

7. Alkanes –double bonds Alkynes –triple bonds Alicyclics –cyclical or ring shaped versions of alkanes, alkanes and alkynes. Aromatics –benzene compounds.
8. Many organic substances have more than one name because these substances were known before IUPAC system names were applied. This means that many have both common names (or names) and an IUPAC name.
9. Benzene-C₆H₆

Mendeleev used to write out the properties of the elements and their atom weights on cards, which he pinned to the laboratory wall. He would move them around and stand back to see the effect. He began to see patterns. But he was not sure where to put hydrogen so he left it out. Even today hydrogen's place on a chemical table is of some dispute. In fact his various omissions were his triumph because other elements would later be discovered that filled the gaps, proving that his table was valid.

PART III

A Bit of Bonding

A basic introduction to electrons and the octet rule and the formulae of alcohols, ethers, amines, aldehydes, ketones, carboxylic acids, and esters; an explanation of the difference between polar and non-polar and how the attachment of polar groups renders non-polar hydrocarbons non-soluble: and a simple look at how substitute groups create other organic families.

Question work sheet:

1. In the cathode ray tube an invisible ray makes a shadow on the phosphor at one end. But it isn't a light ray, it is a ray of electrons. How do we know this?
2. It's an atom's inner electrons which are important in chemistry. True or false.
3. In terms of electrons (ignoring protons and neutrons) how does each element in the periodic table differ from the one before it?
4. Elements with a certain number of electrons in their outer shell are generally stable and unreactive. What is this number?
5. Benzene shows how electron bonds can be delocalized over a whole molecule. True or false.
6. Oil does not dissolve in water because hydrocarbon molecules do not show the characteristics of What?
7. What is a substitution reaction?
8. Write the family formula of alcohols.
9. Other than carbon, hydrogen, and oxygen – what other element makes an amine compound?
10. Animal and vegetable fats and oils are from the group of triglycerides. They are triple tailed molecules of what organic family?

Answers to above question sheet:

1. The ray responds to a magnetic field. Light is unaffected by magnetism so it is not a light ray.
2. False – It's the Outer electrons that matter in Chemistry.
3. Each element in the table has one more electron in its structure than the one before it.
4. 8. The octet rule.
5. True.
6. Polarity. Carbon atoms share electrons equally so hydrocarbons are not electrically polar. They are not attached to polar substances like water.

7. A substitution reaction occurs when other atoms, or groups of atoms, are substituted for a hydrogen on a hydrocarbon chain.
8. The family formula for the alcohols is R-OH.
9. Nitrogen
10. Triglycerides are of the family of esters.

The modern version of the old cathode ray tube is of course a TV tube or a TV type computer monitor. In fact these are still often referred to as a CRT – for Cathode ray tube. They have built in magnets to control the electron beams. We said that an atom which had lost some electrons would bind to another atom which had an excess of electrons. That's right but it isn't the half of it. What we described is an ionic bond. Other types of bonds are covalent bonds, where atoms electrons (they may share equally or un equally; most organic compounds have bonds of this type.) There are metallic bonds, forming an electron sea. There are hydrogen bonds where (as in water) the hydrogen is bonded to an electronegative partner and is left with a lower electron density. The result of this is a polar molecule, which is attracted to other polar molecules (we will talk about this latter). And do not forget van de Waals forces between atoms.

PART IV

Improving on Nature

Organic chemistry goes industrial with William Perkin exploring carbon's tetrahedral bonds and the discovery of chirality. This video looks at the concept of atoms as 3D objects and 3D structural diagrams and models. There is also a brief look at various synthetic organic compounds developed from natural ones, both achievements and diffi.

Question sheet:

1. By the middle of the nineteenth century there were at least three important advances in chemistry. Name two of them.
2. What is the name given to substances which have two versions, each of which
Changes light in a different way?
3. In three dimensional space carbon's bonds push as far apart as possible around its atom. Why?
4. For it to be possible for a molecule to have a mirror image version of itself the central atom must have at least four bonds and each one must have a different group attached. True or false?
5. Name three out of the four ways shown in the program of representing an Organic molecule.
6. Cocaine is a drug with good aspects and bad aspects. What are they, and What did organic chemists hope to do? Were they successful?
7. From what family of drugs do caffeine and nicotine come?
8. What is the common name for diacetylmorphine?
9. Name an organic compound that is beneficial in principle yet, when used on a large scale, has caused problems.
10. Why do you think the program showed a supermarket, when it talked about the benefits of organic chemistry?

Answers to above questions:

1. Valency. Structural diagrams. The periodic table. You could also say that the success of William Perkin drew public attention to the financial rewards of chemical synthesis.
2. Optical isomers.