10. The last sentence in the program is "Since public safety only follows public concern, understanding these issues will be crucial to our future". What does this mean?

Answers to above questions:

1. False. Petroleum oils are hydrocarbons. Fat and animal oils are triglycerides.
2. Mentioned in the program are: natural gas, methane, butane, petrol, kerosene (jet fuel), diesel, lubrication oil, bitumen, petroleum, wax, alicyclics and aromatics. Of course there are lots more.
3. Waxes, bitumen and lubrication oils come off at the bottom of the tower. At the very top methane, ethane, propane and butane are drawn off as gases.
4. The catalytic cracker takes molecules of heavier oil and breaks (or 'cracks') them down into the smaller molecules that make petrol.
5. Too fast.
6. 40% of the world's energy comes from oil.
7. We mentioned solvents, paints, glues, dyes, plastics, perfumes, fibres and cloth, fertilizers, pesticides, drugs and explosives. The list is really very long.
8. Rachel Carson.
9. The overwhelming majority of plastics are not biodegradable. So disposal becomes a big problem.
10. Put another way-if people don't understand the issues they won't care about them. And if they don't care about them then they are risking their future safety.

We wanted to talk about burning plastics as a way of disposing of them. But there's a problem here too. What is it? We didn't mention tetraethyl lead, the longest-lived method of increasing the octane number of petrol (since the 1930's). We didn't mention it because it's not used now. Why isn't it used now? Why was it used for so long? We had to cut out the full story of thalidomide (lack of time again). Thalidomide was given to women in the nineteen sixties as a drug to prevent nausea during pregnancy. But there was inadequate research before its release. It turned out that thalidomide had an optical isomer which was a dangerous mutagen. Tests had been done on the safe isomer, but the manufactured drug was a racemic mixture, meaning that is contained both isomers. Many babies were born horribly malformed. We now know that even the safe isomer can be changed by the body to create some of the dangerous form, so it's totally banned for pregnant women. But it has minimal effects on adults themselves, and recently thalidomide has shown itself to be useful anti-cancer drug.

PART VII

Proteins

Describes how protein is intimately involved in life processes, and how proteins function as hormones; looks at the discovery of amino acids, their family formula, and polymerization of them; takes a look at peptides, denaturing albumin, and the levels of protein structure; and shows the lock and key model of enzyme action with an introduction to enzymes themselves.

Question sheet:

1. What chemical element distinguishes the amine group of compounds and is a signature of protein?
2. What is the simplest amino acid?
3. How many amino acids are present in human biology?
4. A molecule of what substance is dropped off when two amino acid units bond?

5. A small chain of amino acids doesn't qualify as a protein. Such small chains are referred to as...?
6. The possible sequences of amino acids to make proteins are almost limitless. But in addition to amino acid sequence how else do proteins vary?
7. Pepsin, lactase and invertase are examples of what?
8. Define 'catalyst'.
9. If we need 20 types of amino acids to stay alive, and 8 are essential in our diet, how do we get the other 12?
10. At the end of the program we say "proteins are the key to life, but they are not the locksmith who designs it". What substance do you think 'designs' life? (Note: this substance is not actually substance is not actually stated in the program. Make an intelligent guess-it is not a protein.)

Answers to the above questions:

1. Nitrogen.
2. Glycine.
3. Twenty. (As far as we know).
4. Water.
5. Peptides.
6. In addition to amino sequence proteins vary in shape and they may join into complexes.
7. Pepsin, lactase and invertase are enzymes.
8. A catalyst is a substance that speeds up a chemical reaction by its presence, but it does not get consumed in the reaction. Small Amounts of a catalyst may therefore can have a big effect, because one molecule of catalyst operates on many molecules of reagent (substrate). The presence of the appropriate enzyme can cause its subtrates to react with each other up to million times faster.
9. We can synthesize the other 12 amino acids from other nutrients.
10. You guessed it! DNA. DNA is not a protein. It's a nucleic acid, a different family.

One note about non-biological catalysts such as platinum in car exhausts. When the platinum gets hot it speeds up the oxidation of pollutants and makes a cleaner exhaust. We mention that there are more proteins possible that atoms in the universe. How is it that we can estimate the number of particles in the universe? What is the estimate? There are more than 2000 known enzymes. All are proteins. Some hormones are also proteins. What enables a protein molecule to hold a complex shape? Another level of understanding of proteins involves looking at hydrogen bonding between amino acid side chains. In our program we showed a number of the side chains, but never went any further into their possible roles. If you noted about optical isomerism in episode 4, then you probably noticed that, except for glycine, all amino acids have a central carbon atom attached to four different substituent groups. Every amino acid has two optical isomer; it's yet another way that proteins can vary!