

National Exams December 2016

BS-12, Organic Chemistry

3 hours duration

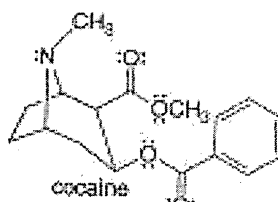
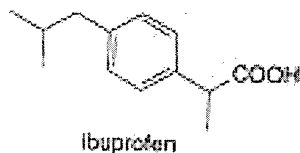
NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a CLOSED BOOK EXAM.
Any non-communicating calculator is permitted.
One aid sheet 8.5" x 11" hand-written on both sides.
3. TEN (10) questions constitute a complete exam paper.
The first 10 questions as they appear in the answer book will be marked.
4. Each question is of equal value.

Question 1:

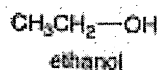
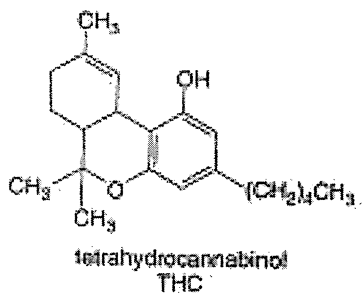
Many drugs are Bronsted-Lowry acids or bases.

- What is the most acidic proton in the analgesic ibuprofen? Draw the conjugate base.
- What is the most basic electron pair in cocaine? Draw the conjugate acid.



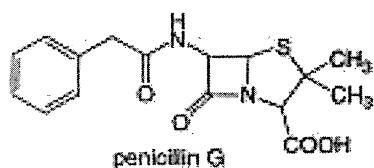
Question 2:

THC is the active component in marijuana and ethanol is the alcohol in alcoholic beverages. Explain why drug screenings are able to detect the presence of THC but not ethanol weeks after these substances have been introduced into the body.



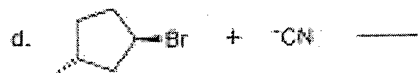
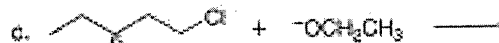
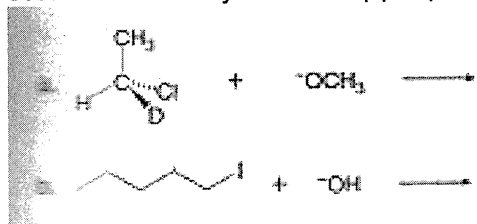
Question 3:

Although penicillin G has two amide functional groups, one is much more reactive than the other. Which amide is more reactive and why?



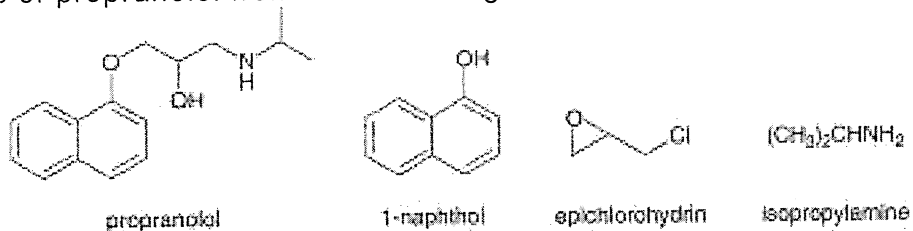
Question 4:

Draw the products of each of these S_N2 reactions and indicate the stereochemistry where appropriate.



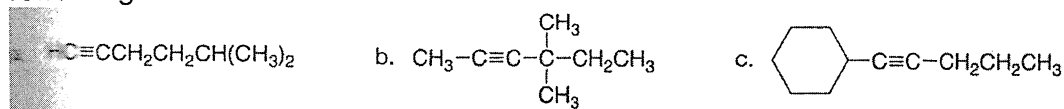
Question 5:

Propranolol, an antihypertensive agent is used in the treatment of high blood pressure, can be prepared from 1-naphthol, epichlorohydrin and isopropylamine using two successive nucleophilic substitution reactions. Devise a stepwise synthesis of propranolol from these starting materials.



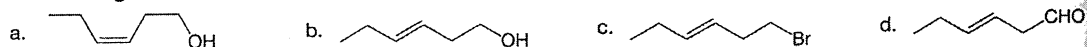
Question 6:

What acetylide anion and alkyl halide are needed to synthesize each of the following?



Question 7:

Devise a synthesis of each compound from acetylene and organic compounds containing two carbons or fewer. You may use any other required reagents.



Question 8:

Match each compound to its IR-spectrum. Compound F is $(\text{CH}_3\text{CH}_2)_3\text{COH}$

