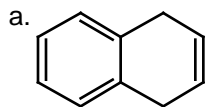
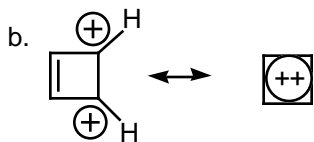


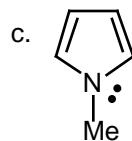
1. Determine which of the following compounds is likely to be aromatic based on electron count. Explain your analysis.



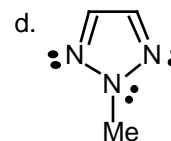
Aromatic, just like benzene. The other double bond is non-conjugated, no overlap



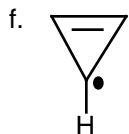
This is a 2-pi electron system, planar, continuous p overlap. Should be aromatic, and more stable than one imagines for a dication (intrinsically unstable)
Aromatic



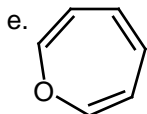
This pyrrole has 6 pi electrons, counting the lone pair on N. It is available because the N can assume sp^2 hybridization. Aromatic



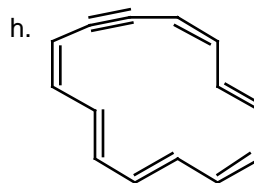
The derivative is also a 6-pi electron system, counting the one pair on the N bearing the Me group, and not counting the (orthogonal) lone pairs on the sp^2 N's. Aromatic



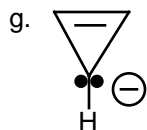
This radical has a cyclic continuous array of p orbitals and they contain 3 pi electrons. Need only 2 for aromaticity. Non-aromatic



If planar, 8 electrons in pi system: not aromatic

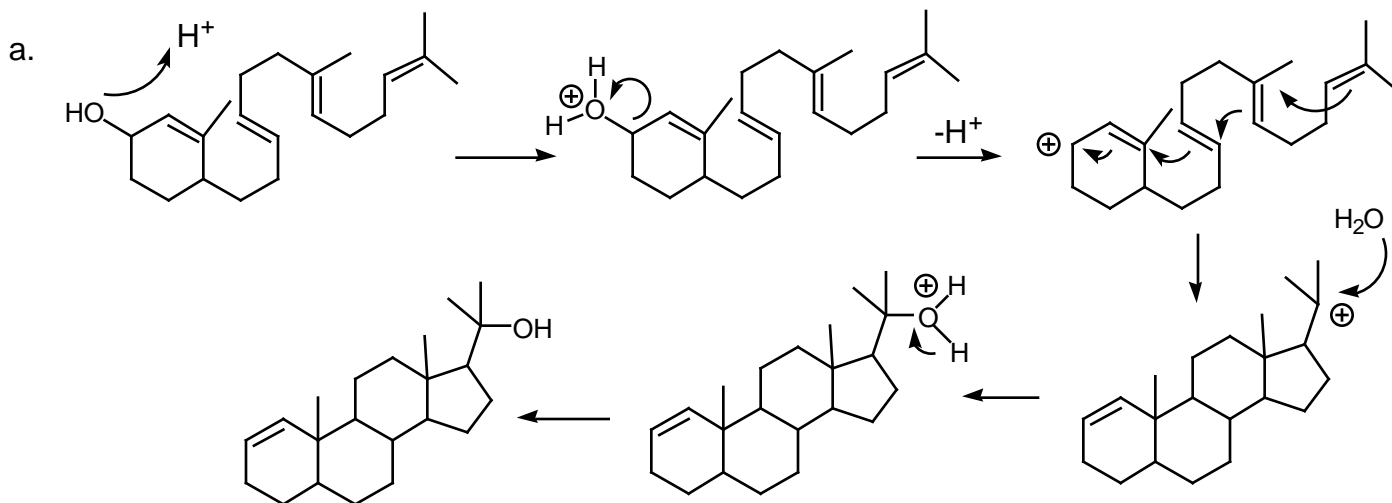


The alkyne contributes only 2 pi electrons for a total of 14. Should be aromatic, if it can be planar.

