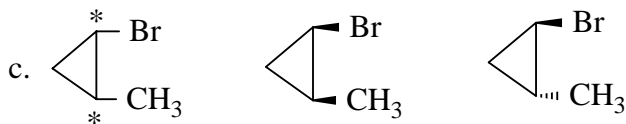
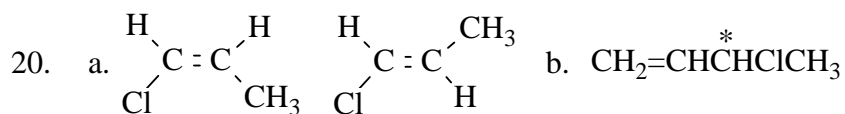
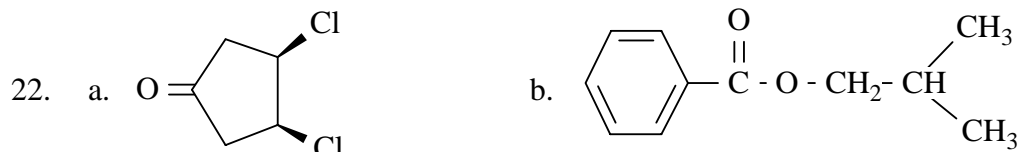


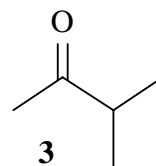
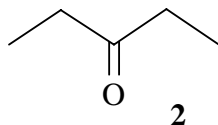
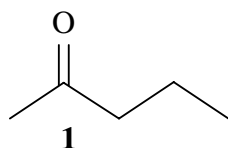
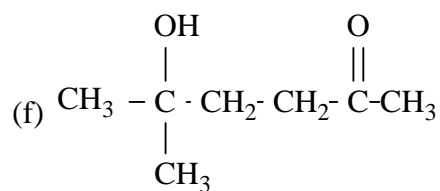
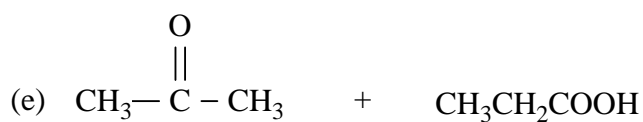
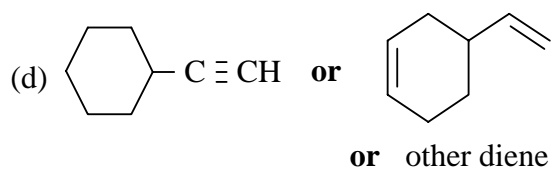
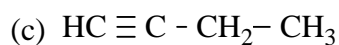
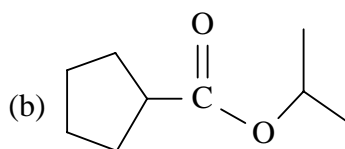
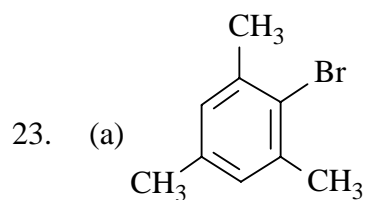
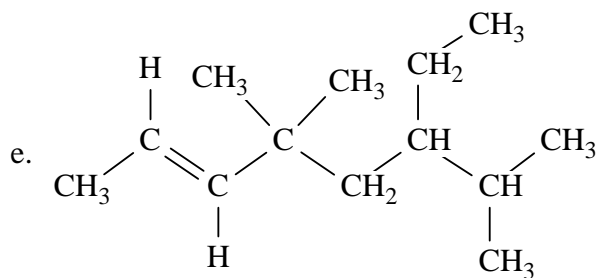
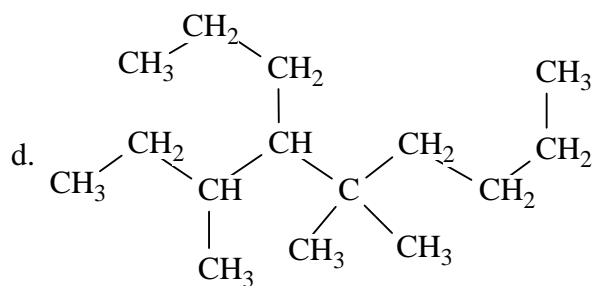
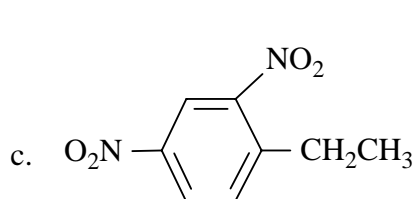
ANSWERS TO CHEM 1110 FINAL FOR SPRING 2002

