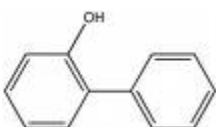
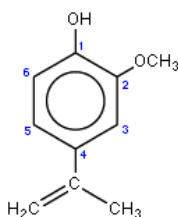


Alcohol Study Guide

1. Draw the structure of a) cis 1,2 cyclopentanediol b) trans 1,2 cyclopentanediol c) 2,3-dimethyl-2,3- butanediol d) 1,2,3- propanetriol e) phenol
2. What reaction occurs between phenol and sodium hydroxide? Write the chemical equation. Would this reaction occur with ethanol? Why or why not?
3. Would you expect ortho phenyl phenol and eugenol (structures shown below) to be acidic? If so, write the equation that produces the hydrogen ion.

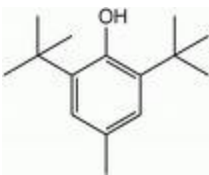


ortho phenyl phenol

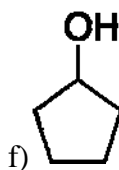
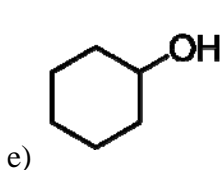
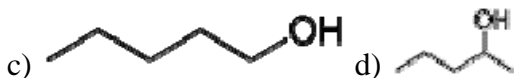
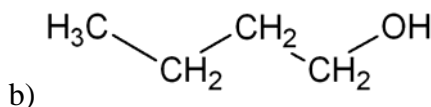
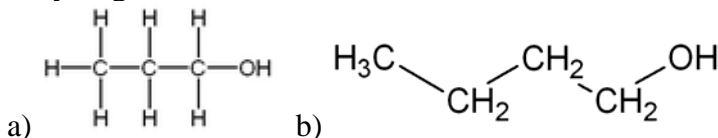


eugenol

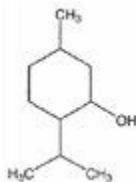
4. What are the problems with using phenol as an antiseptic? What problems can result from the routine use of Chloroseptic as a throat antiseptic? What other commercial uses does phenol have? Name several chlorinated phenolic compounds and describe their uses. What effect does chlorination have on their activity?
5. What health claims have been made for dietary polyphenolics? Name some foods that are particularly rich in polyphenolics.
6. Give the name of one of the most thoroughly studied flavonoids.
7. Give several reasons why one might be skeptical about the importance of flavonoids being important antioxidants in the body.
8. What are some good sources of resveratrol? What health claims have been made for resveratrol? What geometric isomer of resveratrol is shown in the text? Promoters have claimed that resveratrol may be the reason for the French paradox. Explain what the French paradox is and why this claim is unlikely to be true.
9. Will BHT be soluble in water? How could you increase the water solubility without adding new functional groups to the molecule? BHT and BHA are sometimes added to the waxy coating of sealed food packaging. Think about advantages or disadvantages of putting the BHT in the packaging rather than the food itself.



10. In each of the examples below, write the structure of the product resulting from the dehydrogenation reaction.



Menthol (structure shown below) can be dehydrogenated into menthone. Show the structure of the product.



11. Write the two successive reactions involved in the dehydrogenation and oxidation of alcohol (ethanol) in your body. Indicate which product(s) are toxic. Indicate the molecular mechanism and clinical effect of Antabuse.

12. Write the product of the dehydrogenation of methanol (methyl alcohol, wood alcohol). Indicate why methanol is regarded as a potent poison, even though the methanol itself is not terribly toxic. What is the treatment for methanol poisoning?

What common commercial product contains methanol?

13. Write the metabolic products for ethylene glycol. What are the medical problems that arise from ethylene glycol poisoning? What is the treatment? What common commercial products contain ethylene glycol? Why is the presence of small amounts of ethylene glycol in cheap wines NOT a problem?

