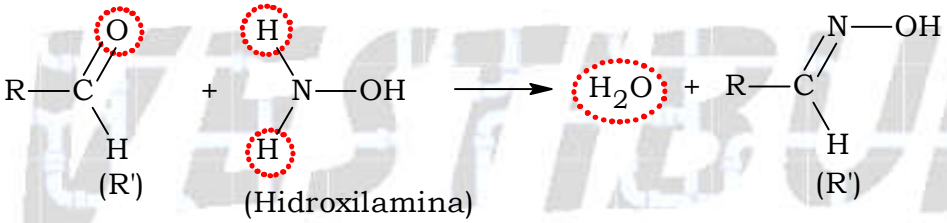


(Álcool)

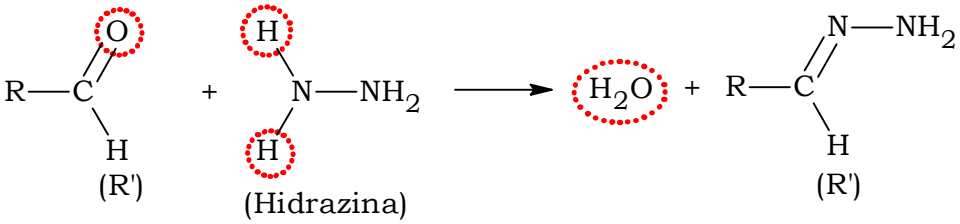


(Aldeídos ou Cetonas) (Alcinos) (Alcoóis acetilênicos)

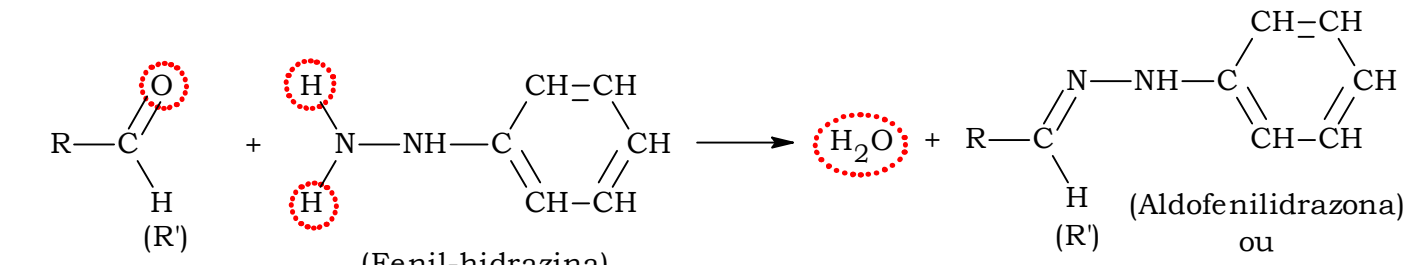
Reações de eliminação do oxigênio do grupo carbonila (C = O)



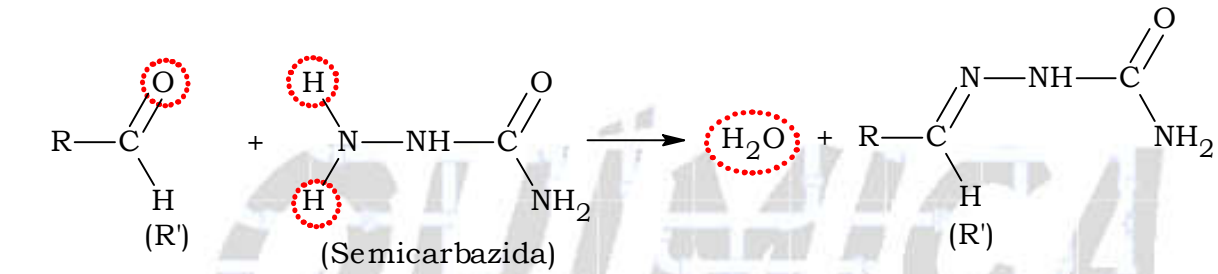
(Aldeídos ou Cetonas) (Hidroxilamina) (Aldoximas ou Cetoximas)



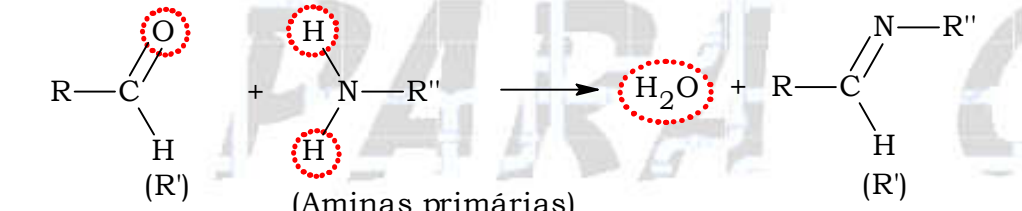
(Aldeídos ou Cetonas) (Hidrazina) (Aldoidrazonas ou Cetoidrazonas)



(Aldeídos ou Cetonas) (Fenil-hidrazina) (Aldofenilidrazona) ou (Cetofenilidrazona)

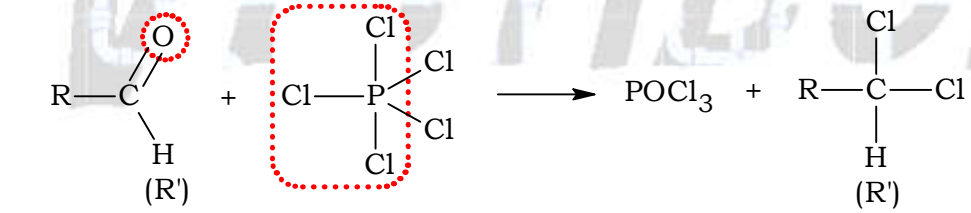


(Aldeídos ou Cetonas) (Semicarbazida) (Aldo-semicarbazonas) ou (Ceto-semicarbazonas)



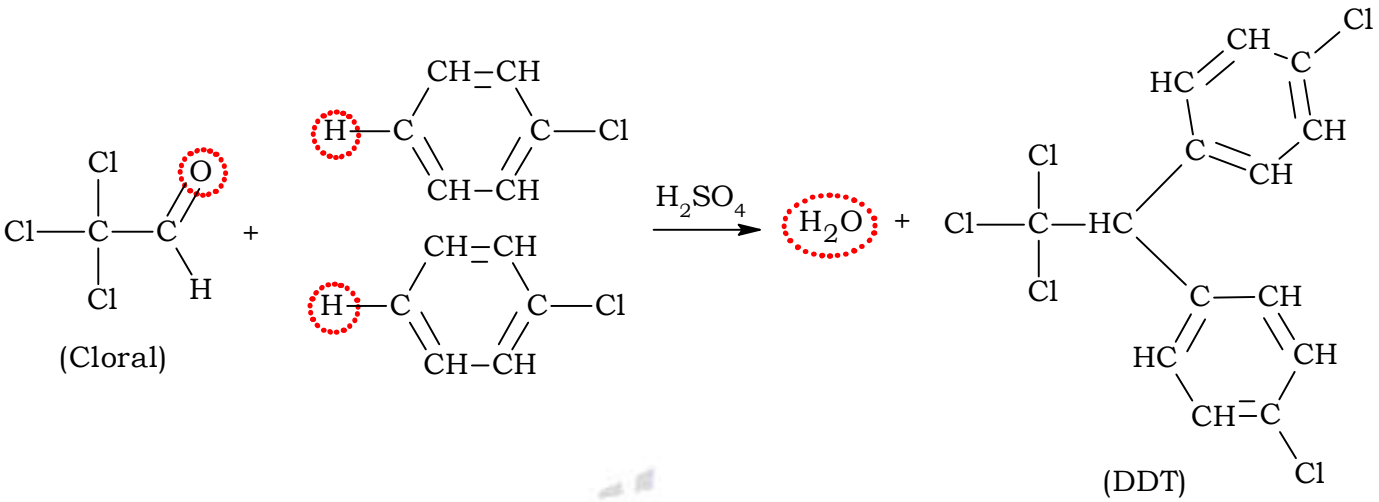
(Aldeídos ou Cetonas) (Aminas primárias) (Bases de Schiff)

Reações de eliminação do oxigênio do grupo carbonila (C = O)



(Aldeídos ou Cetonas)

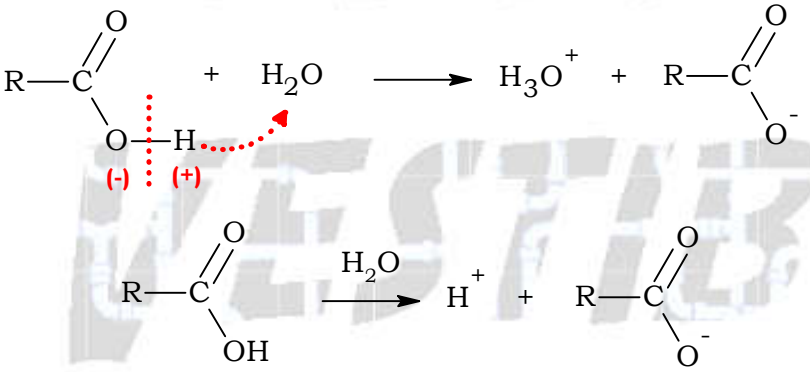
Síntese do DDT



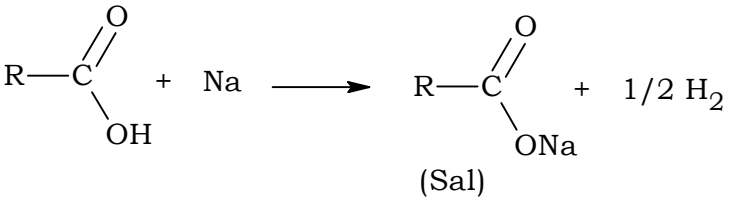
Observação: o DDT foi o primeiro pesticida moderno (sintetizado em 1874) e utilizado em larga escala após a Segunda Guerra Mundial. Considerado cancerígeno e perigoso, foi banido em muitos países durante a década de setenta. No Brasil sua fabricação e uso foram proibidos a partir de 2009.

11) Ácidos Carboxílicos

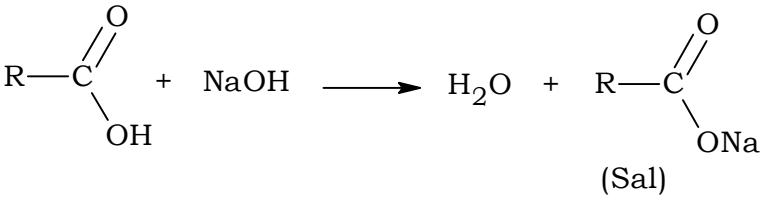
Caráter ácido



Reação com metal

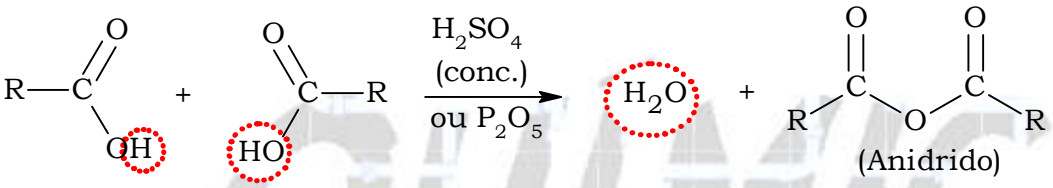


Reação com base



(Sal)

Desidratação (formação de Anidrido)

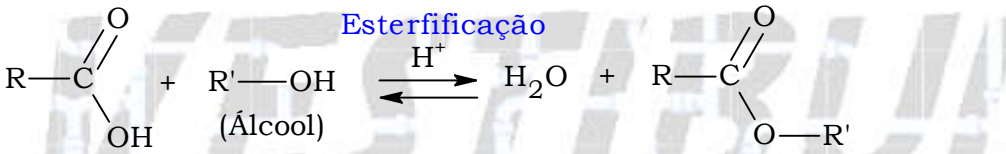


(Anidrido)

Reação com Composto de Grignard (Reação de Zerewitinoff)

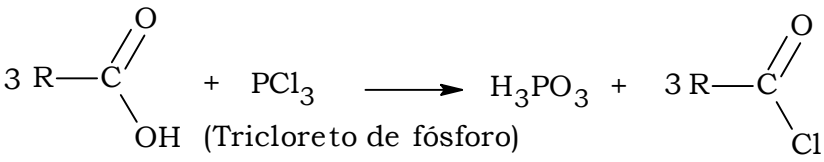
(Composto de Grignard) (Sal misto)

Reação de esterificação



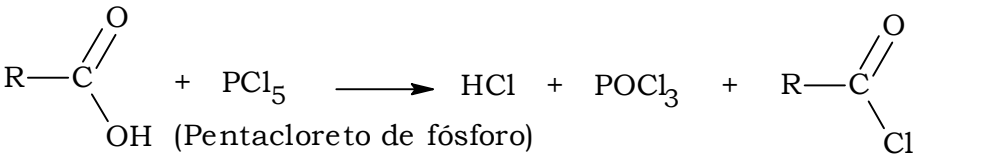
(Ácido carboxílico) (Álcool) (Éster de ácido carboxílico)

Reações com haletos de fósforo



(Tricloreto de fósforo)

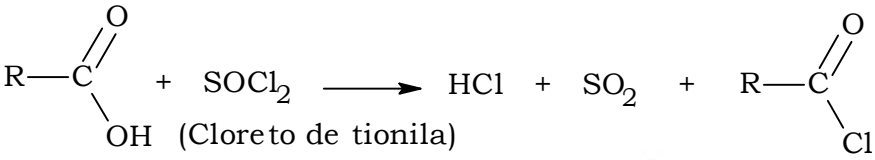
(Cloreto de ácido)



