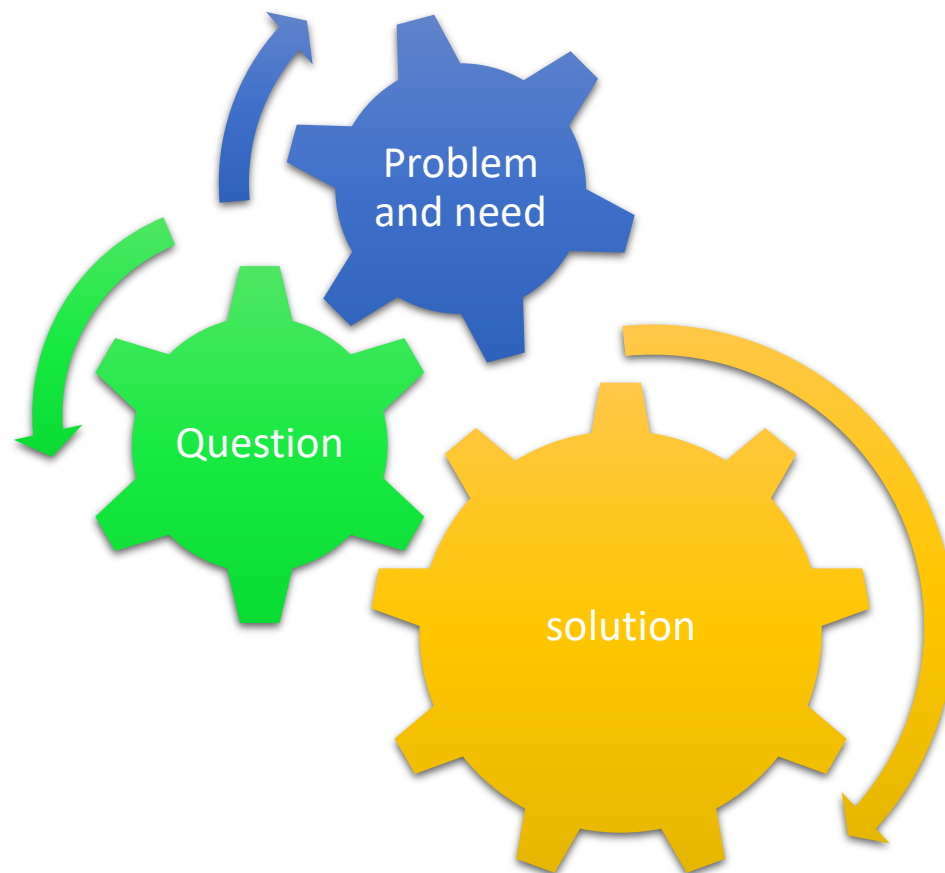


دوره الكل ها: ساختار و سنتز شیمی آلی فصل اول: ساختار الكل ها

مدرس: امیرمهدی ایمان زاده

۱۴۰۱-۱۴۰۲

معارفه



اهمیت و ضرورت دوره



Alcohols importance

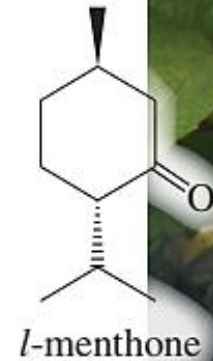
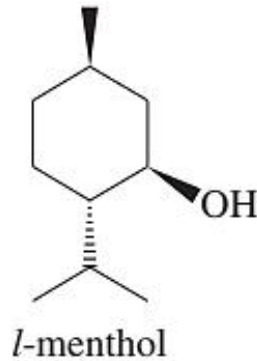
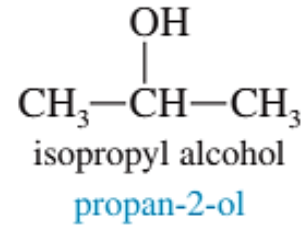
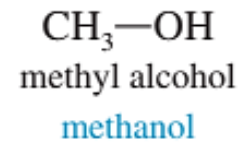
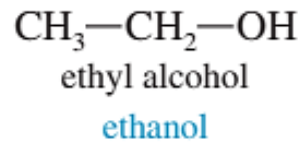
Reactions

Synthesis methods

هدف

- 1** Draw structures and assign names for alcohols, phenols, diols, and thiols.
- 2** Predict relative boiling points, acidities, and solubilities of alcohols and thiols.
- 3** Show how to convert alkenes, alkyl halides, and carbonyl compounds to alcohols.
- 4** Use organometallic reagents for the synthesis of primary, secondary, and tertiary alcohols with the needed carbon skeletons.