1. $X = 6$
2. (d) NO_2
3. (d) COCl_2
4. (b) 1.13 g/L
5. (d) 664 nm
6. (d) 25 orbitals
7. (e) 16 electrons
8. Energy = 2.723×10^{-18} Joules and frequency = $4.11 \times 10^{15} \text{ s}^{-1}$
9. (a) $6 \rightarrow 1$
(b) $6 \rightarrow 5$
(c) $6,5,4,3 \rightarrow 2$
10. (c) Pb
11. (b) 4
12. (e) K^+
13. (a) F
14. (d) Mg^{2+}
15. (b) Cl
16. (c) K
17. (b) Cl
18. (a) Li
19. (c) Al-Cl

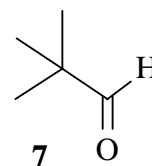
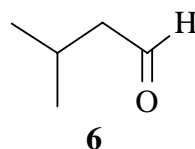
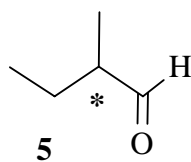
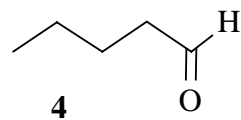


- 21.
- (a) m-chlorophenol or 3-chlorophenol
 - (b) 6-bromo-4-ethylheptanal
 - (c) 2,2-dimethyl-3-hexyne
 - (d) butanoic acid
 - (e) 2-phenyl-2-propanol

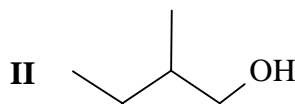
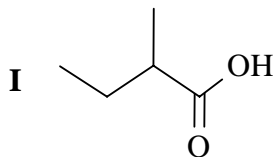




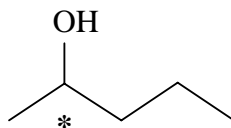
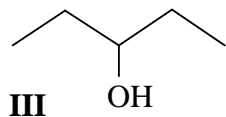
24. (a)



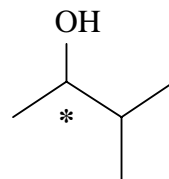
- (b) **A** is **5** [the only one which is optically active (has a C with 4 different groups attached)]. **I** and **II** are the derived carboxylic acid and primary alcohol shown.



Because **B** and **C** are not oxidized, they are ketones and not aldehydes. **B** is **2** and **C** is **1** or **3**. **III** is the optically inactive alcohol and **IV** is the optically active alcohol.

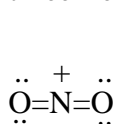


or

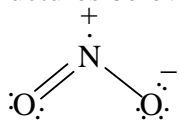


IV

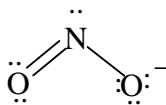
25. (b) trigonal planar
26. (d) tetrahedral
27. (b) 120°
28. (e) $< 90^\circ$ & $< 120^\circ$
29. (c) sp^3
30. (b) sp^2
31. (e) SF_4
32. (e) 2.5
33. (a) 1.0
34. (c) B_2
35. (b) O_2^+
36. (b) O_2^+
37. (e) 3 sigma and 4 pi bonds
38. Look at the three Lewis structures below and the answer should be obvious.