(Pentacloreto de fósforo)

(Cloreto de ácido)

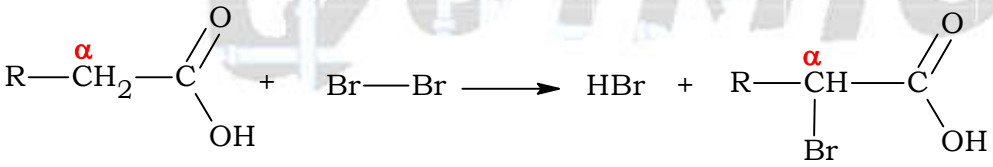
Reação com cloreto de tionila

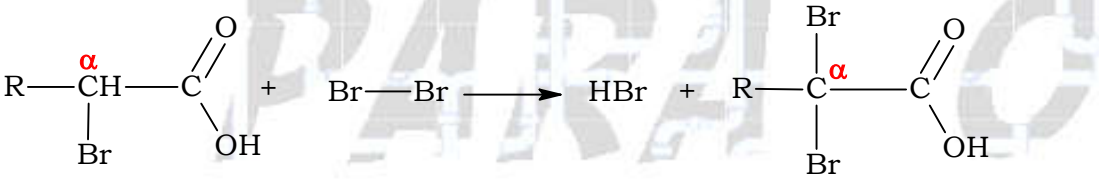


(Cloreto de tionila)

(Cloreto de ácido)

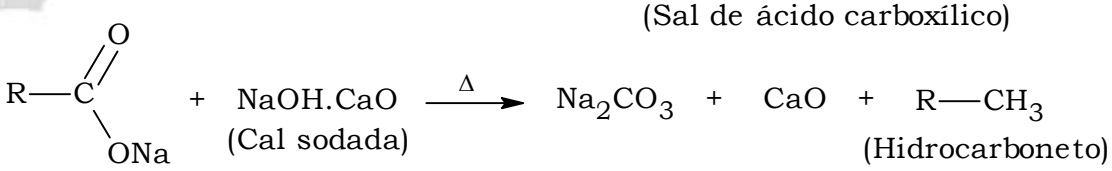
Reações de halogenação no carbono alfa (α)





Método de Dumas ou fusão alcalina

(Sal de ácido carboxílico)

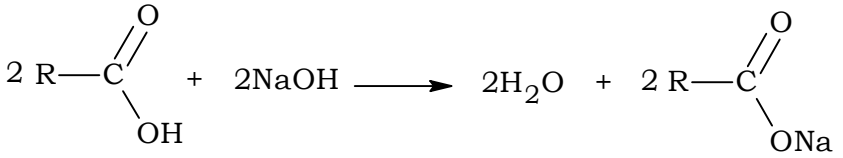


(Sal de ácido carboxílico)

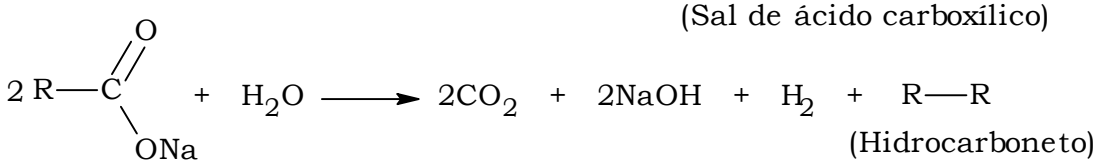
(Cal sodada)

(Hidrocarboneto)

Método de Kolbe (eletrolítico)



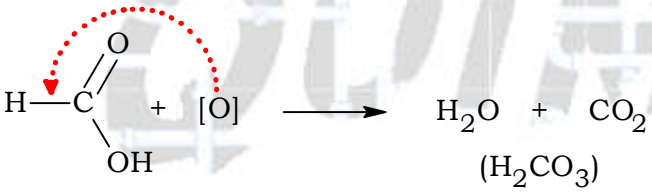
(Sal de ácido carboxílico)



(Sal de ácido carboxílico)

(Hidrocarboneto)

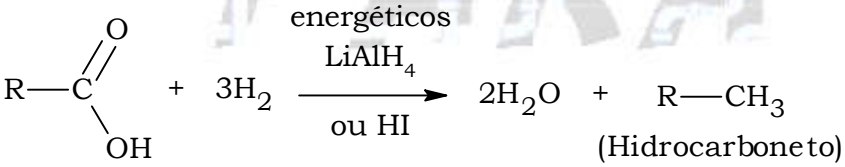
Oxidação do ácido fórmico ou metanoico



(Ácido fórmico ou metanoico)

(H_2CO_3)

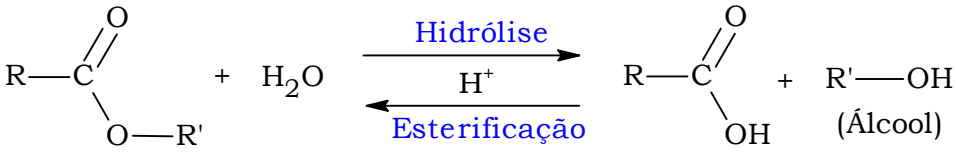
Redução



(Hidrocarboneto)

12) Ésteres

Reações de Hidrólise e Esterificação (equilíbrio)

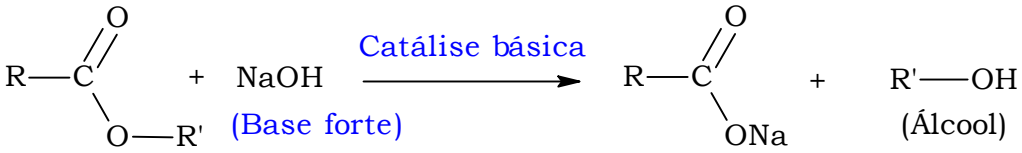


(Éster de ácido carboxílico)

(Ácido carboxílico)

(Álcool)

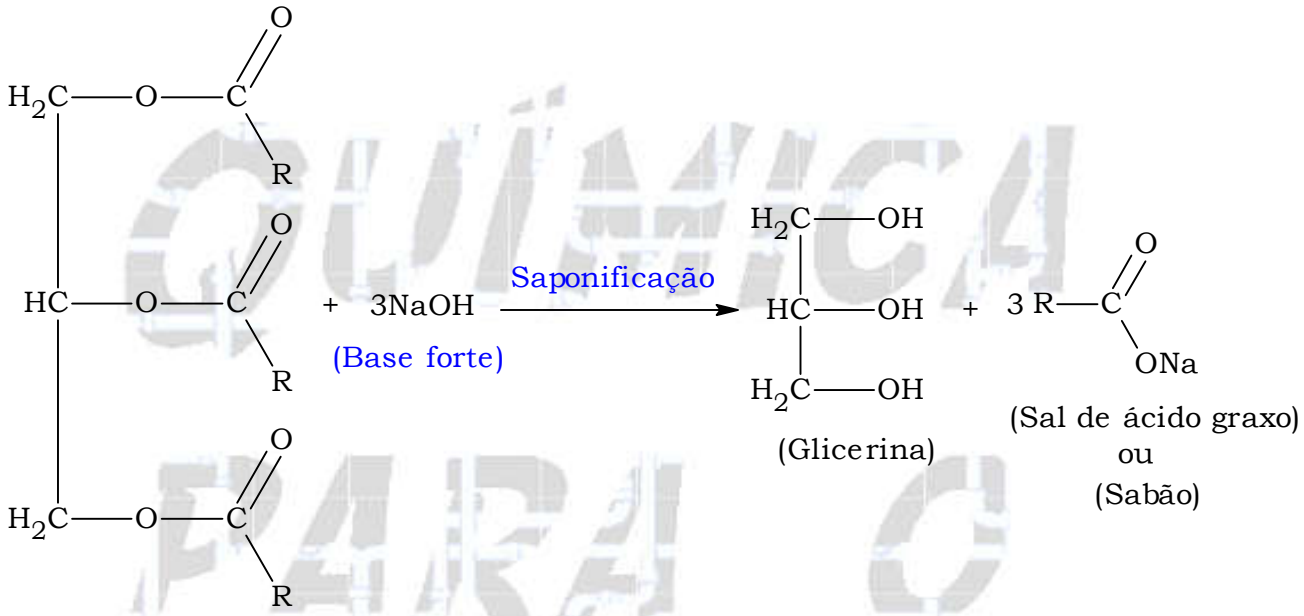
Reação com base forte



(Éster de ácido carboxílico)

(Carboxilatos de sódio)

Reação de Saponificação

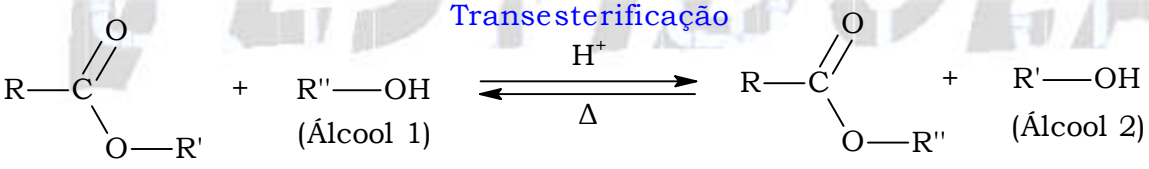


(Ésteres de ácidos graxos e glicerina)

ou

(Triésteres - Óleos ou gorduras)

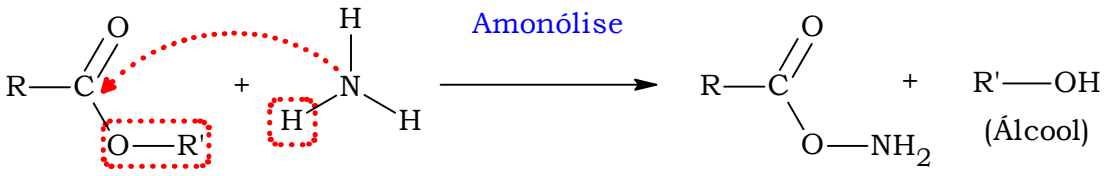
Reação de Transesterificação ou Alcoólise



(Éster 1)

(Éster 2)

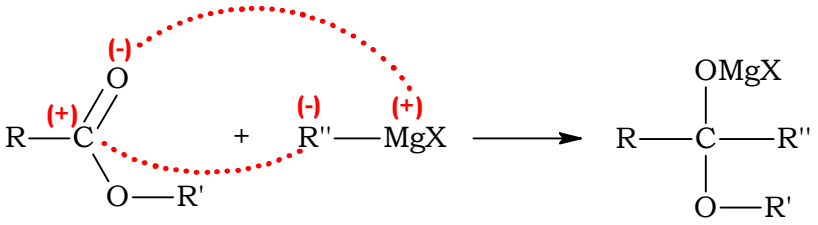
Reação de Amonólise



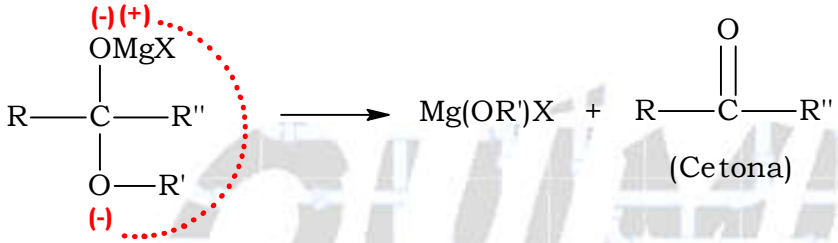
(Éster de ácido carboxílico)

(Amida)

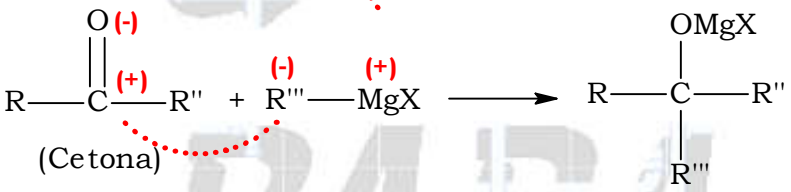
Reação com Composto de Grignard



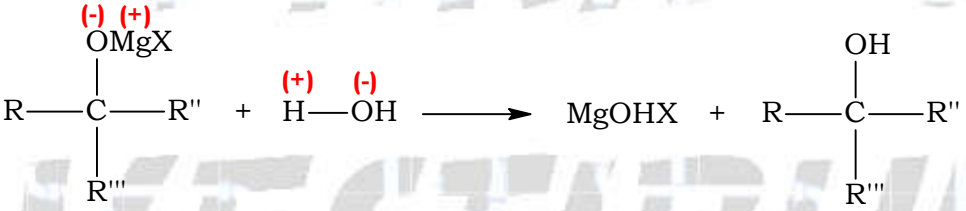
(Éster de ácido carboxílico)



(Cetona)

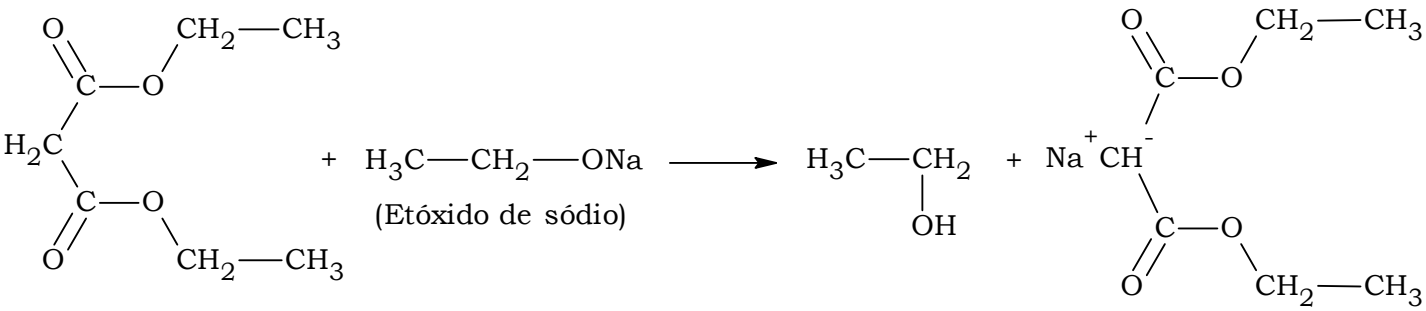


(Cetona)