معرفی اجمالی الکله‌ها

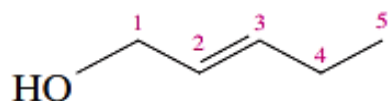


ساختار و طبقه بندی الكل ها

- الكل نوع اول
- الكل نوع دوم
- الكل نوع سوم
- فنول
- ديول
- گلايكول

نامگذاری الکل ها و فنول ها

1. Name the longest carbon chain that contains the carbon atom bearing the —OH group. Drop the final *-e* from the alkane name and add the suffix *-ol* to give the root name.
2. Number the longest carbon chain starting at the end nearest the hydroxy group, and use the appropriate number to indicate the position of the —OH group. (The hydroxy group takes precedence over double and triple bonds.)
3. Name all the substituents and give their numbers, as you would for an alkane or an alkene.

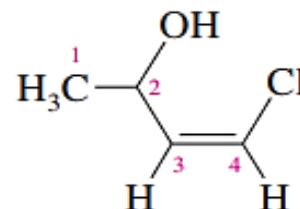


old IUPAC name:

trans-2-penten-1-ol

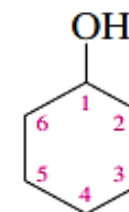
new IUPAC name:

trans-pent-2-en-1-ol



(*Z*)-4-chloro-3-buten-2-ol

(*Z*)-4-chlorobut-3-en-2-ol



2-cyclohexen-1-ol

cyclohex-2-en-1-ol

نامگذاری آیوپاک الکل ها (آلکانول)

TABLE 10-1
Priority of Functional Groups in
Naming Organic Compounds

acids (highest)

esters

aldehydes

ketones

alcohols

amines

alkenes, alkynes

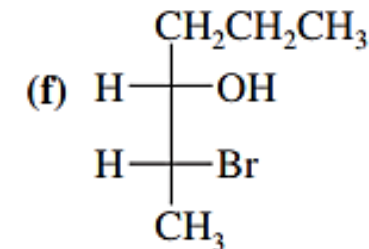
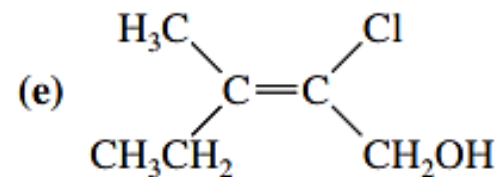
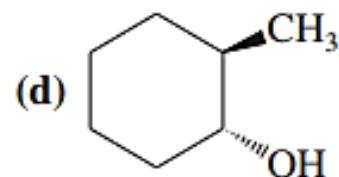
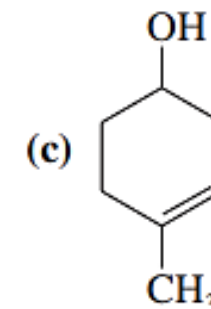
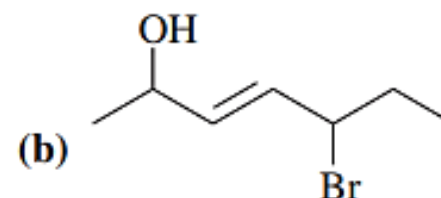
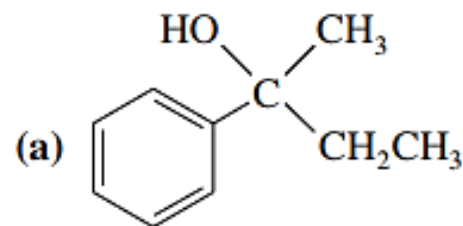
alkanes

ethers

halides (lowest)

PROBLEM 10-1

Give the IUPAC names of the following alcohols.



