Student 5: Low Achieved

Intended for teacher use only

Description of tests	Observations	Identification
Dipped damp blue litmus paper into the solution.	The litmus turned red.	Indicates an acidic pH.
In a test tube, we added a marble chip to a new sample of solution.	There was some slight bubbling around the edges of the chip	Confirmed the pH of the solution is acidic.
In a test tube, we added a small squirt {<10mL) of copper sulfate to a new sample of solution.	No reaction was observed.	Indicates the solution does not contain the amine functional group. (1)
In a test tube, we added a small amount {<10ml) of acidified dichromate to a new sample of solution.	No reaction was observed.	Indicates the solution is not a 1° or 2° alcohol or aldehyde.
In a test tube, we added a small amount {<10ml) of bromine water to a new sample of solution.	After swirling the test tube to mix the bromine water and solution together, we noticed the solution lightened in colour, from a slightly dark orange to a lighter yellow shade.	Indicates the solution is an alkene.

Description of tests	Observations	Identification
Dipped damp blue litmus paper into the solution.	The litmus paper stayed blue, there was no colour change.	Indicates possibly either a neutral pH or a basic pH.
Dipped damp red litmus paper into the solution.	The litmus paper stayed red again there was no colour change.	Confirmed our solution has a neutral pH not basic.
In a test tube, we added a small amount (<10mL) of copper sulfate to a new sample of our solution.	No reaction was observed.	Indicates that the solution does not contain the amine functional group. (1)
In a new test tube we added a small amount (<10mL) of acidified dichromate to a new sample of our solution.	The solution turned a dark murky green.	Indicated the solution may be a 1° or 2° alcohol or aldehyde.
In a new test tube we added a small amount {<10ml) of benedict's solution to a new sample of our solution.	No reaction was observed.	This indicated to us that the solution is a 1° or 2° alcohol, not an aldehyde.
In a new test tube we added a small amount (<10ml) of bromine water to a new sample of our solution.	No reaction was observed and the solution stayed orange.	This indicates to us that our solution is an alkane.

Unknown liquid sample A

The compound I was able to identify for the unknown powder sample A, was Maleic acid.

Unknown liquid sample B 2

The compound I was able to identify for the unknown liquid sample B, was glycerol. It's chemical formula is $C_3H_80_3$. It's shorthand formula, which I will refer to in this report, is

To summarise my observations, the solution has a neutral pH due to no colour change on the damp blue and red litmus papers. It does not contain an amine functional group as it did not turn a dark blue colour when I added copper sulfate. The solution did turn a dark murky green colour when I added acidified dichromate, which indicated that it may contain a 1° or 2° alcohol or aldehyde. But when I added benedict's solution, no colour change was observed, which confirmed the solution does contain a 1° or 2° alcohol. The solution is also an alkane due to no reaction being observed when I added bromine water.

Glycerol is what's known as a 'polyol' compound, containing three hydroxyl groups (where one oxygen atom is covalently bonded to one hydrogen atom). A polyol is an alcohol that contains more than one hydroxyl group, like what we see in glycerol.

It is also an alkane, specifically containing 3 carbon atoms to make it a propane.

Equations

Glycerol + acidified dichromate:

$C_3H_8O_3 + H^+/Cr_2O_7^{2-} \rightarrow$

The alcohol in glycerol has been oxidised by the oxidising agent, in this case the acidified dichromate, to form a ketone. A ketone is a functional group that contains a carbonyl group.

One of the H atoms in glycerol ($C_3H_80_3$) is replaced with an oxygen atom, as a result of the oxidation, but is then lost due to the high number of bonds. That oxygen atom becomes double bonded to a carbon atom: forming a carbonyl group. The resulting product is also a carboxylic acid, where a carbon atom is double bonded to an oxygen atom.

Sources

Glycerol is a colourless, odourless, syrup-like substance that tastes sweet. It is not to be confused with glycerine, which is very similar but typically is the commercially-sold, purified version of glycerol; their uses are non interchangeable.

Glycerol can be extracted from the plant sources of soybeans or palm, or animal fat "tallow". It can also be produced as a co-product from fat or oil splitting. For example, triglycerides, which are found in human body fat, can be what's called 'saponified', which is a chemical reaction where hydroxides break bonds between the fatty acids and glycerol to form and separate the free fatty acids and glycerol- more basically, the triglycerides, or fats, are broken down chemically to separate and form two by products, fatty acids and glycerol.

Uses

Glycerol has many uses across a few industries.

In the food industry glycerol is favoured for it's sweetness and also it's ability to preserve, sweeten and thicken: it can be used to preserve plant leaves, can be used as a sweetener but without harmful tooth decay effects, to thicken food substances and is added to frosting to stop it from setting hard. 3