Organic Chemistry Example Problems

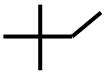
1. An alkane is:
a) a hydrocarbon with no double or triple bonds
b) a hydrocarbon with only single or double bonds
c) a hydrocarbon with a ring structure
d) a hydrocarbon that has triple bonds

2. Which of the following compounds has a chiral carbon?
a)  b) 

c)  d)  e) 

the middle carbon in d (2,3-dimethylpentane) is chiral (sees H, ethyl-, methyl-, and isopropyl-constituents). All other sp^3 hybridized carbons have two or more identical constituents

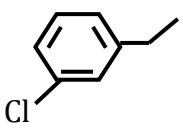
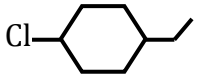
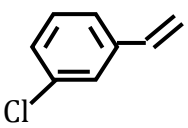
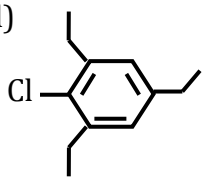
3. Which class of hydrocarbons can have cis-/trans- isomers:
a) alkanes b) alkenes c) alkynes d) aromatics

4. Which of the following compounds is an isomer of n-hexane?
a)  b)  c)  d)  e) 

a) is n-hexane so not an isomer, b) has an extra -CH_2, c) has the same number of Cs and Hs so is an isomer (name = 2,2-dimethylbutane), d) and 3) have two Hs fewer due to the ring and double bond

5. What is the reaction product of HCl + CH_2=CH(CH_3)?
a) Cl$CH_2CH_2CH_3$ b) $CH_3CHClCH_3$ c) CH_2=C(Cl)(CH_3) d) ClCH=CH(CH_3)
alkene reactions are additions so c) and d) are wrong. From Markovnikov's rule, Cl is added to the interior giving b)

6. Give the name for the compound: $CH_3CH_2CHCH_3$
CH_2CH_3
a) 3-ethylbutane b) 2-ethylbutane c) 3-methylpentane d) 2-ethanyltetraane
f) 3-methylquintane
longest chain is 5 carbons (3 on top plus 2 on bottom) making backbone = pentane. Addition occurs in middle or 3- position and is of CH_3 or methyl group

7. Which carbon skeleton structure represents 1-chloro-3ethylbenzene?
a)  b)  c)  d)  e) 

8. Which of the following alkenes has no cis-/trans- isomers?
a) CHCl=CHCl b) CHCl=CH(CH_3) c) CCl_2=CH(CH_3) d) C(CH_3)H=C(CH_3)Cl e) CHBr=CHCl
Only c) doesn't have the same constituent on each carbon adjacent to the double bond

9. Hydrogenation of $CH_3(CH_2)_5CH=CH(CH_2)_3CH_3$ (cis- isomer) is expected to result in a product that:
a) is more polar b) is more volatile c) is less stable d) melts at a higher temperature
e) has identical properties of the reactant
product is alkane and double bonds give lower melting points

10. $CH_3CH_2OCH_2CH_2CH_3$ is an example of a/an:
a) alcohol b) ether c) amine d) carboxylic acid e) ketone