Answers to check

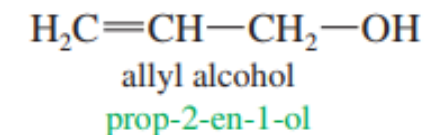
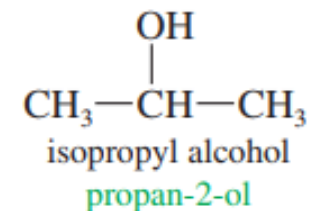
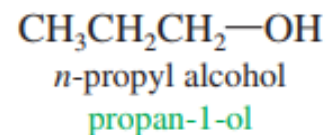
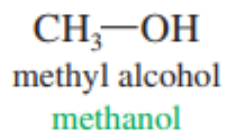
10-1 The 1993 IUPAC recommendations put the position number before the group it describes.

- (a) 2-phenylbutan-2-ol
- (b) (*E*)-5-bromohept-3-en-2-ol
- (c) 4-methylcyclohex-3-en-1-ol ("1" is optional)
- (d) *trans*-2-methylcyclohexan-1-ol ("1" is optional)
or (1*R*,2*R*)-2-methylcyclohexan-1-ol
- (e) (*E*)-2-chloro-3-methylpent-2-en-1-ol
- (f) (2*R*,3*S*)-2-bromohexan-3-ol

نام های عمومی الکل ها

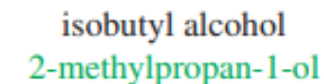
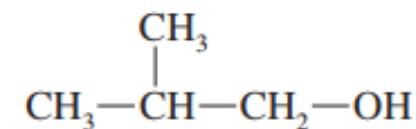
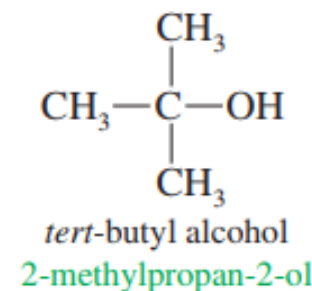
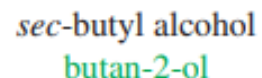
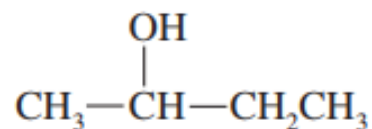
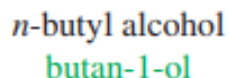
common name:

IUPAC name:



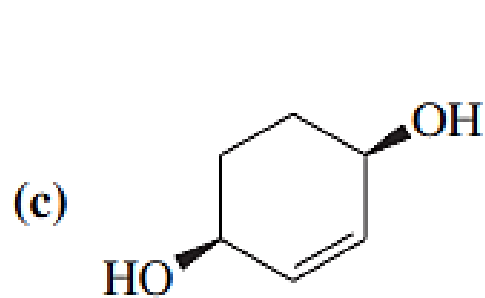
common name:

IUPAC name:

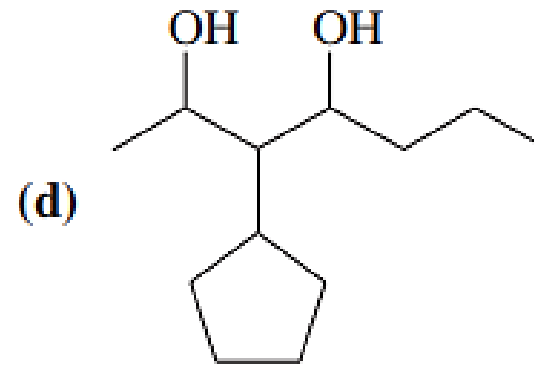


(d) 3-methylbutan-1-ol; isopentyl alcohol
(also isoamyl alcohol)

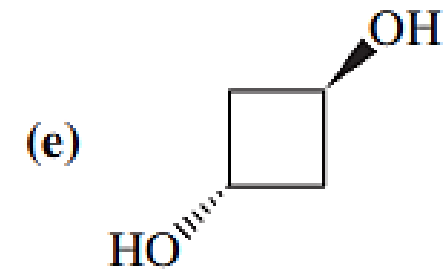
نامگذاری دیول ها



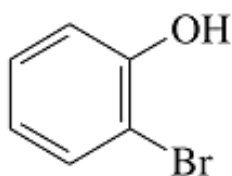
(c) *cis*-cyclohex-2-ene-1,4-diol
(e) *trans*-cyclobutane-1,3-diol