(Álcool terciário)

Reação do Éster Malônico com Etóxido de sódio

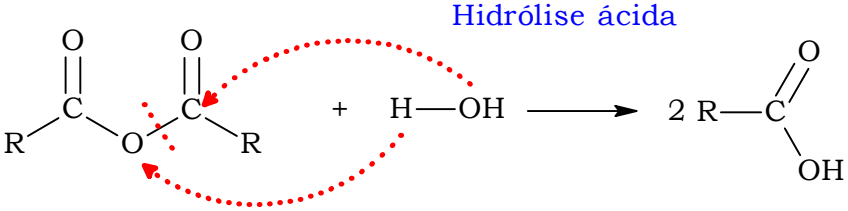


(Éster Malônico)

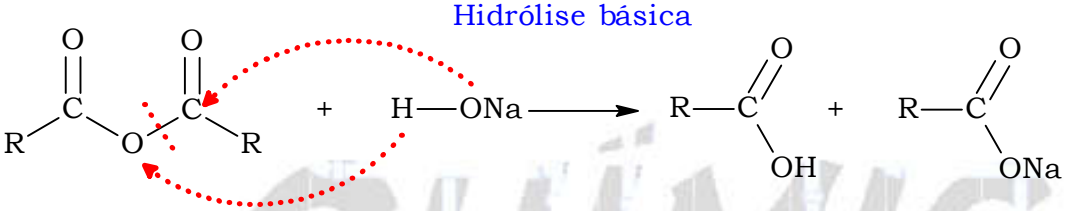
(Etóxido de sódio)

13) Anidridos

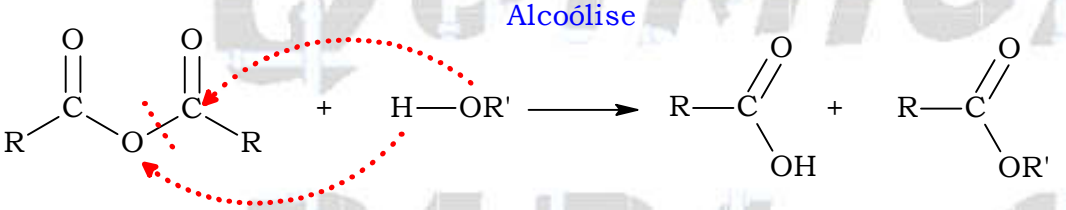
Hidrólise ácida



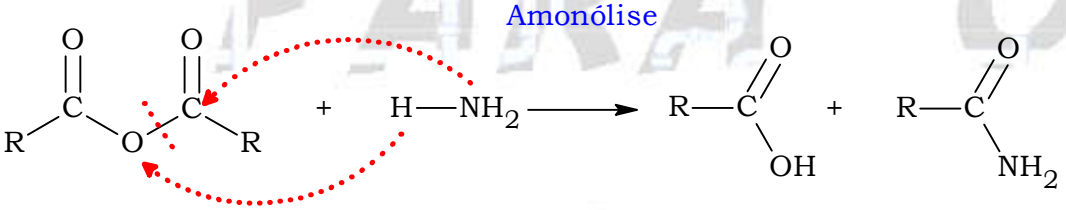
Hidrólise básica



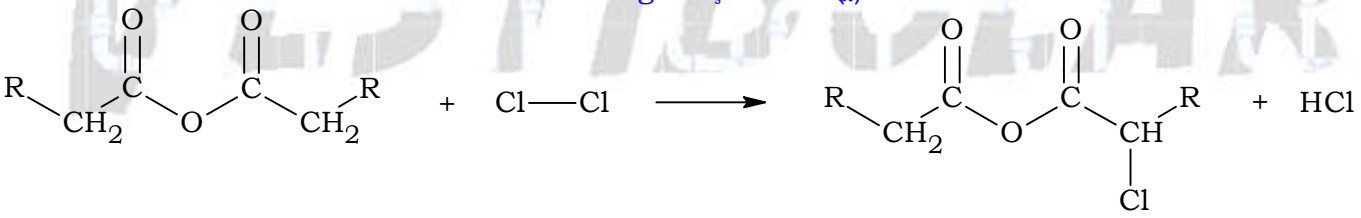
Alcoólise



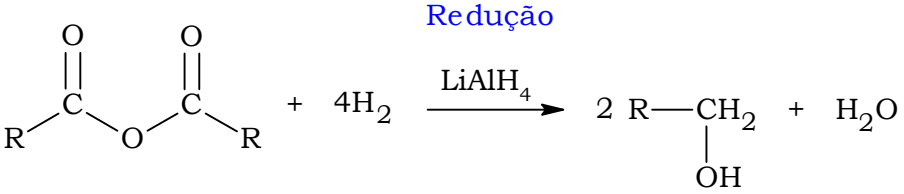
Amonólise



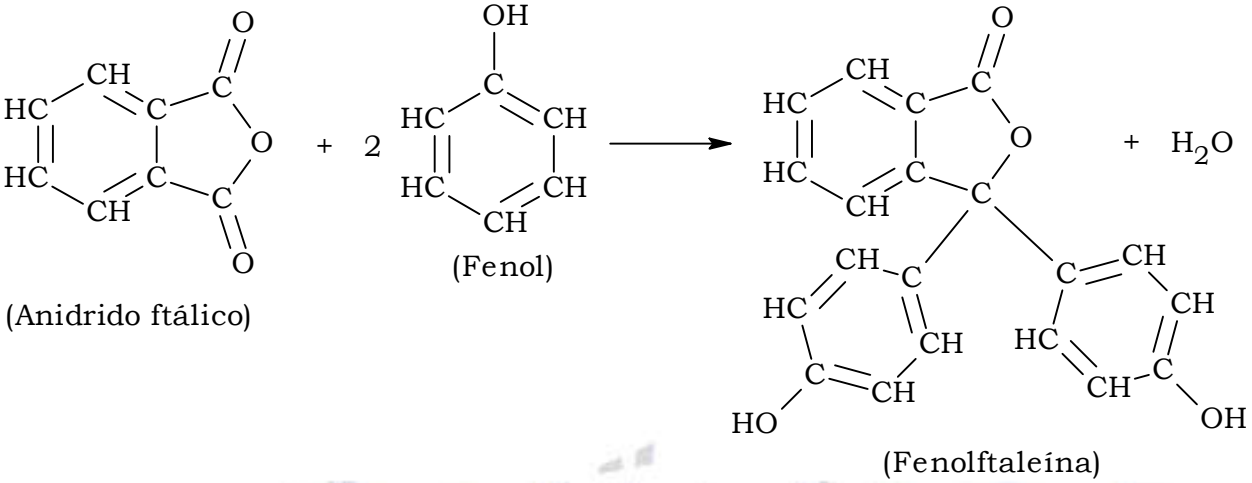
Halogenação alfa (α)



Redução

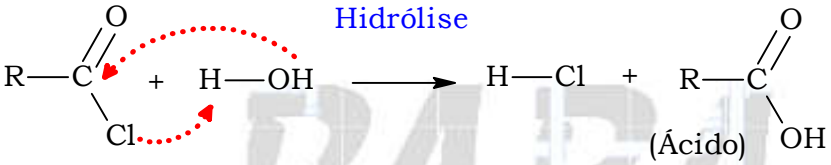


Produção de fenolftaleína

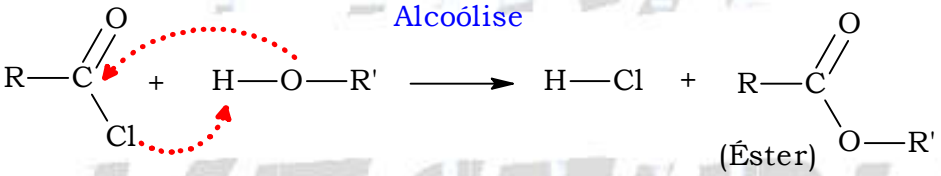


14) Cloreto de ácidos

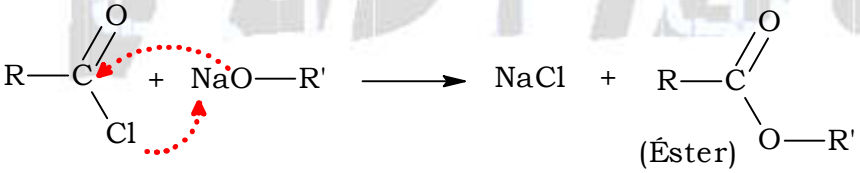
Hidrólise



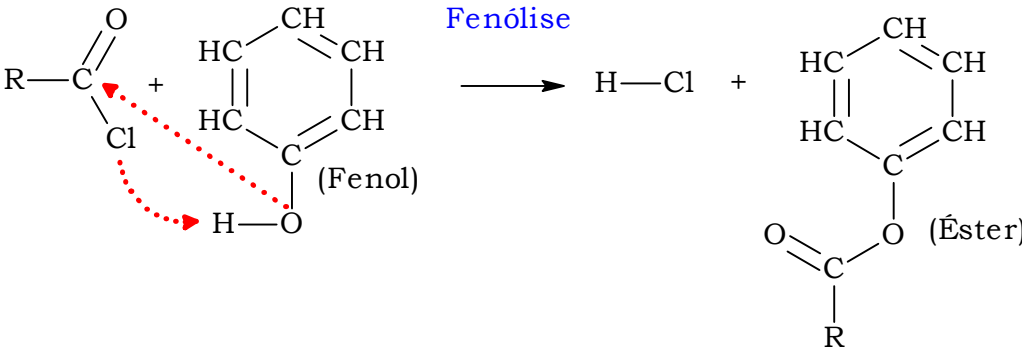
Alcoólise



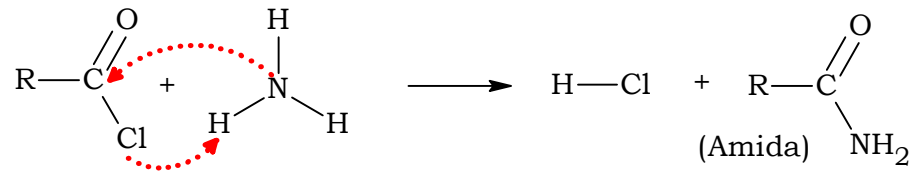
Reação com alcoóxidos

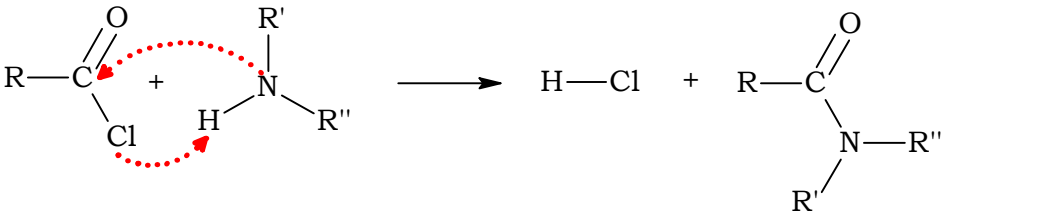


Fenólise



Amonólise



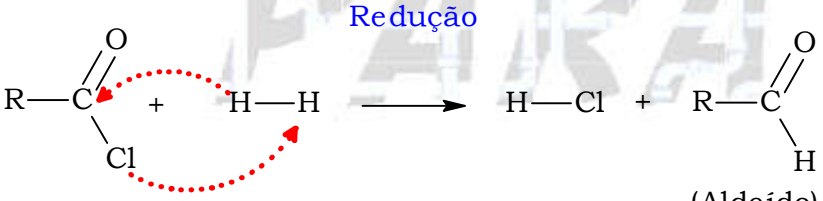


(Amida N,N-dissubstituída)

Reação com sal

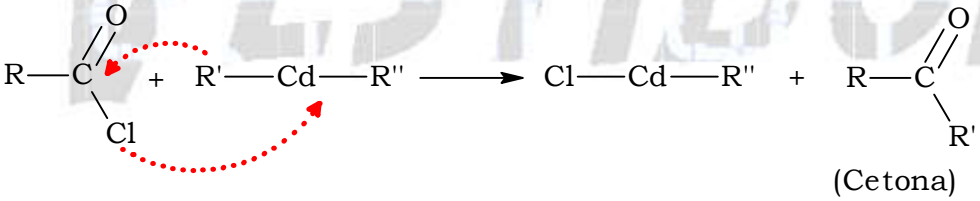
(Anidrido)

Redução



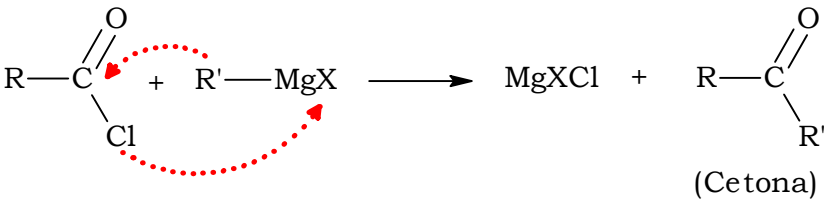
(Aldeído)

Reações com organometálicos do Cádmio



(Cetona)

