SL & HL Answers to Fundamentals of organic chemistry (1)

1. i. 2-bromobutane

ii. hexan-3-ol

iii. but-2-ene (for HL it is (*E*)-but-2-ene or *trans*-but-2-ene)

2. i. alcohols: $C_nH_{(2n+1)}OH$

ii. alkenes: C_nH_{2n}

iii. alkynes: $C_nH_{(2n-2)}$

iv. amines : $C_nH_{(2n+1)}NH_2$

3. i. C_6H_{10}

ii. Although cyclohexene does contain just one C=C double bond, when two of the carbon atoms join together to form the six-membered ring two hydrogen atoms are lost (so the general formula for cyclic alkenes is $C_nH_{(2n-2)}$, not C_nH_{2n}).

iii. $C_6H_{10}(l) + H_2(g) \rightarrow C_6H_{12}(l)$

iv. Benzene does not consist of alternate double and single bonds between the carbon atoms. Instead it is a resonance hybrid so that all the bonds are of equal strength. This makes the benzene ring more thermodynamically stable by about 150 kJ mol^{-1}. In order to add hydrogen this energy has to first be overcome so the energy given out is approximately (3 x 120) – 150 = 210 kJ mol^{-1}. (HL students should answer this by saying that the carbon atoms are sp^2 hybridized. The remaining six p electrons (one on each of the six carbon atoms) delocalise to form a delocalised pi bond around all six carbon atoms).