(d) 3-cyclopentylheptane-2,4-diol



نامگذاری فنول ها

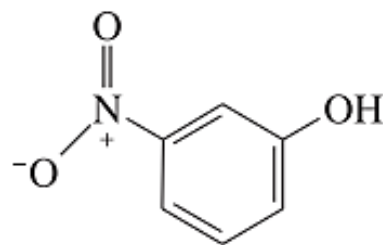


IUPAC name:

2-bromophenol

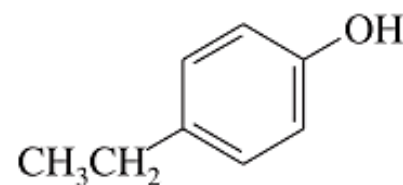
common name:

ortho-bromophenol



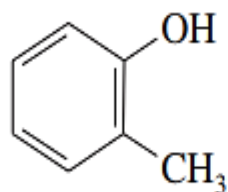
3-nitrophenol

meta-nitrophenol



4-ethylphenol

para-ethylphenol

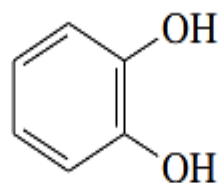


IUPAC name:

2-methylphenol

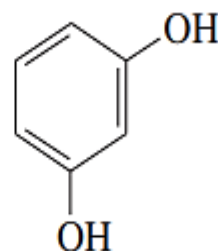
common name:

ortho-cresol



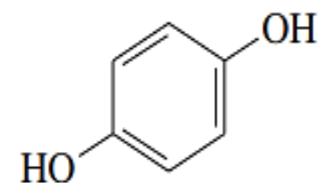
benzene-1,2-diol

catechol



benzene-1,3-diol

resorcinol



benzene-1,4-diol

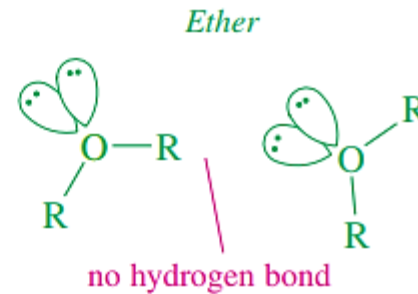
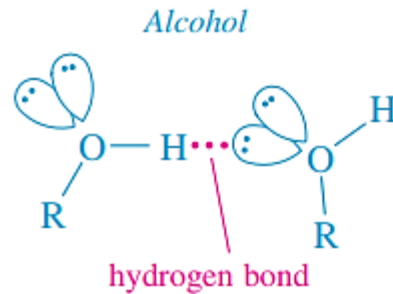
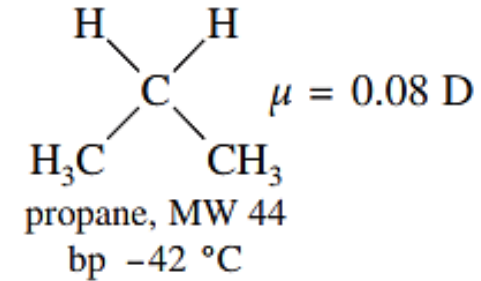
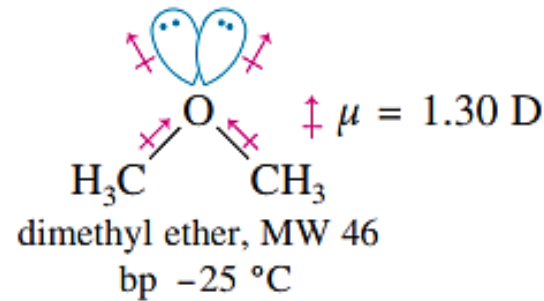
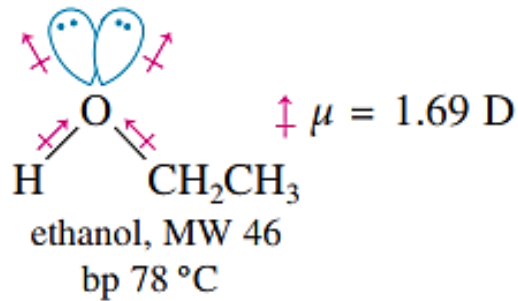
hydroquinone