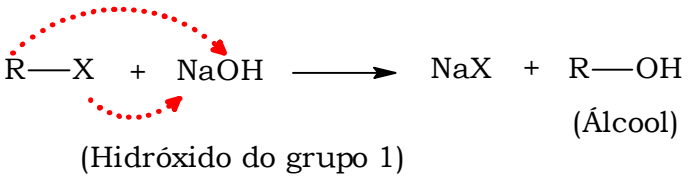
Reações com Compostos de Grignard

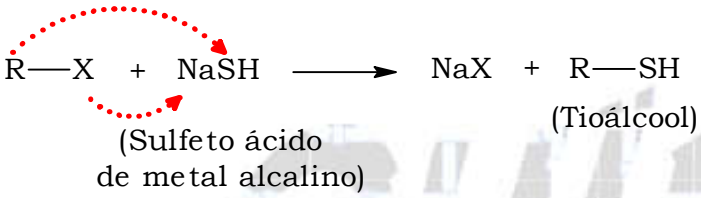


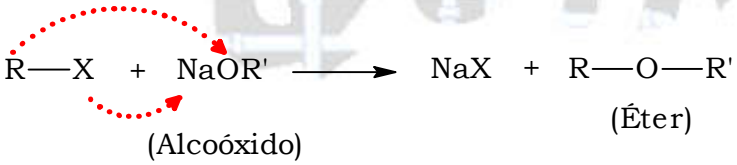
(Cetona)

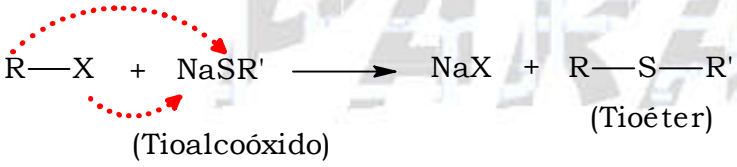
15) Compostos halogenados

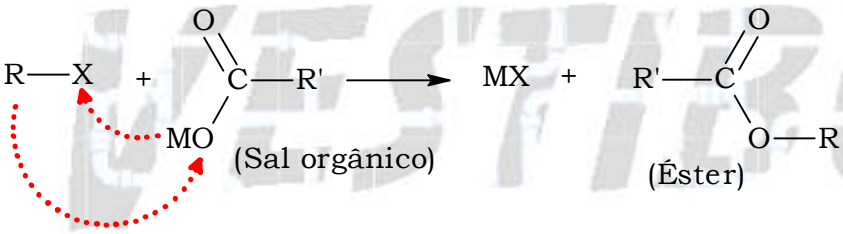
Reações de substituição

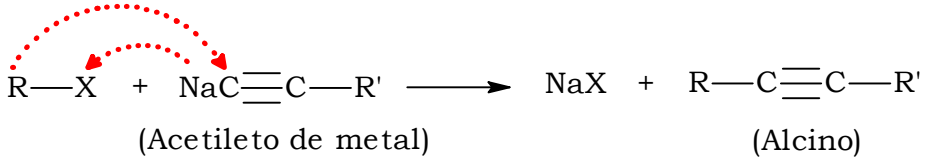


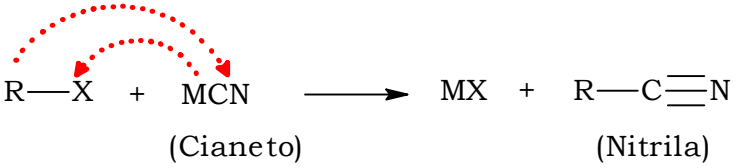


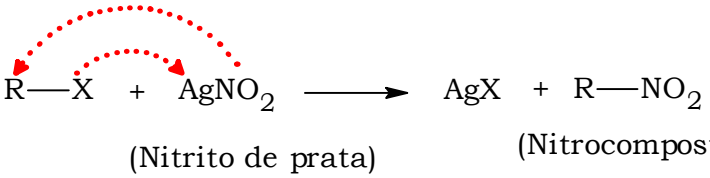




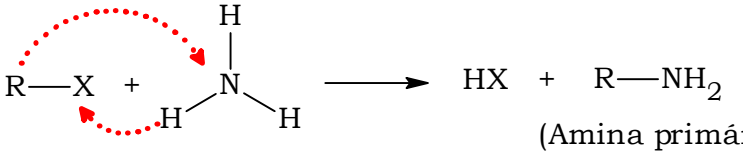




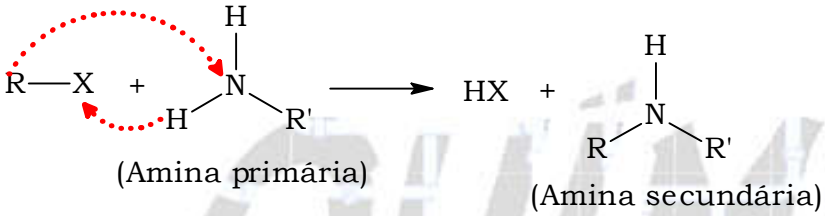




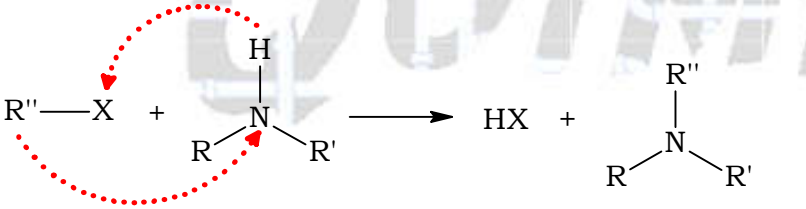
(Nitrito de prata) (Nitrocomposto)



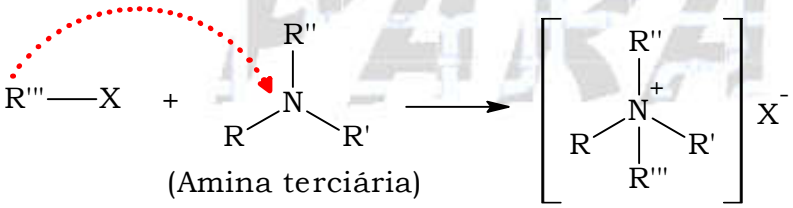
(Amina primária)



(Amina primária) (Amina secundária)

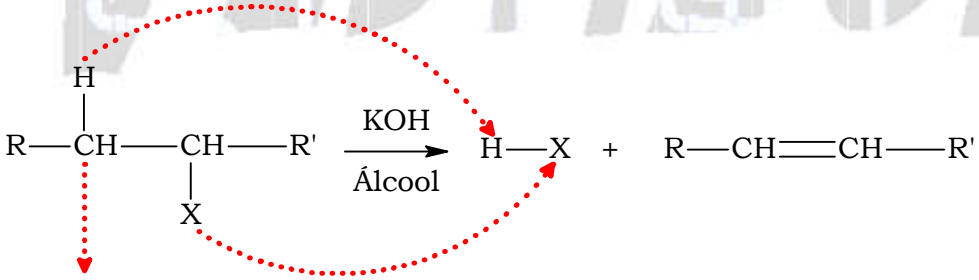


(Amina secundária) (Amina terciária)



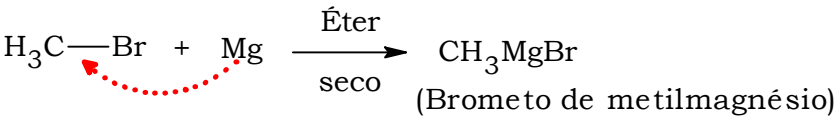
(Amina terciária) (Sal de amônio quaternário)

Reações de eliminação



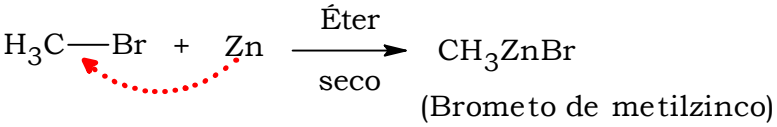
O "H" sai do Carbono menos hidrogenado (Regra de Saytzeff)

Adição de metal



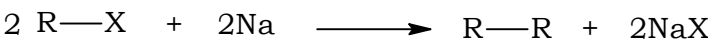
(Brometo de metilmagnésio)

Adição de metal

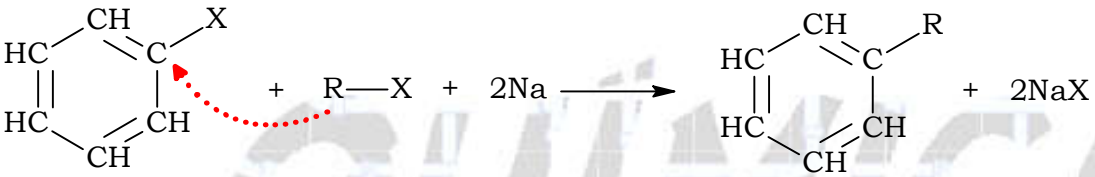


(Brometo de metilzinco)

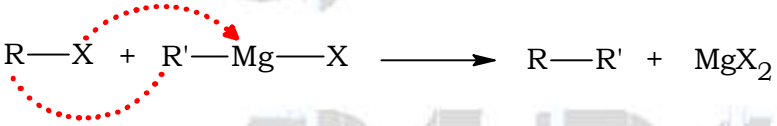
Síntese de Wurtz



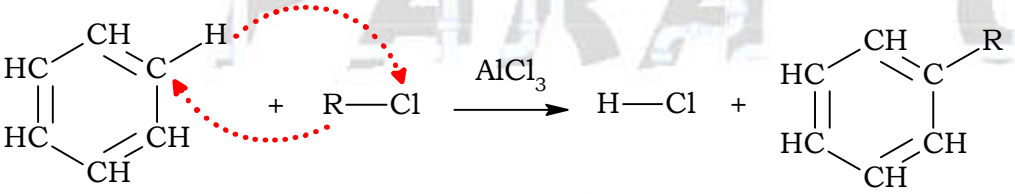
Síntese de Wurtz - Fittg



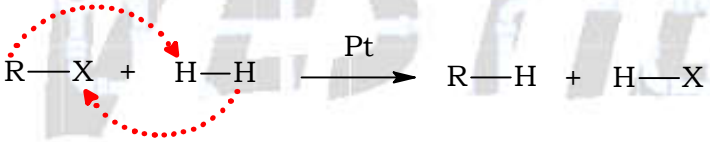
Síntese com Compostos de Grignard

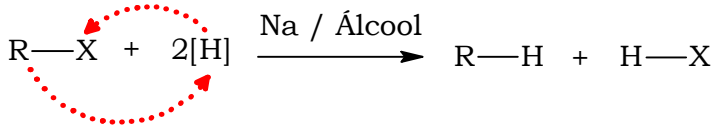


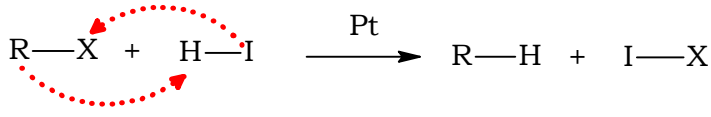
Síntese de Friedel-Crafts

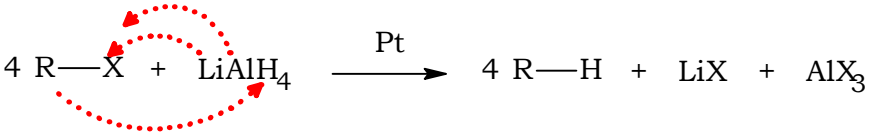


Redução de Haletos



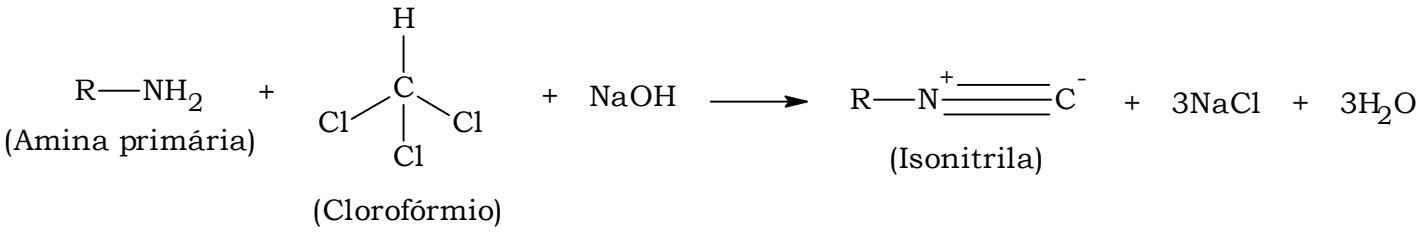




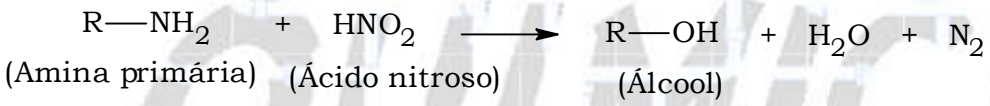


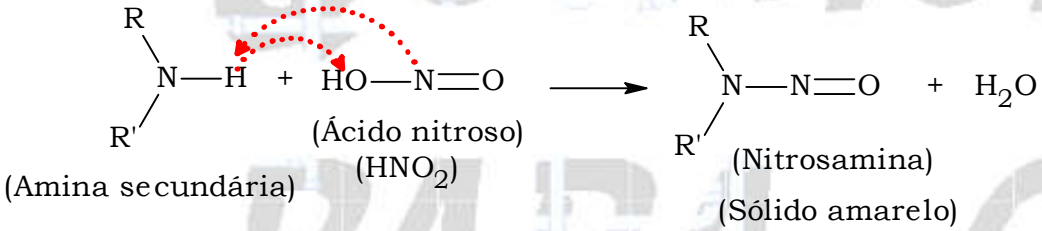
16) Aminas

Apenas as aminas primárias reagem com clorofórmio em meio básico.

