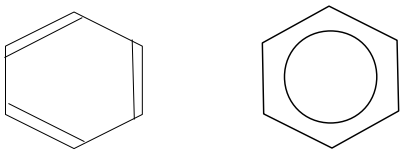
ARENES: INTRODUCTION

1. The diagrams below show two different ways of representing the structure of benzene – the Kekulé structure on the left, and the modern version on the right.



a) Describe exactly what each of them shows.

b) What evidence is there from the physical shape of the molecule that the Kekulé structure is wrong?

c) What evidence is there from the chemistry of benzene that the Kekulé structure is wrong?

d) The delocalisation energy of benzene is about 150 kJ mol^{-1}. Explain what that means, and how it affects the reactivity of benzene.

2. a) The only intermolecular forces in liquid benzene are van der Waals dispersion forces. However methylbenzene (toluene) also has a small permanent dipole. Explain the origin of this dipole.

b) The melting and boiling points of benzene and methylbenzene are

	Melting point (°C)	Boiling point (°C)
benzene	5.5	80
methylbenzene	-95	111

Explain why the boiling point of methylbenzene is bigger than that of benzene, whereas the melting point is much lower.

c) Why are the arenes (such as benzene and methylbenzene) insoluble in water?

Apart from the brief question in 1(d) above, questions about the reactivity of benzene and methylbenzene are better dealt with using specific examples, and you will find these on the other pages in this section.