ویژگی های فیزیکی الکلی ها

- دو مورد انحلال و نقطه جوش را بررسی میکنیم

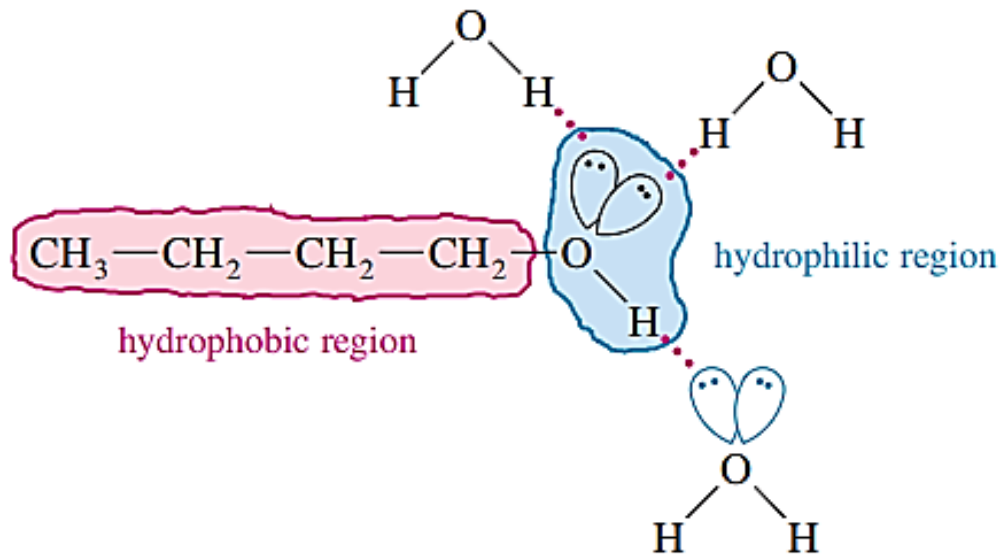
نقطه جوش الکل ها

- پیوند هیدروژنی و دوقطبی-دوقطبی بودن
- هیدروژنی قوی تر از دیپل-دیپل هست



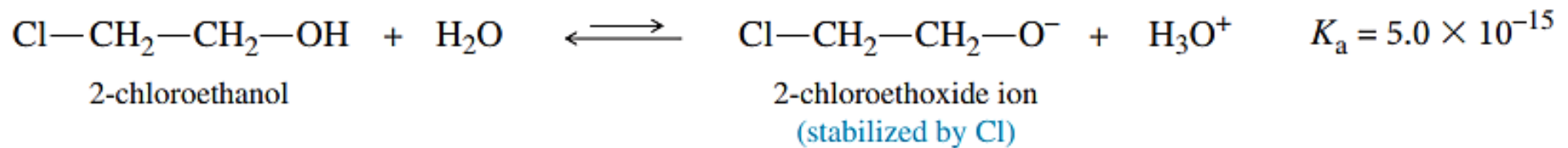
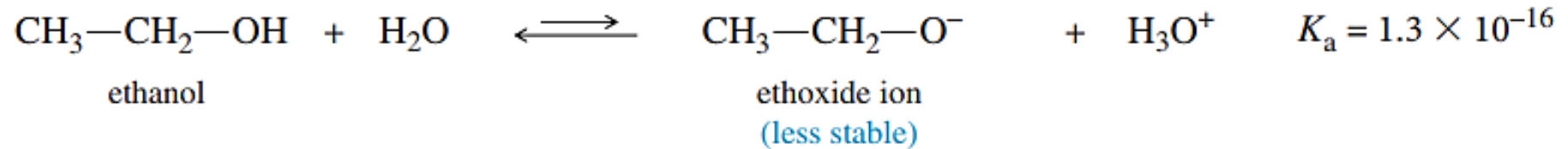
ویژگی های انحلال الکل ها

- هر چقدر هیدروفوب کمتر، محلول تر
- کوچولو ها قابل امتزاج
- مسئله انحلال
- هر چه فشرده تر، بهتر



اسیدیته الکل ها و فنول ها

• الکل ها حاوی پروتون؟ مثل آب؟



اثرات روی اسیدیته

ثابت تفکیک الکلی ها بر اساس ساختارشان متفاوت هست
اگر گروه الکترون کشنده باشد، آلوکسید پایدارتر، ثابت بزرگتر، اسیدی تر

Predict which member of each pair will be more acidic. Explain your answers.