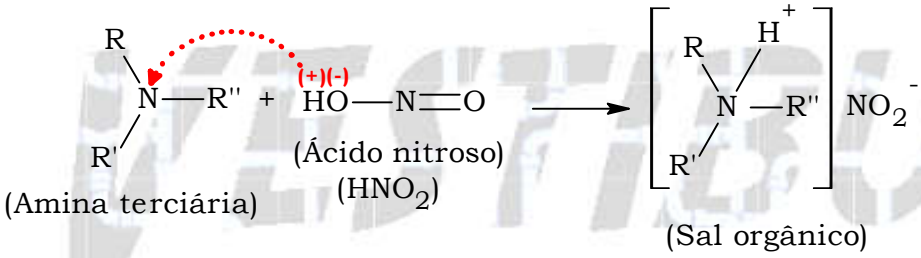


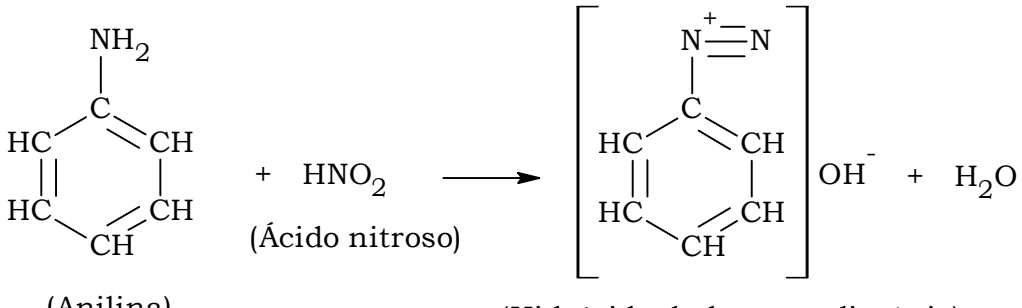
Reações com ácido nitroso (HNO_2)

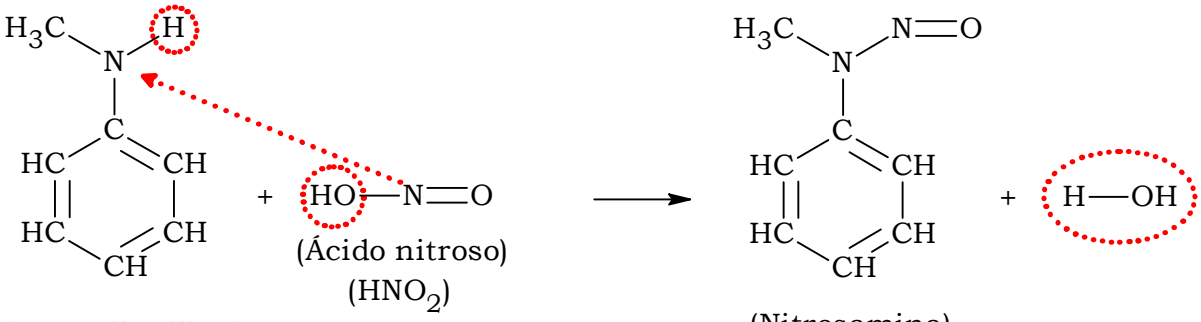




Reações com ácido nitroso (HNO_2)



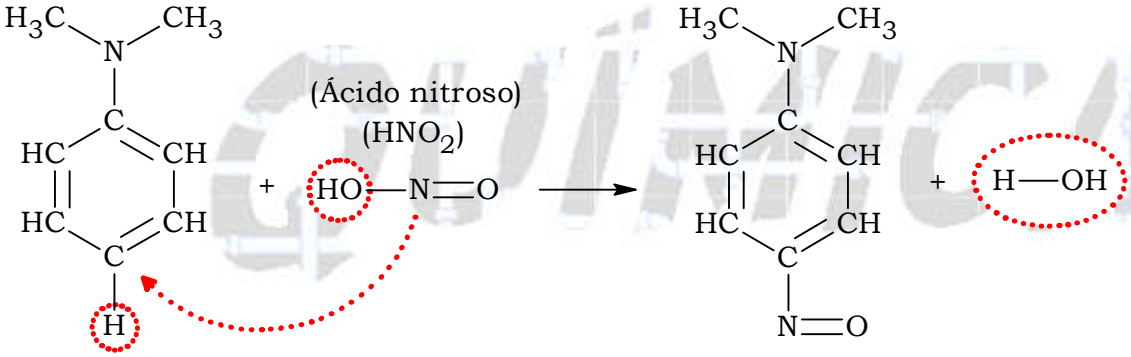




(N-metilanilina)
(Amina aromática secundária)

(Ácido nitroso)
(HNO_2)

(Nitrosamina)
ou
(N-nitroso-N-metilanilina)

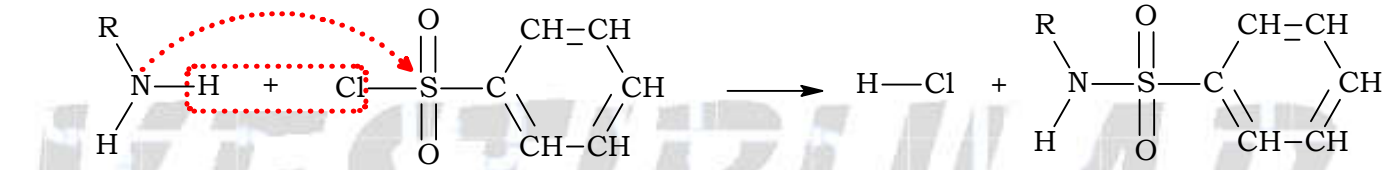


(N,N-dimetilanilina)
(Amina aromática terciária)

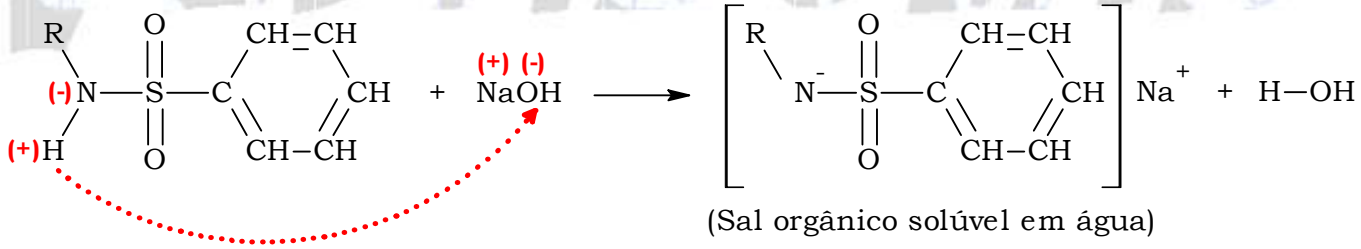
(Ácido nitroso)
(HNO_2)

(p-nitroso-N,N-dimetilanilina)

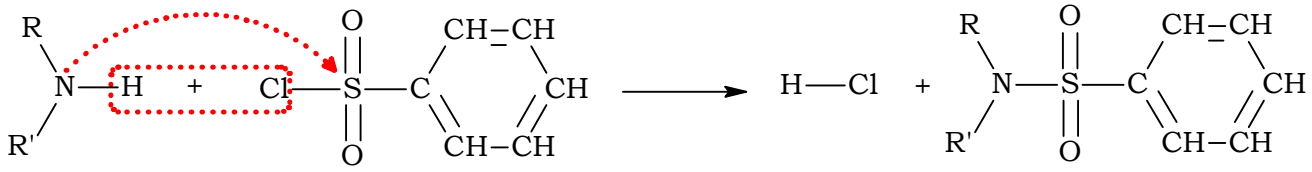
Método de Hinsberg



(Amina primária) (Cloreto de benzenossulfonila)

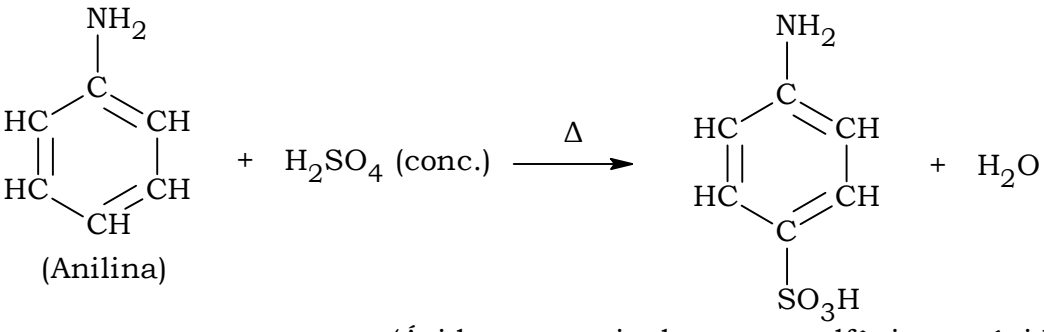


(Sal orgânico solúvel em água)



(Amina secundária) (Cloreto de benzenossulfonila) (Insolúvel em água)

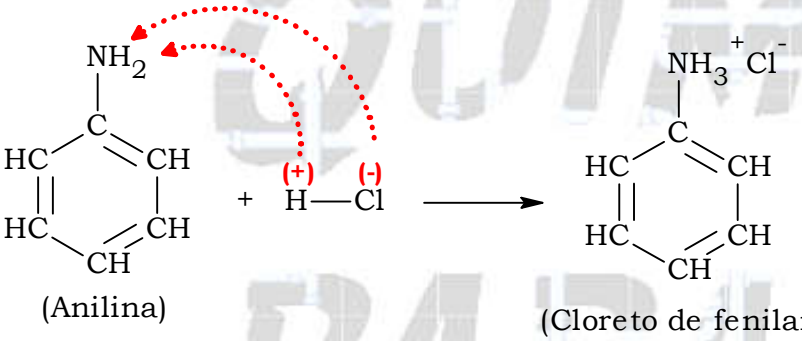
Reações da Anilina



(Anilina)

(Ácido para-aminobenzenossulfônico ou ácido sulfanílico)

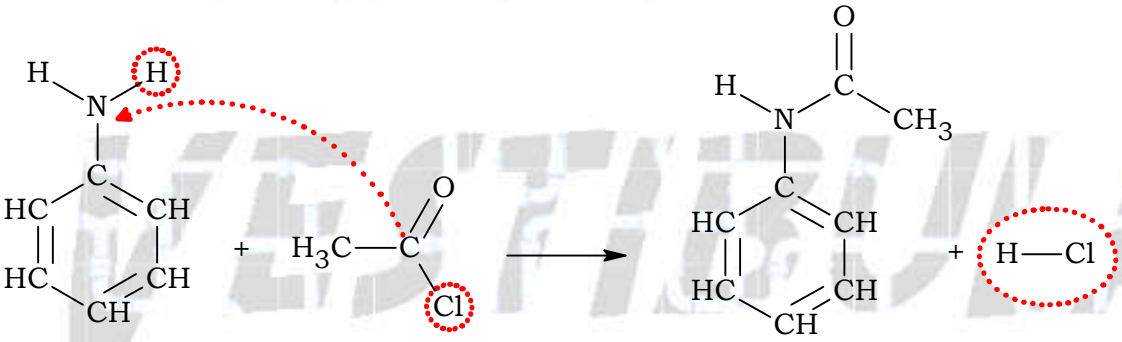
Reação da Anilina formando sal



(Anilina)

(Cloreto de fenilamônio)

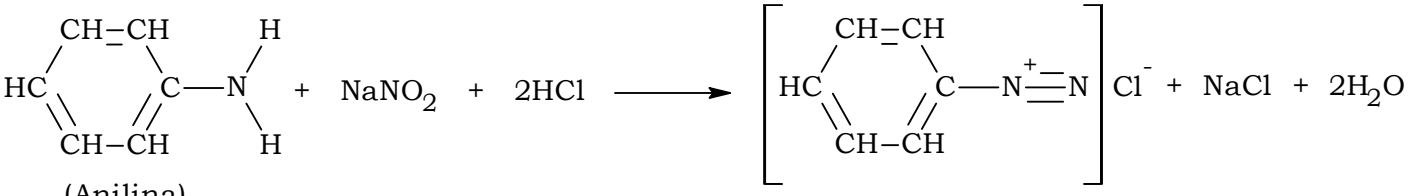
Reação de Acilação da Anilina formando Anilida



(Anilina)

(Acetanilida ou Anilida de ácido acético)