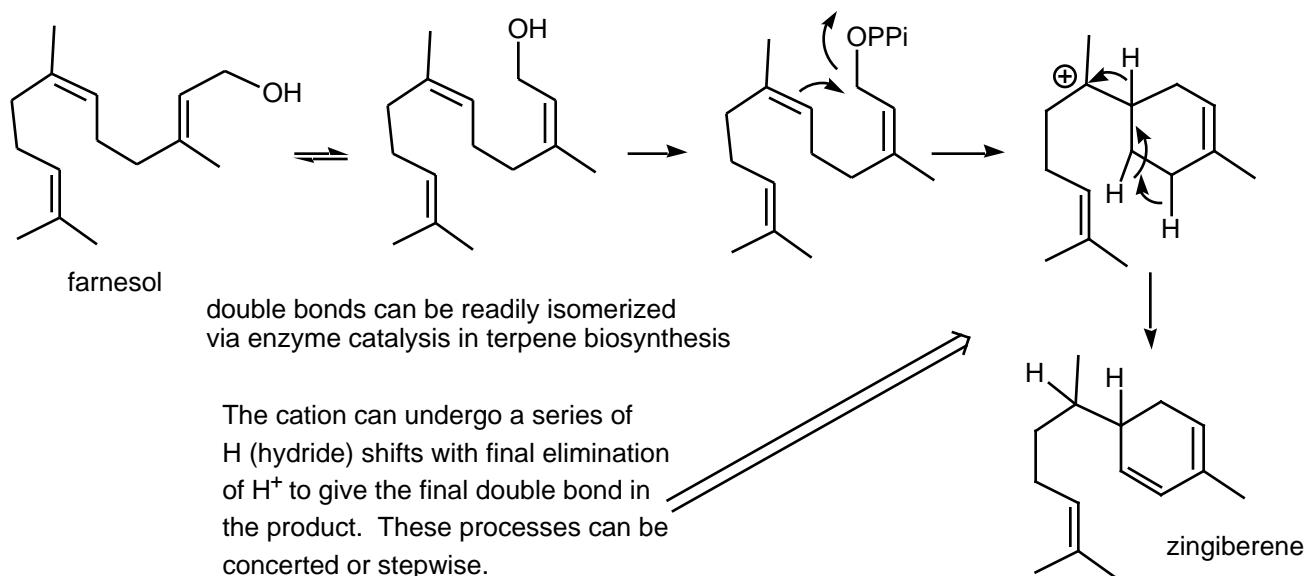


4 pi electrons; two electrons in an anti bonding orbital
Not aromatic

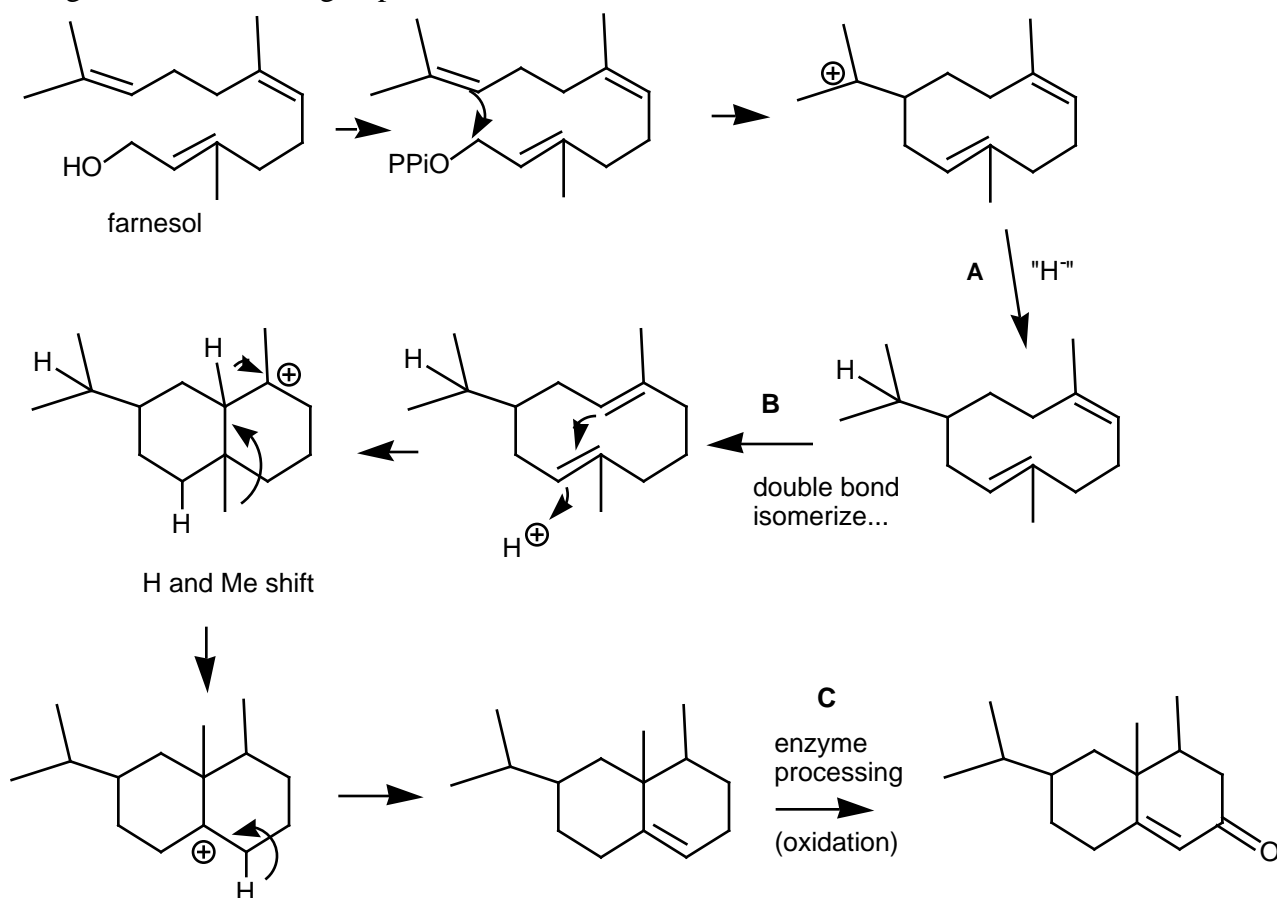
2. Use the arrow formalism to rationalise the following reactions:



3. Propose a mechanism for the biosynthesis of zingiberene, from oil of ginger



4. Propose a mechanism for the biosynthesis of nootkatone. You need not account for the precise configuration of the side groups.



This is a tough one. We did not talk about several features in lecture. Cation intermediates can be reduced by transfer of a hydrogen atom (formally H^-) as in the step labeled **A**. Double bonds can be isomerized one notch by enzymes (**B**). Oxygen (and double bonds) can appear "out of nowhere" by further processing by an enzyme system after the initial framework has come together (as in the step labeled **C**). Sometimes an oxygen group (alcohol, ketone) can arise by H_2O addition to a cation intermediate. Do what you have to.

The key trick is to see the polyisoprene pattern in the target. That is tricky in this case because a Me group has moved and disturbed the simple polyisoprene pattern.