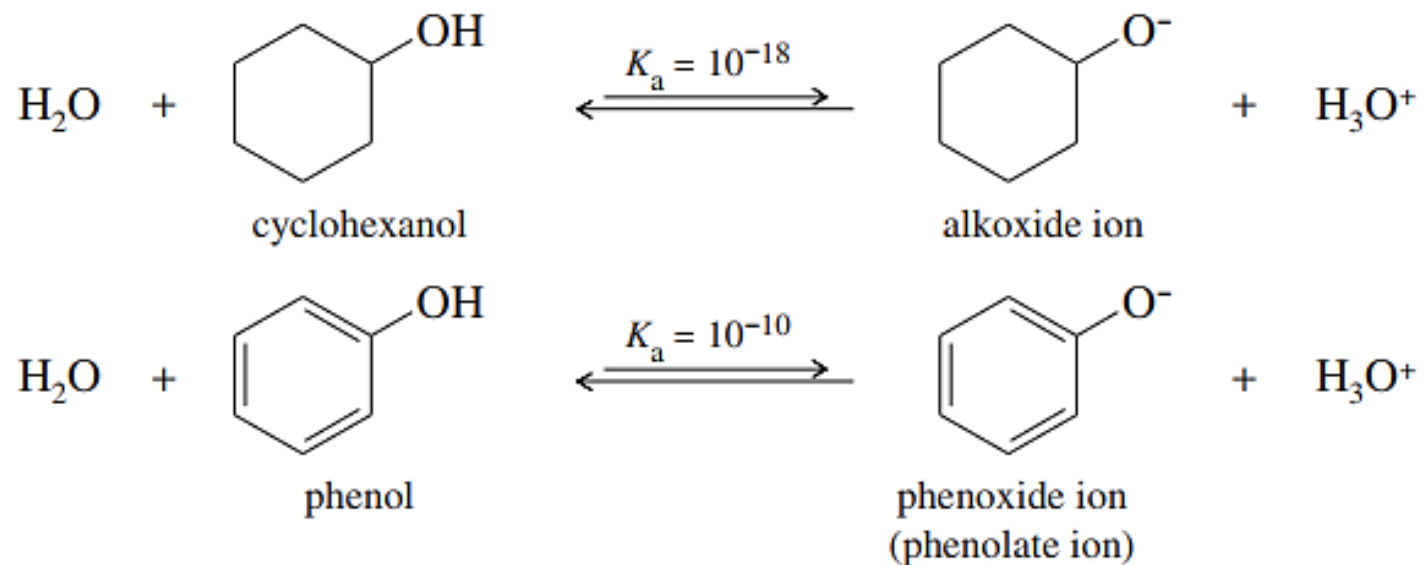
- (a) methanol or *tert*-butyl alcohol
- (b) 2-chloropropan-1-ol or 3-chloropropan-1-ol
- (c) 2-chloroethanol or 2,2-dichloroethanol
- (d) 2,2-dichloropropan-1-ol or 2,2-difluoropropan-1-ol

تشکیل سدیم و پتاسیم آلوکسید

- چیز خاصی ندارد!
- جزو مباحث تدریس نشده است!