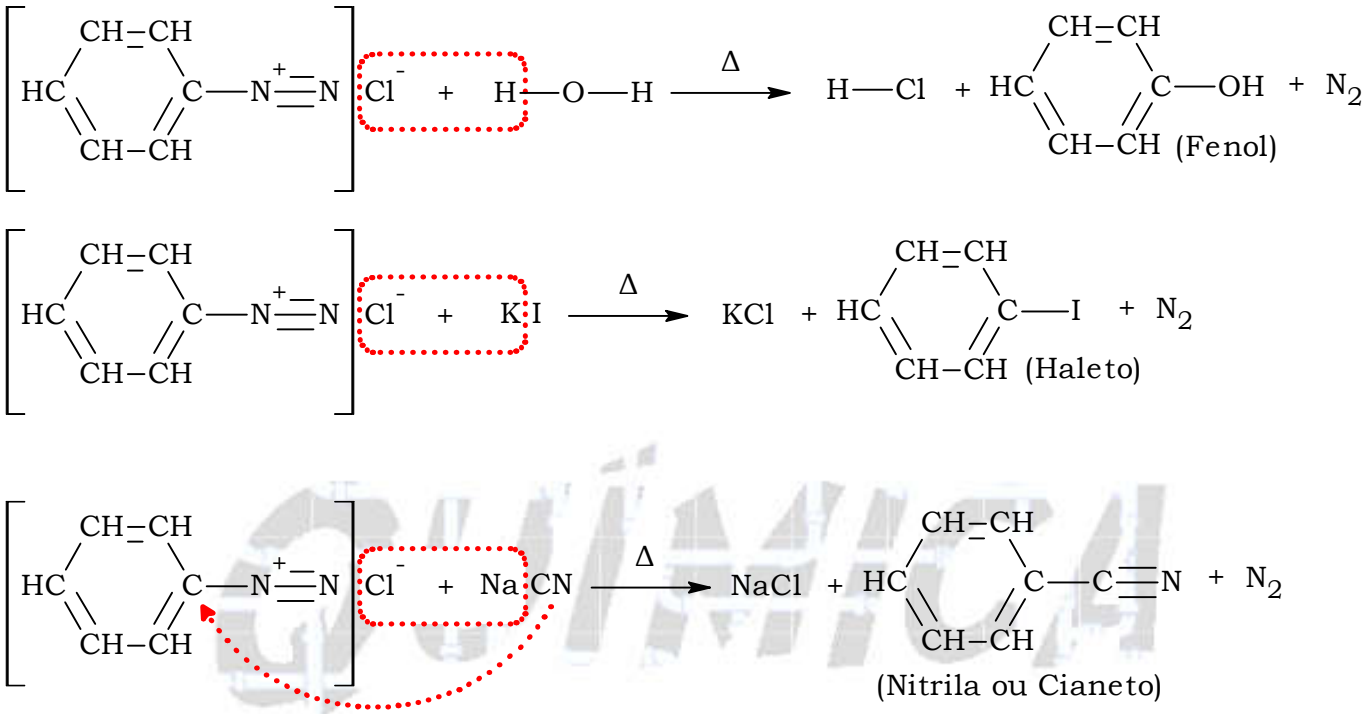
Reação de diazotação



(Anilina)

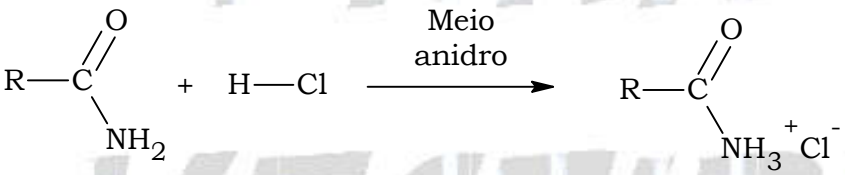
(Cloreto de benzenodiazônio)

Eliminação de gás nitrogênio

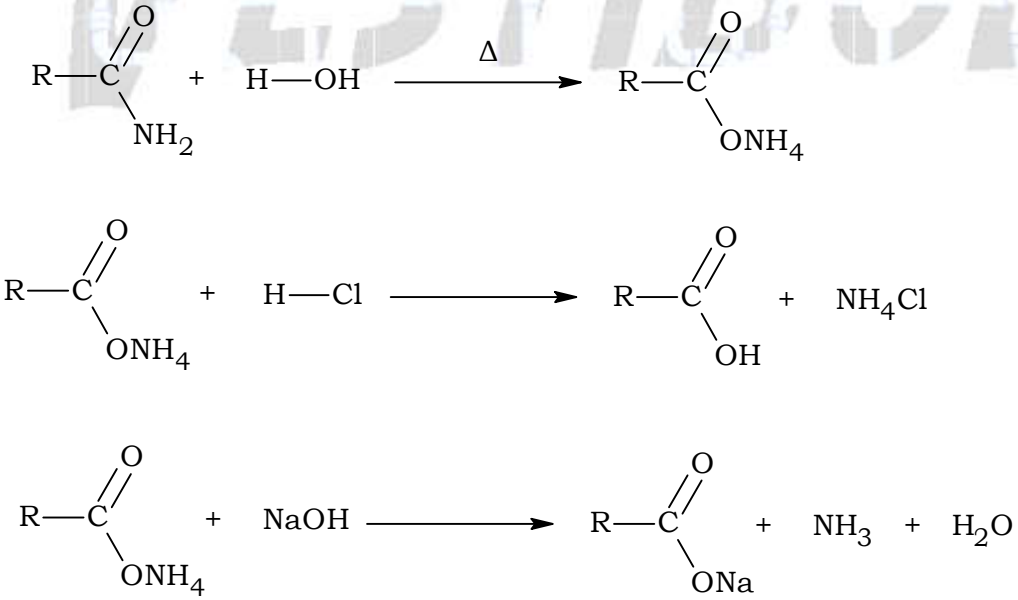


17) Amidas

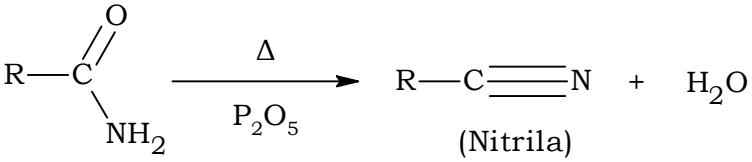
Caráter



Caráter anfótero das Amidas

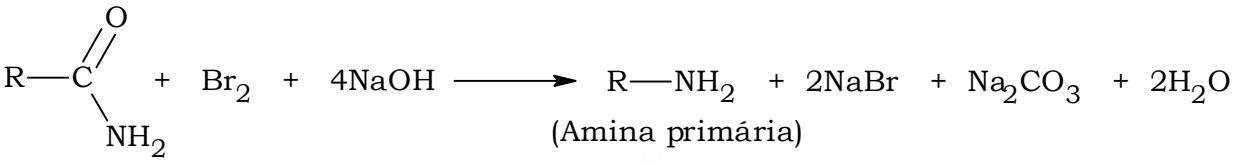


Desidratação



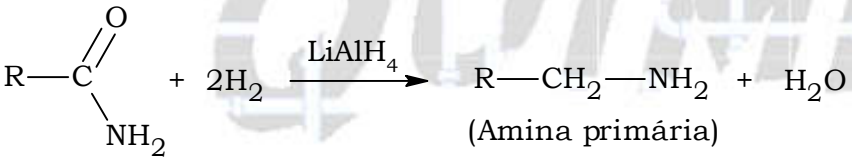
(Nitrila)

Reação com Halogênios em meio básico



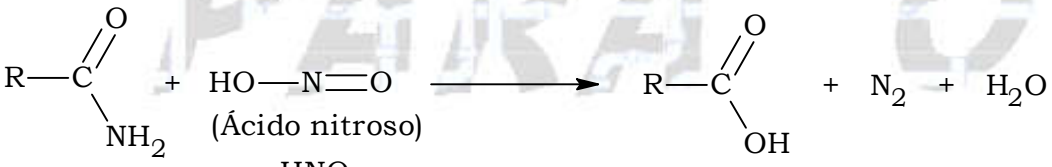
(Amina primária)

Redução



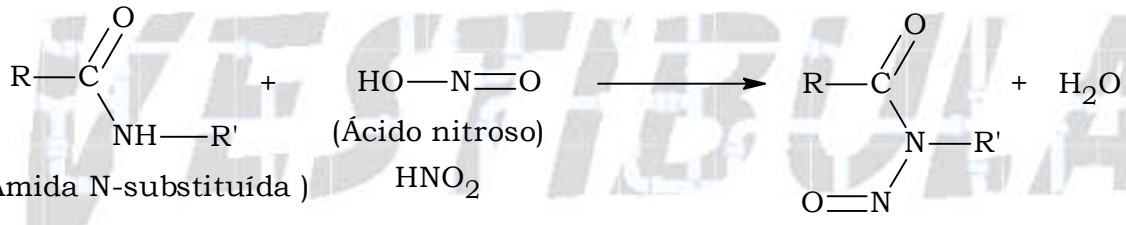
(Amina primária)

Reações com ácido nitroso



(Ácido nitroso)
HNO_2

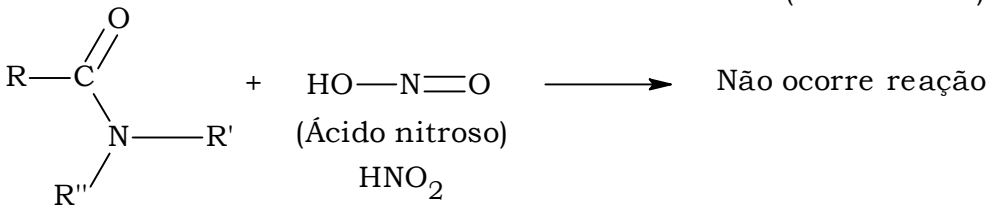
(Ácido carboxílico)



(Amida N-substituída)

(Ácido nitroso)
HNO_2

(Nitrosamida)

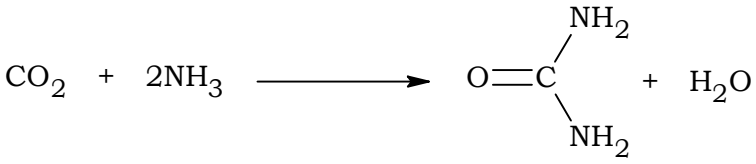


(Amida N,N-dissubstituída)

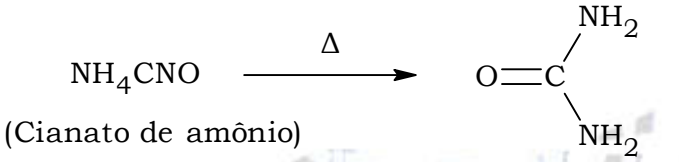
(Ácido nitroso)
HNO_2

Grande incidência nos vestibulares!!

Ureia (diamida do ácido carbônico)



(Ureia)



(Cianato de amônio)
(Sal)

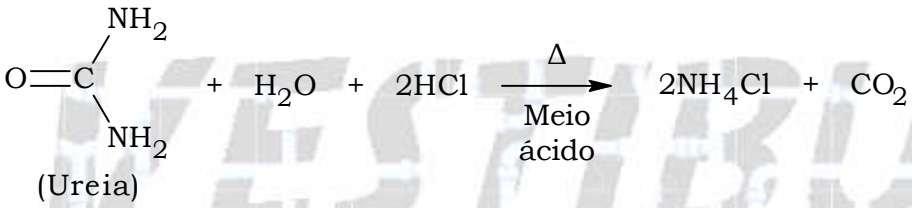
(Ureia)
(Composto orgânico)

Observação: Wöhler (em 1928) utilizou esta reação para derrubar a "teoria da força vital", que dizia que apenas seres vivos poderiam produzir compostos orgânicos.

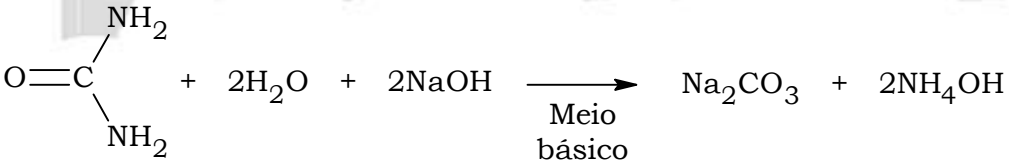
Caráter básico da Ureia

(Ureia)
(Ácido nítrico)

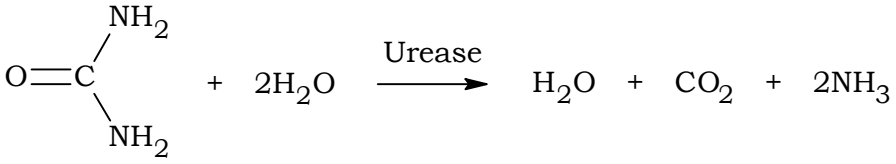
Hidrólise da Ureia



(Ureia)



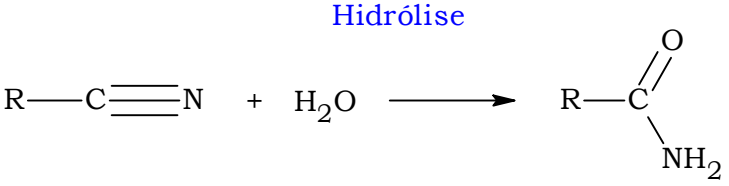
(Ureia)



(Ureia)

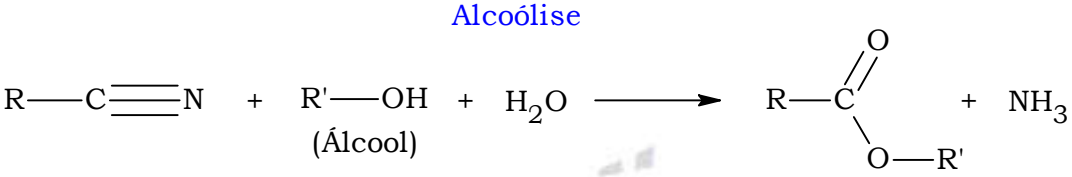
18) Nitrilas ou Cianetos de alquila

Hidrólise



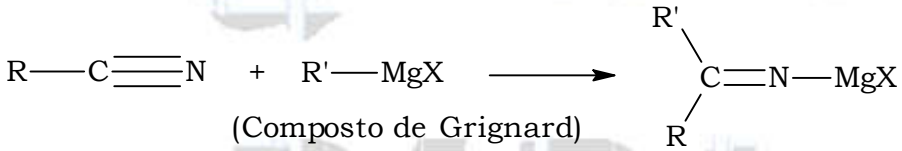
(Amida)

Alcoólise



(Álcool) (Éster)

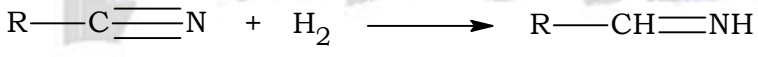
Reação com Composto de Grignard



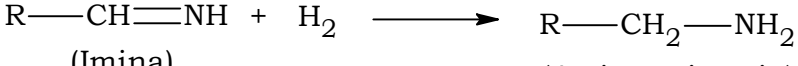
(Composto de Grignard)

