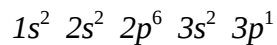


2001 CHEM1907/1908 (1LS Advanced Courses)

2001-J-2

- | | | |
|---------------------------|----------------------------|--|
| NaOH | sodium hydroxide | |
| | iron(III) chloride-6-water | $\text{Fe}^{3+}(\text{aq}), \text{Cl}^{-}(\text{aq})$ |
| HClO_4 | | $\text{H}^{+}(\text{aq}), \text{ClO}_4^{-}(\text{aq})$ |
| Na_2CrO_4 | | $\text{Na}^{+}(\text{aq}), \text{CrO}_4^{2-}(\text{aq})$ |
| | acetic acid | $\text{H}^{+}(\text{aq}), \text{CH}_3\text{CO}_2^{-}(\text{aq})$ |



3

1

-1, 0, +1

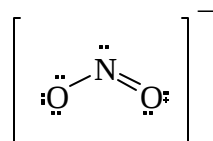
+1/2 (or -1/2)

2001-J-3

- +IV
+VI
 1.02×10^5
- 2.20
3.90

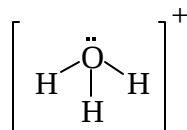
2001-J-4

•



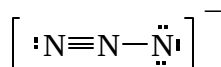
bent

sp^2



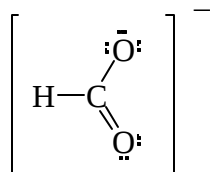
trigonal pyramidal

sp^3



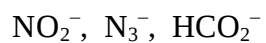
linear

sp



trigonal planar

sp^2



2001-J-5

- 4.54 g
0.312 g
101.3 kPa

2001-J-6

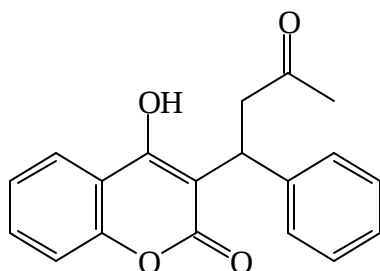
- Reactants, as $K < 1$.

$$\frac{[\text{HCN}][\text{PO}_4^{3-}]}{[\text{CN}^-][\text{HPO}_4^{2-}]} = \frac{[\text{HCN}]}{[\text{H}^+][\text{CN}^-]} \times \frac{[\text{H}^+][\text{PO}_4^{3-}]}{[\text{HPO}_4^{2-}]} = \frac{K_a(\text{HPO}_4^{2-})}{K_a(\text{HCN})} = \frac{10^{-12.38}}{10^{-9.21}} < 1$$

- Opt 1 S
 $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$
Metal that can exist is more than one stable oxidation state.
iron, copper, *etc*

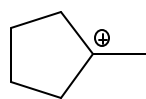
- Opt 2 carbonate
 $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
Metal that can exist is more than one stable oxidation state.
potassium, sodium, magnesium, calcium, zinc, *etc*

2001-J-7

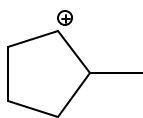


•

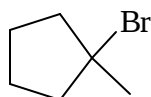
•



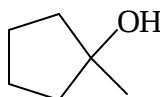
more stable



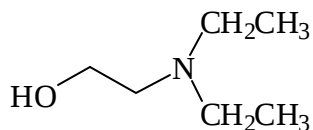
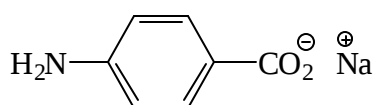
less stable



and

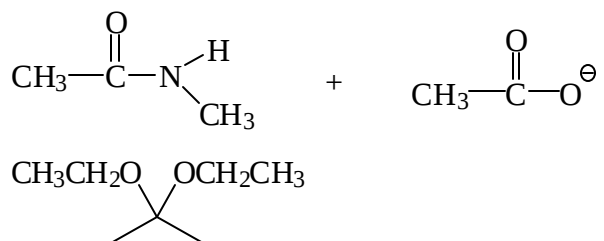
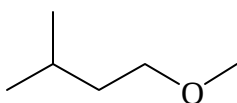
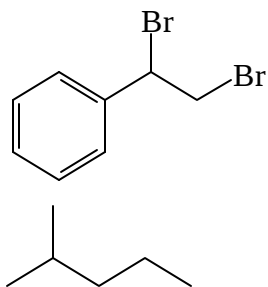
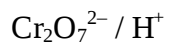