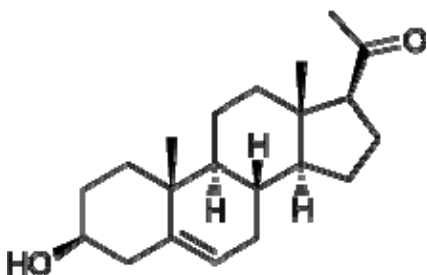
14. What is meant by the term “denatured” alcohol. Why is alcohol denatured?

15. Why is it difficult (but not impossible) for a person to drink so much ethanol at one sitting as to kill himself.

16. What is the alcohol in RV antifreeze? What molecule is it metabolized into? What part of intermediary metabolism is this used in?

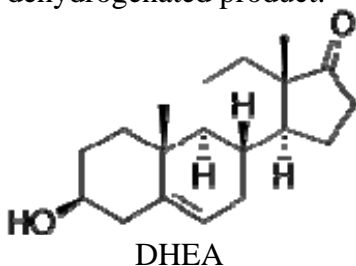
17. Explain what tests can be used to determine whether an individual has had any alcohol in the last several days. What are some of the limitations on this method?

18. Cholesterol is metabolized in multiple steps into a molecule of pregnenolone which then undergoes a dehydrogenation of its alcohol group on C #3 of the A ring (ring on the lower left side) into a ketone group. Show the structure of the resulting ketone when pregnenolone is dehydrogenated.



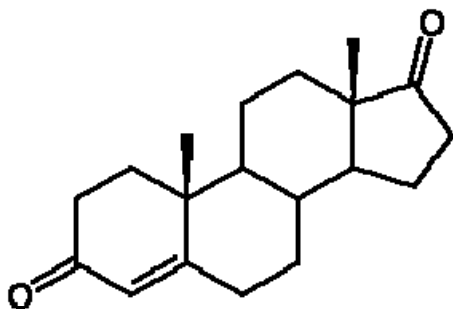
The resulting ketone is isomerized into progesterone, a potent female hormone

19. Dehydroepiandrosterone (DHEA) is a commonly used “dietary supplement” which is promoted as increasing muscle mass and virility. It is dehydrogenated into androstenedione in a reaction analogous to the conversion of pregnenolone into progesterone. Given the structure of DHEA shown below, show the structure of the dehydrogenated product.



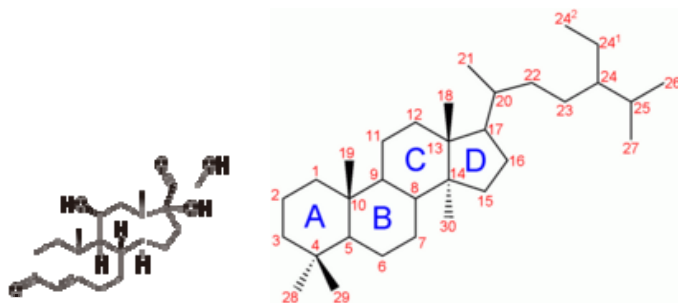
20. Androstenedione can be enzymatically converted into testosterone by **hydrogenation (addition of 2 H atoms)** of the ketone group on the 5 membered ring in

androstenedione. Show the product of this hydrogenation reaction.



Androstenedione

21. Cortisol is metabolized to cortisone by a dehydrogenation of the alcohol group on ring C. Draw the structure of cortisone.

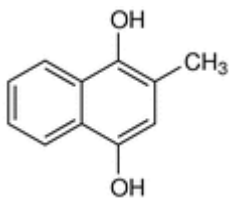


Skip

Digging deeper.

2-methyl 1,4 hydroquinone is oxidized by hydrogen peroxidase in a very exothermic reaction to produce superheated water that the bombardier beetle can spray at potential predators. See W. Agosta, Bombardier Beetles and Fever Trees.

Menadiol, a synthetic form of vitamin K, is converted into menadione, by dehydrogenation of the two alcohol groups. Show the structure of menadione.



Draw the structure of inositol (you don't have to worry about exact stereochemistry). What is the biological importance of inositol?