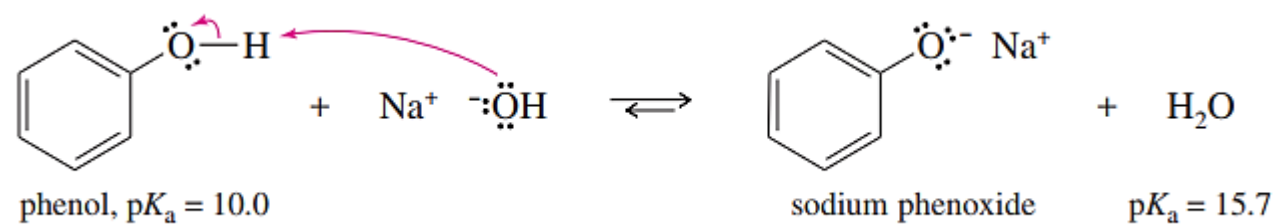
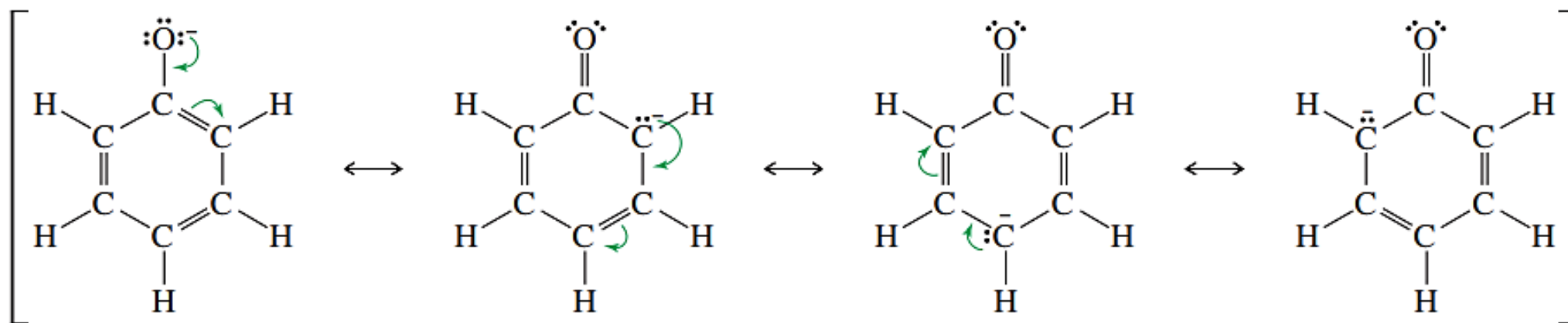
اسیدیتہ فنول ہا

• فنول اسیدی تر است یا سیکلوہگزanol؟



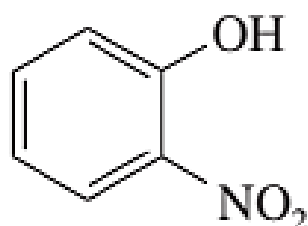
اسیدیته فنول ها

• فنول اسیدی تر است یا سیکلوهگزانول؟

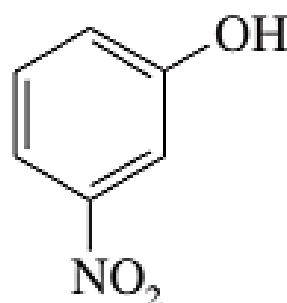


اسیدیته فنول ها

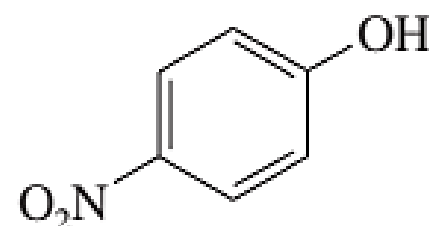
Two of the following nitrophenols are much more acidic than phenol itself. The third compound is only slightly more acidic than phenol. Use resonance structures of the appropriate phenoxide ions to show why two of these anions should be unusually stable.