(Cetona)

Redução feita com $LiAlH_4$ ou ($Na + C_2H_5OH$) ou ($H_2 + Ni$)



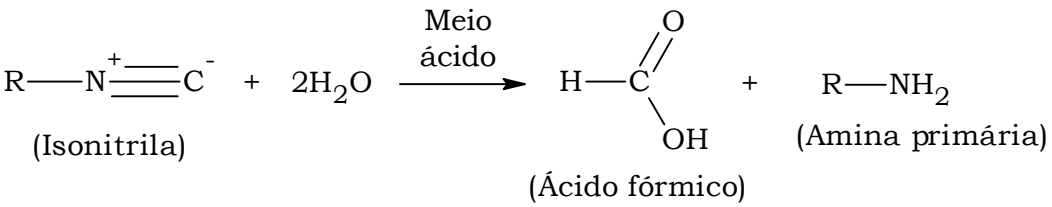
(Imina)



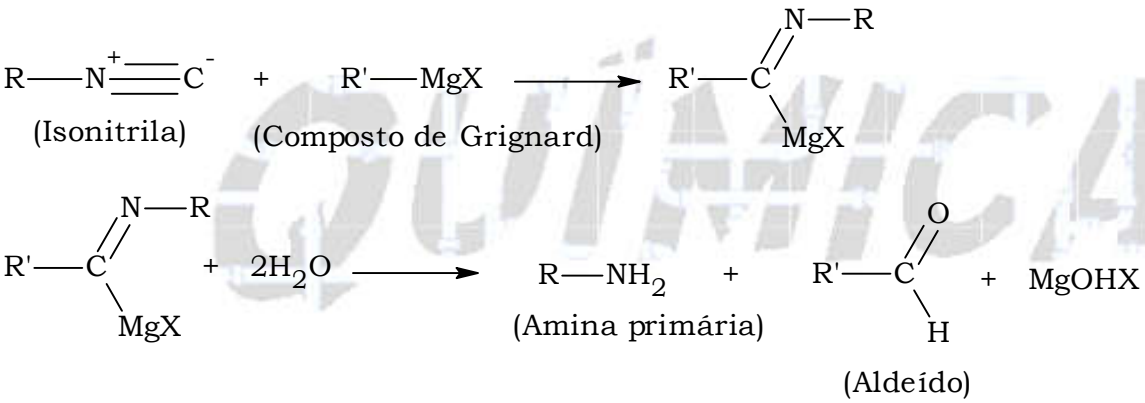
(Imina) (Amina primária)

19) Isonitrilas ou Carbilaminas ou Isocianetos de alquila

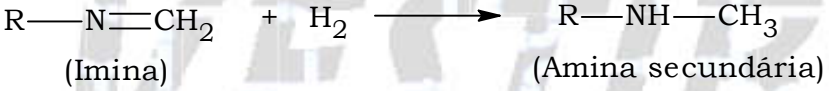
Hidrólise



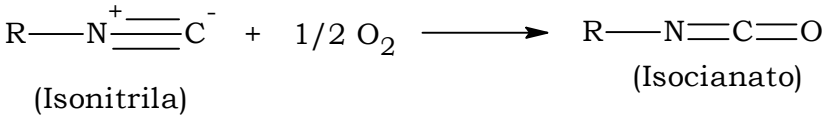
Reação com Composto de Grignard

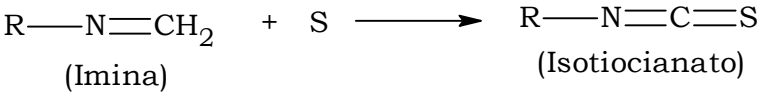


Redução



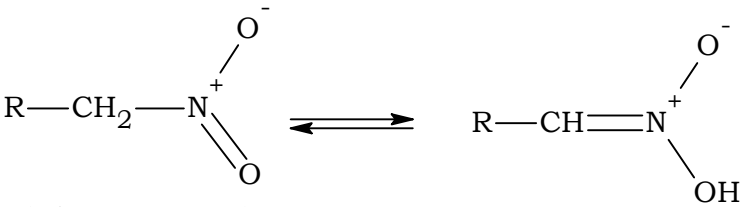
Adição





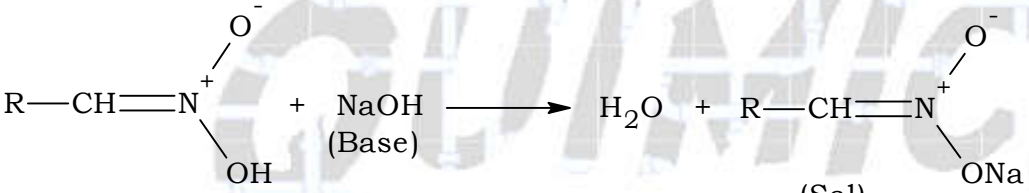
20) Nitrocompostos

Equilíbrio químico (semelhante à tautomeria)



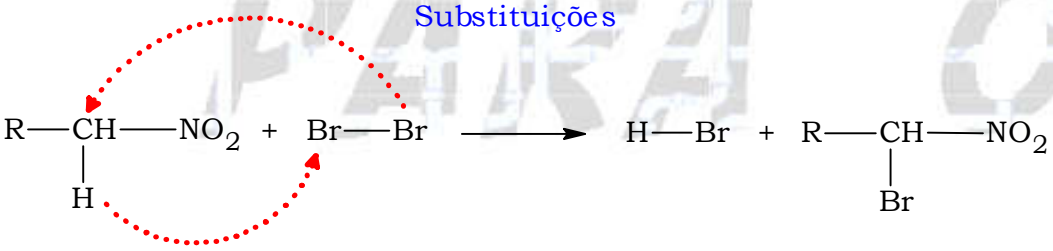
(Nitrocomposto) (Ácido nitrônico) (Forma ácida)

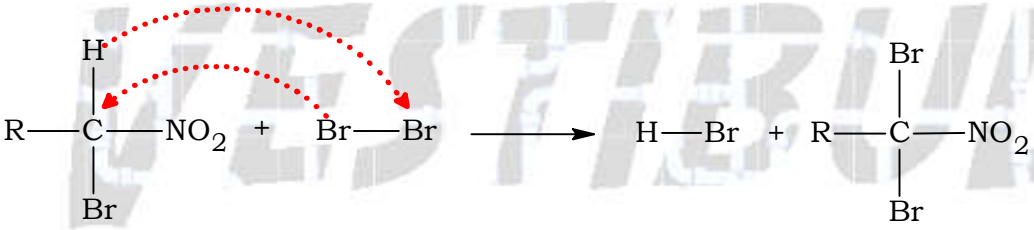
Caráter ácido

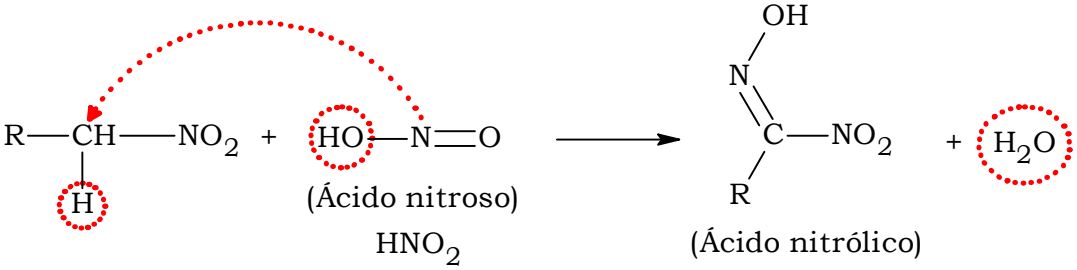


(Ácido nitrônico) (Forma ácida) (Sal)

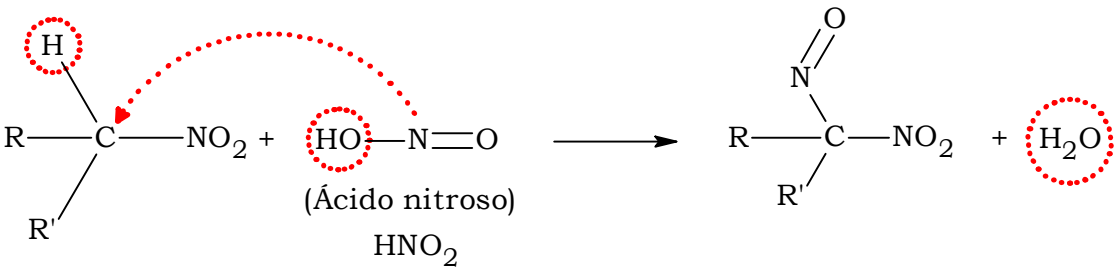
Substituições

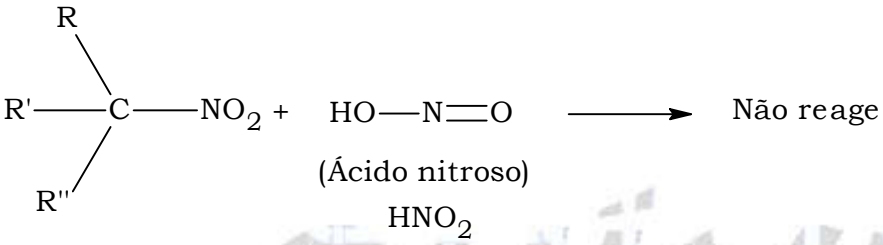




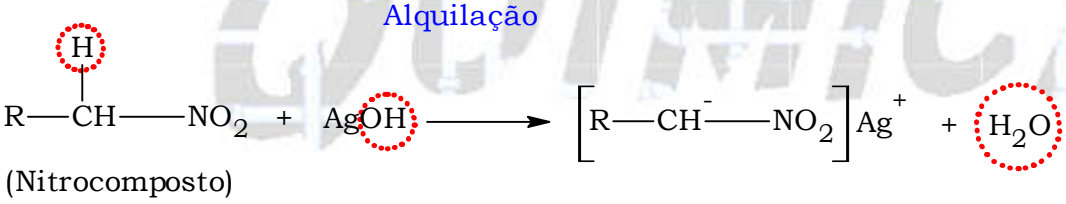


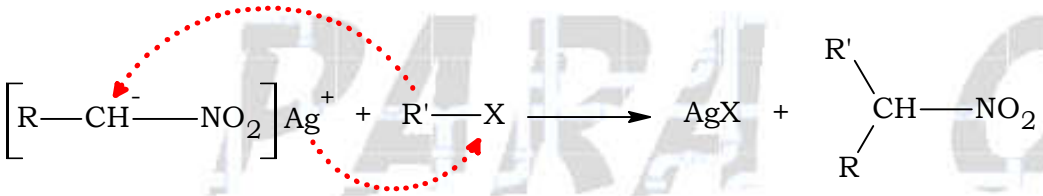
(Ácido nitroso) HNO_2 (Ácido nitrólico)



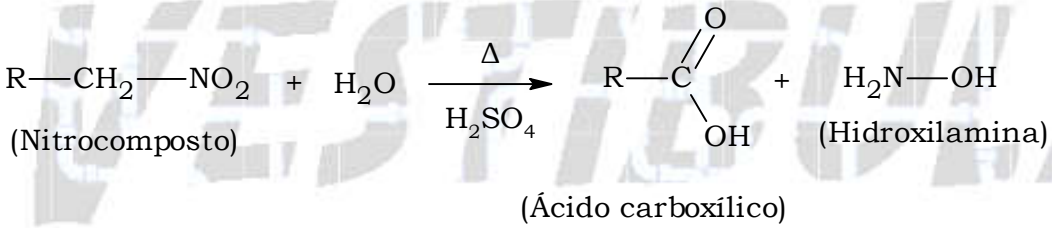


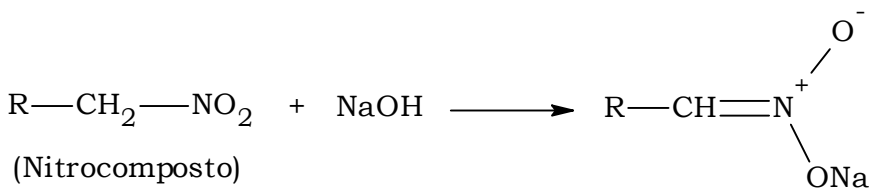
Alquilação

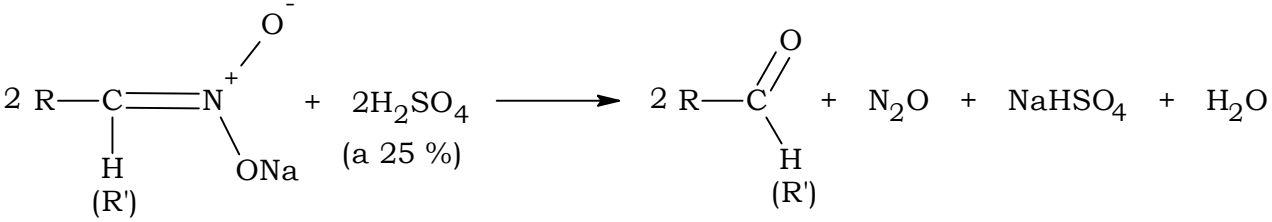




Hidrólise



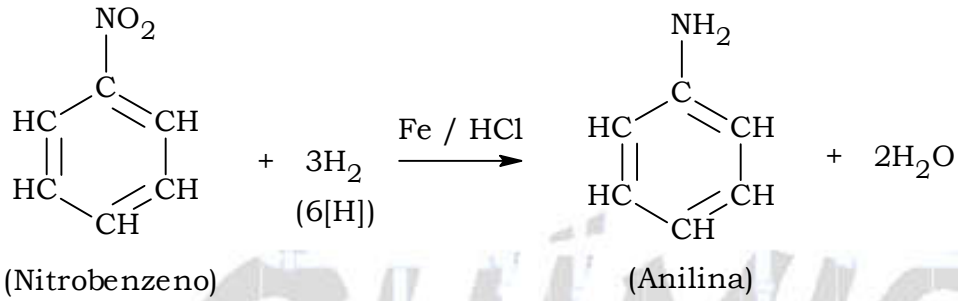




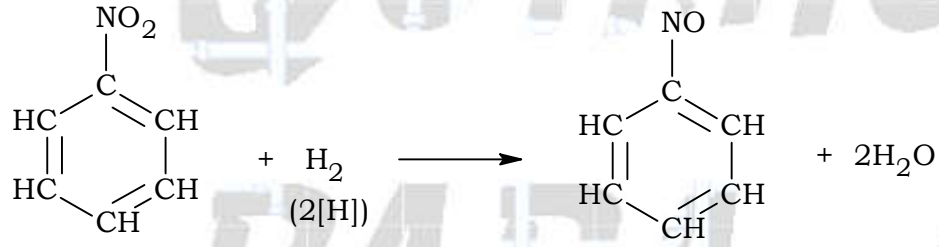
Redução

$$R{-}NO_2 + 3H_2 \xrightarrow{Fe\ /\ HCl} R{-}NH_2 + 2H_2O$$

(Nitrocomposto) (6[H]) (Amina primária)