Linear

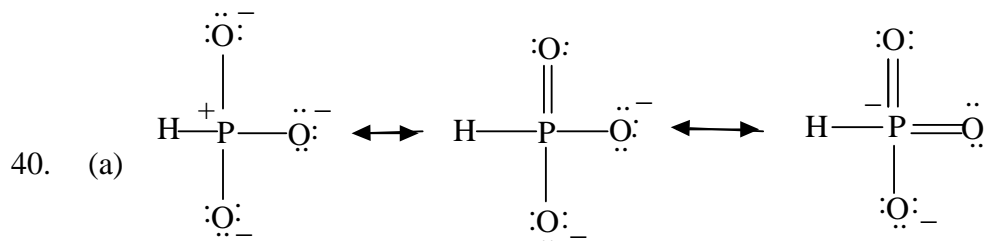


Angular

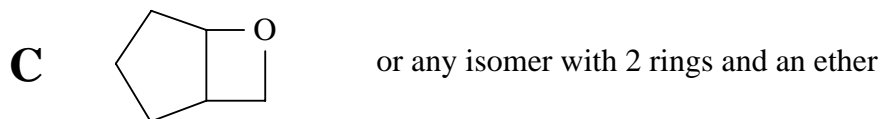
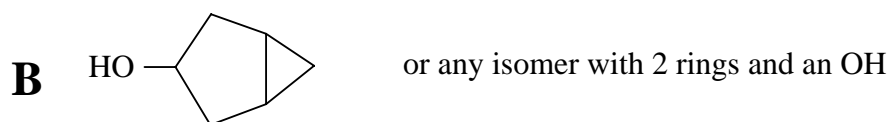
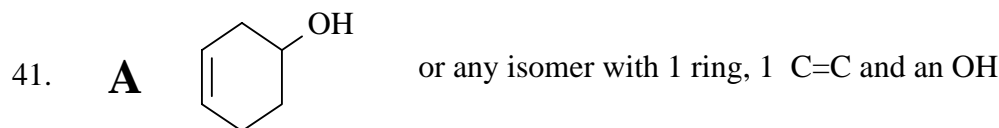
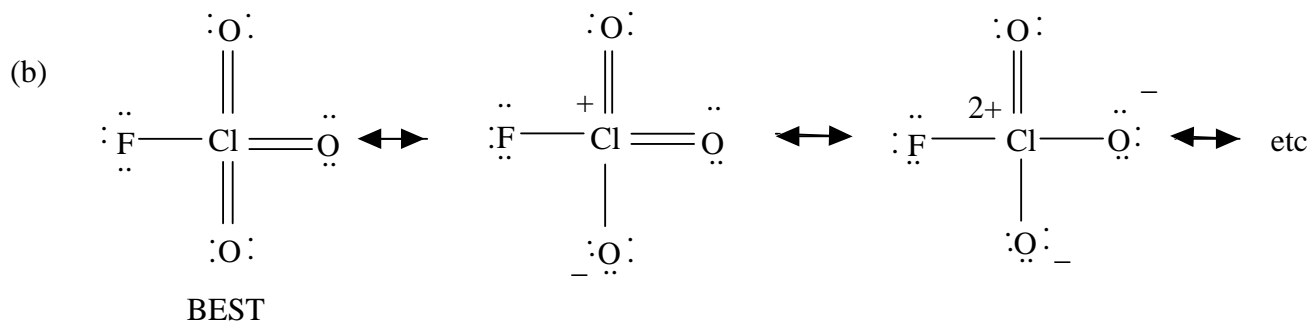


Angular

39. $NaNO_3$ because it is the only ionic compound.



BEST



42. (a) 10 sigma bonds
 (b) 2 pi bonds
 (c) Angle #1 = 120° ; Angle #2 = 109.5° ; Angle #3 = 120°
 (d) 11 non-bonding pairs
 (e) 3 atoms use sp^3 hybrid orbitals
 Total number of sp^3 hybrid orbitals is 12.
 2 atoms use sp^2 hybrid orbitals
 Total number of sp^2 hybrid orbitals is 6.
 0 atoms use sp hybrid orbitals
 Total number of sp hybrid orbitals is 0.

BONUS QUESTION:

In water the angle is 104.5° because the volume of space occupied by the non-bonding pairs is greater than the volume of space occupied by the bonding pairs.

In methanol the bond angle is larger than in water because the methyl group is larger than the H atom in water.

In dimethyl ether the bond angle is larger than 109° because you now have two methyl groups present which are larger than the hydrogens in water and the hydrogen in methanol.