Applied Science

Staff members

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Saint Benedict Catholic Voluntary Academy-Sixth Form

Y12 content

Autumn

Unit 1: Principles and Applications of Science

This is unit which has the external assessment in May of Y12. Covered periodicity in Chemistry, cells in Biology and Waves in Physics

Spring/Summer

Unit 2: Practical Scientific Procedures and Techniques

This is the internally assessed coursework unit which involves carrying out 3 practicals, making standards solutions and testing their concentration by titrations, colorimetry, chromatography and using data loggers to plot cooling curves

Y13 content

Autumn (and the late summer of Y12)

Unit 3: Science Investigation Skills

This is the externally assessed unit for Y13, based on practical skills including planning investigations, writing risk assessments and drawing conclusions, evaluating procedures.

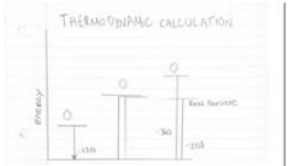
Unit 14: Applications of Organic Chemistry

This covers benzene chemistry, carbonyl compounds, nitrogen compounds and isomerism.

Saint Benedict Catholic Voluntary Academy-Sixth Form

Examples of student work.

Thermodynamic calculation



Real benzene is much lower down on the diagram then Kekule first predicted, this means it is more energetically stable. The real benzene is 150kj mol-1 more stable and this increase in stability is known as the delocalisation energy of benzene.

Furthermore, infra-red evidence showed that benzene only has c-c single bonds and c-h bonds with no double bonds.

Proper benzene is also planar with delocalised electrons above and below the plane of the ring which overlap to form a donut shape.

The larger donut shaped structure is Kekules original proposal for the structure of benzene.

The smaller shape is the real benzene structure as we know it today. In the real benzene structure the bonds are overlapped because we now know that the bonds are the same lengths, not different like Kekule suggested.

Pi bonding

Delocalised electrons

Here the plant leaf has been crushed with the mortar and coated in propapone. Then it was filtered through a funnel into a glass test tube.

My completed TLC chromatogram.

The filter process of the leaves and propapone in order to be dotted on to the TLC plate.

Learning aim D

Skills used

Skill	Evaluation
Dotting of the pigments/acids	As we completed more practical's in chromatography we found that using a small pipette for dotting the acids r pigments was rather unsuccessful as it often ripped through the chromatography or TLC plate and cased spreading in all directions after they were added as it was a controlled amount. And so after finding that it made errors in our practical's we chose to use a toothpick to dot the acids or pigments on as it was a smaller and more concentrated amount which would spread to a larger dot. I think if we did the practical's again it would be necessary to find a scientific piece of equipment to dot the substances and ensure it added only a small amount at a time, perhaps something that told us how much we added instead of saying "1 dot" etc.
Making on the standard solution (inverting)	As we continued to make multiple standard solutions for the colorimetry and calorimetry practical's, we found easier and more successful ways of inverting the solution to just below the meniscus to ensure the measurements and proportions were correct for the colorimetry practical. For example we learned to invert the solution around three times to ensure it didn't separate the components and that they were mixed and suitable for titration.
Performing calibration using ph probes and water of different temperatures	Using the pH probes at first was quite difficult as we had to learn how to connect them to the data loggers and use and electron stirrer. However, as we continued to carry out more practical's it became easier to understand the data logger to work out the temperature from it. Perhaps if we did the practical again we could use a normal thermometer to cross reference and ensure we are collecting the right data as it was difficult to do so at times.
Measuring temperature using with digital thermometer	Instead of using a regular thermometer to measure to temp we used digital ones which connected to the data logger to gather a more precise and correct reading, which also helped us when it came to making our graphs. Before this course I had only ever used a normal thermometer but as we continued to use the digital one I found it easier to set it up and no what not to do with the thermometer for example touching it during a practical as it would affect the temp. This new found skill will enable me to continue to use a data logger alongside a digital thermometer safely in the future to carry out more experiments.
Using a blow dryer to dry plates and chromatography paper	As we carried out the multiple practical's of chromatography we found that the use of the blow dryer often blew the pigments/ acids in multiple directions across the surfaces and therefore when it came to working out the Rf values it became hard to do so, or it was impossible to gather a sensible result. And so, if we did use he blow dryer we s=directed it straight onto the surface for a few seconds only in between dotting the spots or we avoided the use of the blow dryer and let it air dry. We found this worked best and personally I would avoid using the blow dryer if we did these practicals again. This could be more difficult as we only have a set lab time but it would successfully improve the data gathered.
Using a colorimeter to record absorbance rates	Making the standard solution for this and adding the different concentrations for the solutions into the multiple cuvettes allowed me to carry out the colorimetry, later a skill we learned was the transform the data into a graph to show the calibration curves according to concentration and light.
Performing multiple chromatography practical's	Before starting this course I had only ever completed a simple paper chromatography and so when working with the amino acids and plant extracts, at first it was rather difficult to complete the practical and follow the method having never done it before. However, as I continued to complete the four practical I grasped the method and took into account the risk assessments etc and carried them out safely and with more ease

Exam board: Pearson Edexcel

Unit	Marks	Duration	Unit Size (GLH)
Unit 1 1 x Biology 1 x Chemistry 1 x Physics	90	40 minutes per paper	90
Unit 3 Part a – laboratory time Part b – examination	60	3 hours 1 hour 30 minutes	120

Entry requirements

Single Sciences	Grade 5 or above
Combined science	Grade 5-5 or above
Maths	Grade 4 or above
English Language/Literature	Grade 4 or above

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food science/nutrition, forensic science, biological/engineering careers, microbiology, natural sciences, physiology, food technology, nursing, midwifery, radiography, paramedical courses, law and zoology.

Thank you for visiting Applied Science.
If you have any questions, please contact

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