(Nitrobenzeno) (Anilina)



(Nitrobenzeno) (Nitrosobenzeno)

21) Compostos sulfurados: Tioalcoóis, Tioéteres, Ácidos Sulfônicos e Sulfatos

Tioalcoóis, Tióis ou Mercaptanas

Reações com bases fortes

$$R{-}SH + MOH \longrightarrow H_2O + R{-}S^{-}M^{+}$$

(Tioalcoól) (Base forte) (Mercáptido)

Reações com compostos formados por metais pesados

$$2\ R{-}SH + HgO \longrightarrow (RS)_2Hg + H_2O$$

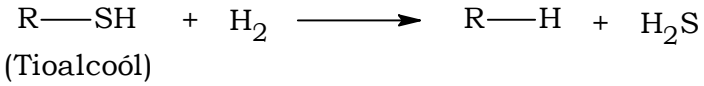
(Tioalcoól) (Precipitado)

Observação: Os Tióis são chamados de **mercaptanas** (**mer**cúrio + **capt**ans ou captador de mercúrio), pois causam a precipitação dos íons de mercúrio.

$$R{-}SH + HgCl_2 \longrightarrow RSHgCl + HCl$$

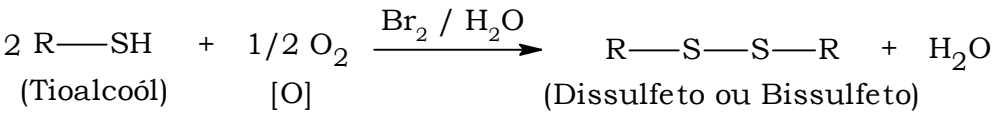
(Tioalcoól) (Precipitado)

Redução



(Tioalcoól)

Oxidação branda



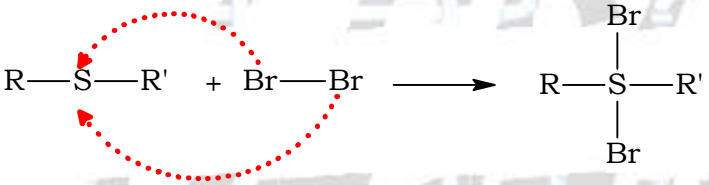
(Tioalcoól) (Dissulfeto ou Bissulfeto)

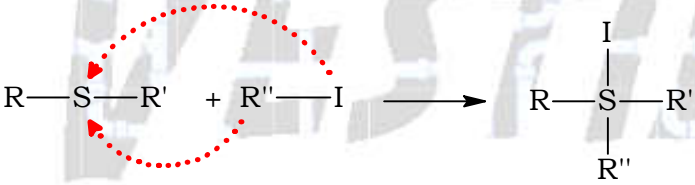
Oxidação enérgica

(Tioalcoól) (Ácido sulfônico)

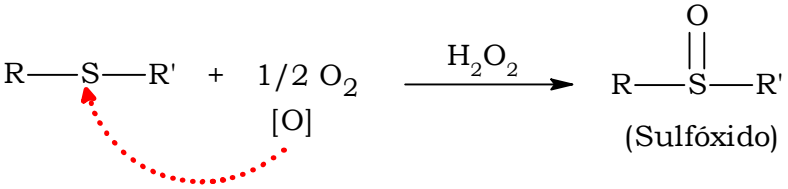
Tioéteres ou Sulfetos

Adição



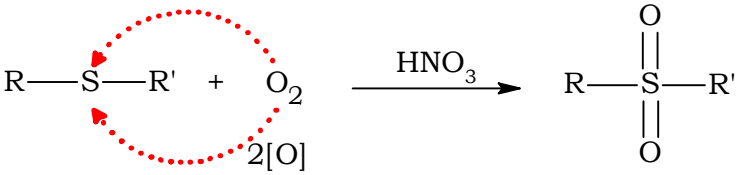


Oxidação branda



(Sulfóxido)

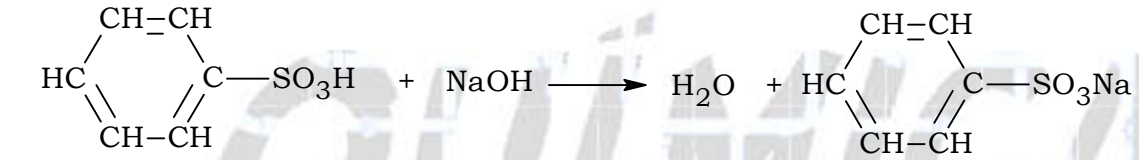
Oxidação enérgica



(Sulfona)

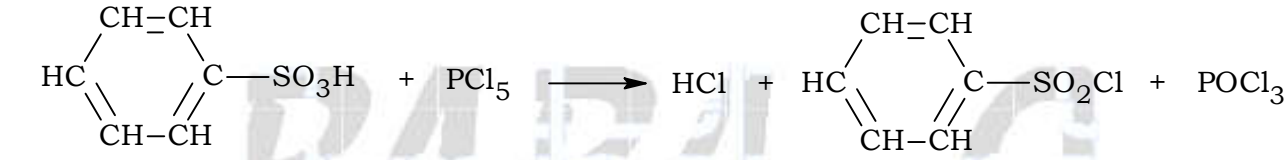
Ácidos sulfônicos

Reação com base



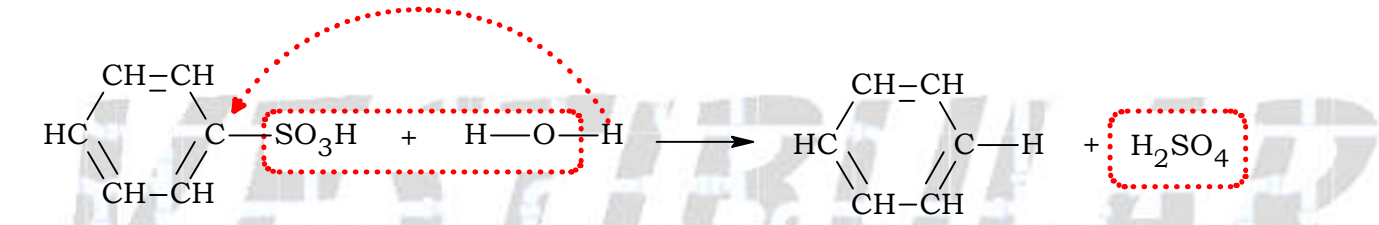
(Ácido benzenossulfônico) (Benzenossulfonato de sódio)

Reação com fosfeto halogenado

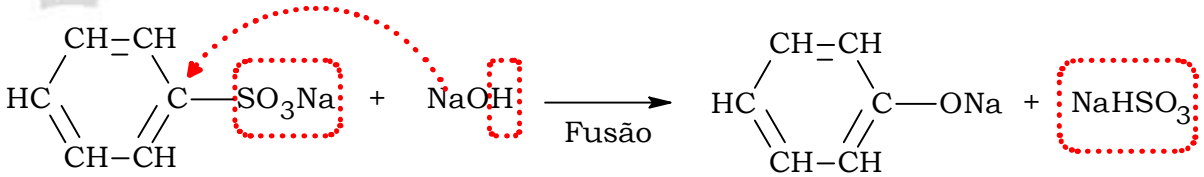


(Ácido benzenossulfônico) (Cloreto de benzenossulfonila)

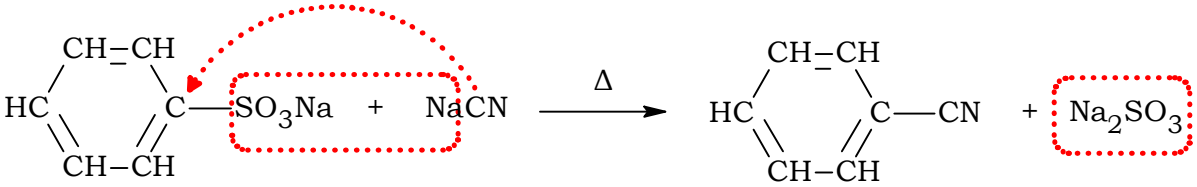
Substituição do grupo SO_3H



(Ácido benzenossulfônico) (Benzeno)

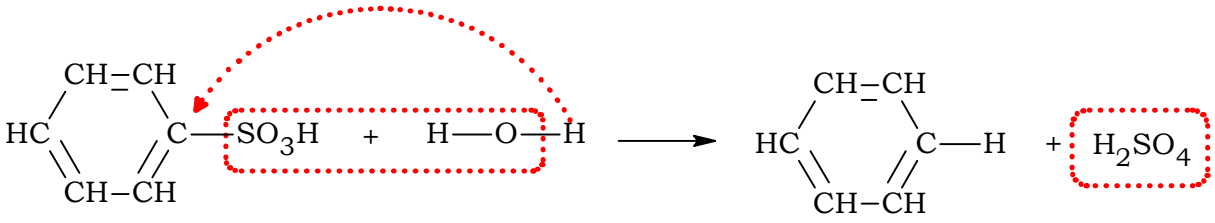


(Benzenossulfonato de sódio) (Benzoato de sódio)

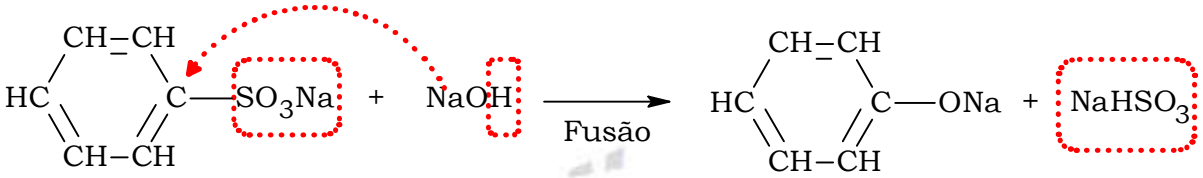


(Benzenossulfonato de sódio) (Benzeno nitrilo)

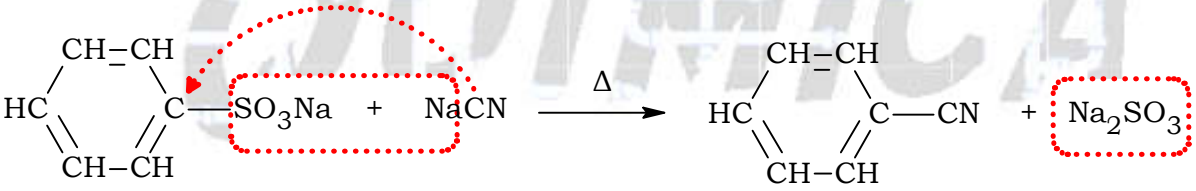
Substituição do grupo SO_3H



(Ácido benzenossulfônico) (Benzeno)

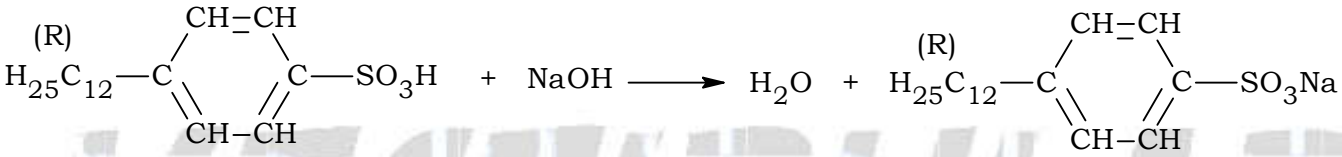


(Benzenossulfonato de sódio) (Benzoato de sódio)



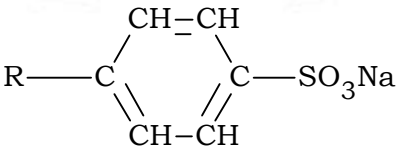
(Benzenossulfonato de sódio) (Benzeno nitrilo)

Detergente (Grande incidência nos vestitulares!)

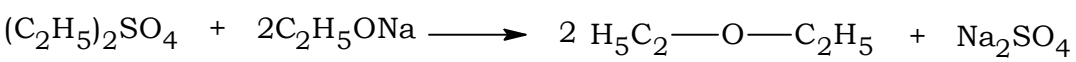


(Ácido dodecilbenzenossulfônico) (Dodecilbenzenossulfonado de sódio)

(DETERGENTE)



Sulfatos



(Éter dietílico)