

## Chemguide – answers

### ALKANES: COMBUSTION

1. a)  $C_5H_{12} + 8O_2 \longrightarrow 5CO_2 + 6H_2O$
- b)  $2C_2H_6 + 7O_2 \longrightarrow 4CO_2 + 6H_2O$
- c)  $2C_{10}H_{22} + 31O_2 \longrightarrow 20CO_2 + 22H_2O$
- d)  $C_6H_{12} + 9O_2 \longrightarrow 6CO_2 + 6H_2O$

(This is the most important question on this page – you have to be competent at writing trivial equations like this. If you didn't get all of these right first time, practise and practise with other hydrocarbons until you always get them right. In fact, there is no excuse for getting them wrong, because you can check your answer at the end to make sure that you have the same numbers of carbon, hydrogen and oxygen atoms on each side of the equation.)

If you have written equations with halves in, it is probably better in most cases to get rid of these by doubling everything if you are simply asked for the equation. An examiner's mark scheme will probably have the more normal version in it, and he or she will have to stop and think about the one with halves. It never pays to irritate your examiner!)

2. Reactions are faster if everything is present in the gas state because collisions between gas molecules are much more common than those between a gas and the surface of a liquid. As the alkanes get bigger, they become less volatile – the molecules in petrol (gasoline) turn to vapour very easily; those in tar are vaporised only with difficulty. That is because as the molecules get bigger the van der Waals dispersion forces also get bigger, and the molecules are attracted to each other much more strongly.
3. a) You get incomplete combustion of the gas, forming small carbon particles which glow yellow. (You will know, of course, that if you heat something with a bunsen burner with the air-hole closed, whatever you are heating becomes covered with soot.)  
  
b) Carbon monoxide interferes with the transport of oxygen around the blood. Oxygen is carried by haemoglobin as oxy-haemoglobin. When it gets wherever it is required it falls off and the haemoglobin returns to the lungs to pick up some more. Carbon monoxide reacts irreversibly with haemoglobin to form carboxy-haemoglobin.