

Chemguide – answers

NITRILES: INTRODUCTION

1. a) (i) $\text{CH}_3\text{CH}_2\text{C}\equiv\text{N}$
- (ii) $\text{CH}_3\text{C}\equiv\text{N}$
- (iii) $\text{CH}_3\underset{\text{CH}_3}{\text{CH}}\text{CH}_2\text{C}\equiv\text{N}$

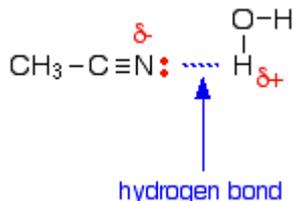
(Sorry if the triple bonds come out messy! They start off perfect, but the individual lines shift around when I copy or move the formulae, or convert the file to pdf, or change the magnification.)

b) 2-hydroxybutanenitrile

2. a) van der Waals dispersion forces and dipole-dipole attractions.

b) The molecule is very polar, and so the dipole-dipole attractions are strong. The electrons in the triple bond are very easily pulled towards the electronegative nitrogen atom.

c) Ethanenitrile doesn't form hydrogen bonds with itself, but can form them with water molecules using the lone pair on the nitrogen atom. Taking the diagram from the Chemguide page:



Formation of these bonds can help to supply the energy needed to break hydrogen bonds between the water molecules.

d) The longer the chain, the more hydrogen bonds between water molecules have to be broken without replacing them by anything as strong. Mixing becomes energetically less profitable.