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2001-J-8

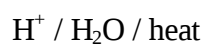
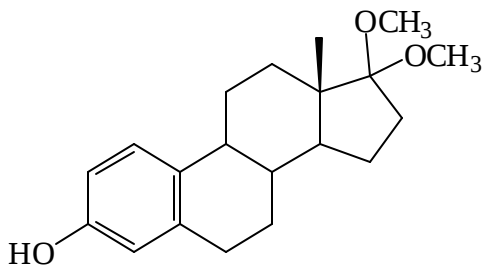
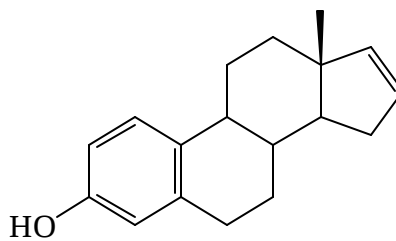
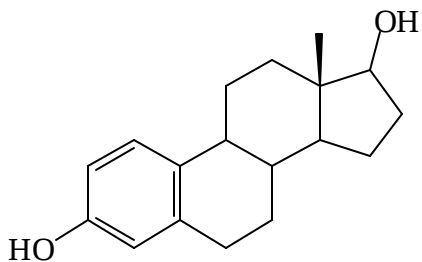
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2001-J-9

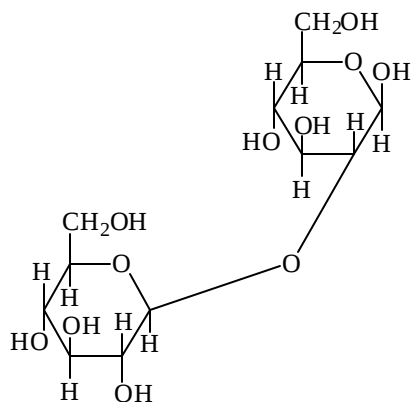
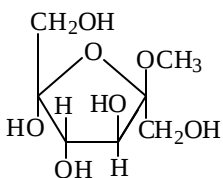
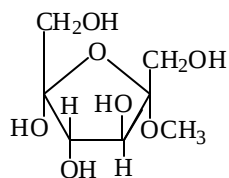
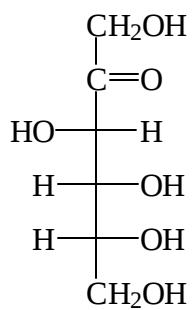
•

$\text{C}_{18}\text{H}_{22}\text{O}_2$
 phenol, ketone
 4



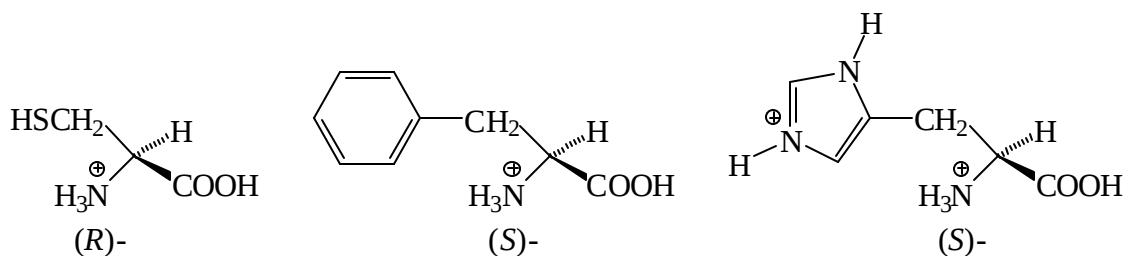
2001-J-10

- No. There is no hemiacetal group present in either of the rings which can equilibrate with the open chain form.

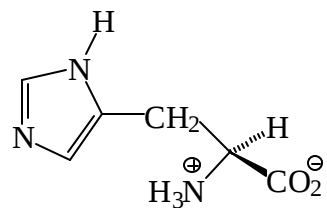


2001-J-11

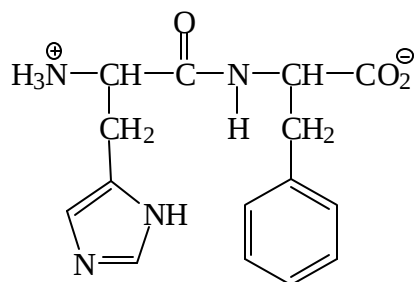
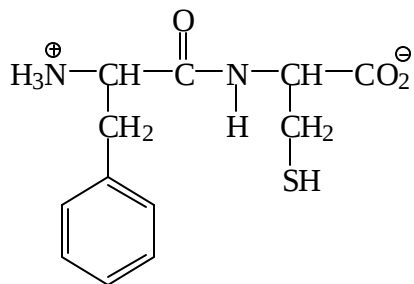
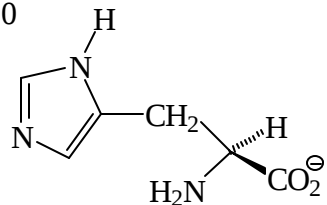
•



pH 7.6



pH 11.0



2001-J-12

- DNA. The sugar unit is 2-deoxyribose. It contains the base thymine (rather than uracil).

A: (nucleotide) base

B: phosphate ester

C: nucleotide