2-nitrophenol

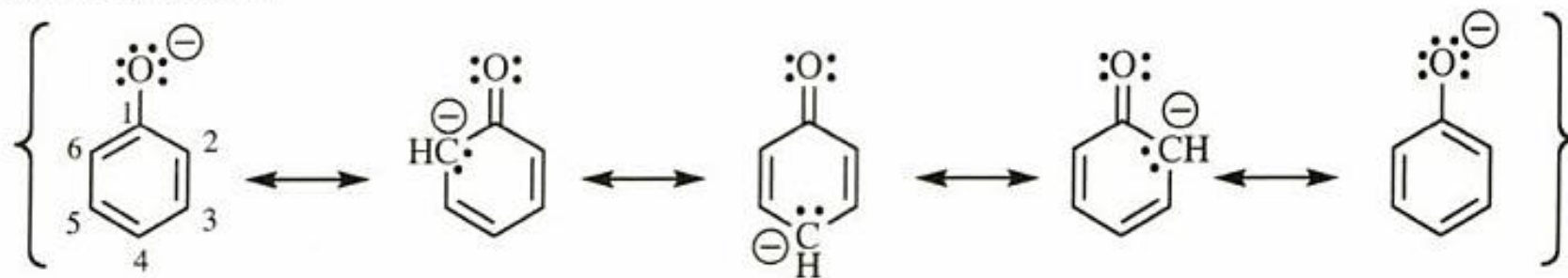


3-nitrophenol

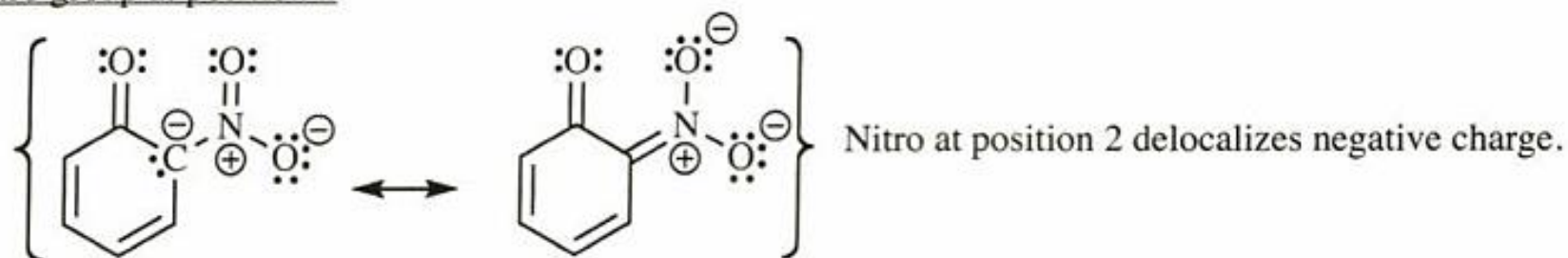


4-nitrophenol

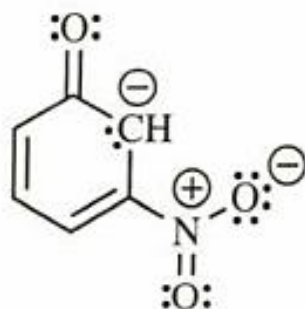
10-9 Resonance forms of phenoxide anion show the negative charge delocalized onto the ring only at carbons 2, 4, and 6:



Nitro group at position 2

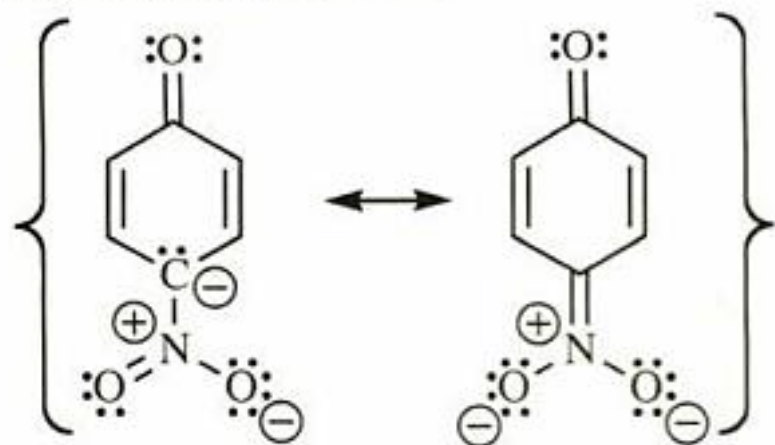


Nitro group at position 3



Nitro at position 3 cannot delocalize negative charge at position 2 or 4—no resonance stabilization.

Nitro group at position 4



Nitro at position 4 delocalizes negative charge.

Only when the nitro group is at one of the negative carbons will the nitro have a stabilizing effect (via resonance). Thus, 2-nitrophenol and 4-nitrophenol are substantially more acidic than phenol itself, but 3-nitrophenol is only slightly more acidic than phenol (due to the inductive effect).

مباحث تدریس نشده

- تشکیل سدیم و پتاسیم آлкоکسید
- Commercially important alcohols

Please go to chapter 2