**YEAR 12 CHEMISTRY**

**ASSESSMENT TASK**

**CHEMICAL MONITORING & MANAGEMENT**

**Open-ended Investigation**

**Introduction:**

Plants need nutrients in order to grow effectively. The three major nutrients that plants need are nitrogen, phosphorous and potassium. There are others that are also important for healthy plant growth and sulfur is among these. Sulfur is commonly found in fertilisers in the form of sulphate. Microbes change sulfate to sulfide compounds that enter the soil solution and can be taken up by plant roots for growth. Sulfur is needed to produce chlorophyll, aids in disease resistance, and also helps in growth and seed formation. While sulfur is normally found in sufficient concentrations in most soils, canola, broccoli and cabbages are three crops that commonly need additional sulfur added to the soil. Some commercial fertilisers contain sulfates along with other anions and cations. Epsom salt (MgSO4) is also a good source of sulfate.

**Outcomes Assessed:**

H10 – Analyses stoichiometric relationships

H11 – Justifies the appropriateness of a particular investigation plan

H12 – Evaluates the ways in which accuracy and reliability could be improved in investigations

H13 – Uses appropriate terminology and reporting styles to communicate information and understanding

H14 – Draws valid conclusions from gathered data and information

**The Task:**

Using a variety of sources including books, the Internet and your own knowledge, you are to research how to accurately measure the sulfate content in two different fertilisers – Epsom salt and a commercially available fertiliser.

**Details:**

* You are to conduct research and **use two different methods** (1 gravimetric, 1 volumetric) to determine sulfate content. If you cannot come up with methods of your own, you may “purchase” a hint (2 marks) or a full procedure (5 marks) from your teacher.
* You are to identify data, plan, select equipment and perform first-hand investigations to measure the sulfate content of these two fertilisers and explain the chemistry involved using standard lab equipment.
* The format is to be that of a formal laboratory write-up. You must carry out a full risk assessment and show all relevant calculations to determine the percentage of sulfate in the sample. (See: “How to write an EPI Report” found at <http://slider-chemistry-12.wikispaces.com/Chemical+Monitoring+and+Management>
* You must analyse the investigations, evaluating the reliability/validity of the results and propose solutions to problems encountered in the procedure.
* Two double lessons (or four single lessons) will be provided for the investigations to be carried out. No other time will be provided. Therefore, you must be PREPARED!
* A mark for practical skills will be given during the investigations. This will include safe and competent use of laboratory equipment.

**Due Date: Monday, 11th June, 2010 Task weighting: 15%**

**Chemical Monitoring & Management**

**Open Investigation 2012**

**Marking Criteria**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ASSESSMENT CRITERIA** | **Marks** | | | |
| **Title** | 0 | 1 |  |  |
| **Background Information:**  Process/chemistry of gravimetric analysis fully **explained** | 0 | 1 | 2 | 3 |
| Process/chemistry of volumetric analysis fully **explained** | 0 | 1 | 2 | 3 |
| **Hypothesis**:  Correctly phrased into a testable hypothesis w/ supporting evidence/theories | 0 | 1 | 2 |  |
| **Aim:**  An aim that includes the dependent and independent variables. | 0 | 1 | 2 |  |
| **Design (method & apparatus)**:  Accurately and fully **identifies** equipment required | 0 | 1 | 2 |  |
| **Identifies** the independent variable | 0 | 1 |  |  |
| **Identifies** the dependent variable | 0 | 1 |  |  |
| **Identifies** the control variables | 0 | 1 | 2 |  |
| Diagram (pencil/computer, ruled, 2D, labelled) | 0 | 1 | 2 | 3 |
| Logical and specific sequence of method **described** and includes reliability | 0 | 1 | 2 | 3 |
| **Safety:**  Safety hazards identified and appropriate safety measures listed | 0 | 1 | 2 |  |
| **Results:**  All relevant calculations accurately and clearly shown | 0 | 1 | 2 | 3 |
| Clear and accurate table of data included | 0 | 1 | 2 |  |
| Correct units used throughout calculations and data table | 0 | 1 | 2 | 3 |
| Fully labelled graph is provided | 0 | 1 | 2 |  |
| Provides relevant observations | 0 | 1 | 2 |  |
| **Discussion:**  **Describes** the relationship / patterns found | 0 | 1 | 2 |  |
| Suggests probable reasons to **explain** relationship w/ supporting evidence/scientific logic | 0 | 1 | 2 | 3 |
| **Evaluates** experiment for strengths and improvements | 0 | 1 | 2 |  |
| **Evaluates** reliability and validity of experiment | 0 | 1 | 2 | 3 |
| Discussion demonstrates a sophisticated level of **analysis** of the investigation | 0 | 1 | 2 | 3 |
| **Conclusion:**  Short and specifically answers the aim | 0 | 1 |  |  |
| States whether hypothesis is supported or rejected | 0 | 1 |  |  |
| **Presentation:**  Correct format / overall neatness / bibliography | 0 | 1 | 2 | 3 |
| **Demonstrates** competent use of equipment during practicals | 0 | 1 | 2 | 3 |
| **Demonstrates** safe practices during practicals | 0 | 1 | 2 |  |
| **Hints “purchased” from teacher** (Hint -2; Procedure -5) |  |  |  |  |
| **TOTAL** |  |  |  | **/60** |