

Grade 8 Natural Science Worksheet

Thinking scientifically to solve problems

Here is a problem to solve:

These are the ingredients of mayonnaise:

Vinegar, lemon juice, salad oil, mustard, egg yolk and salt.

As there are two immiscible substances (substances which cannot mix together) in this mixture, an emulsifying agent would be needed to keep the mayonnaise stable, so that it does not separate out.

1. Identify which two ingredients are immiscible.

Now, here is your problem:

How would you find out which ingredient is the emulsifying agent?

2. Make a detailed report, according to the correct scientific method, describing how you went about solving this problem, outlining each step you take. List the procedural steps you take. It does not matter if a step leads you to an incorrect answer, write it down, nevertheless. Show how each bit of information you acquire leads you to the next step in your investigation. Make every attempt to keep your investigation as scientific as possible.

[20 marks]

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Suggested Solutions

In this assessment item, the scientific method is not provided for the learner. This is meant to be a summative task which requires the learners to know the steps taken in a scientific investigation and how to write up a scientific report according to the scientific method.

Question number	Possible marks	Solution
1, 2	20	<p>This investigation simply posed a problem; the learner had to set up the prediction or hypothesis and then find a way of testing this hypothesis. The learner had to try many options before coming to a conclusion. It was expected that they would have to repeat investigations and try a number of combinations of ingredients before finding the correct emulsifier. Although they were working with simple everyday materials, they were doing science by a trial and error experimental procedure, with little guidance as to how to go about setting up the investigation. Learners must test the hypothesis <u>scientifically</u>. If learners made an assumption as to which was the emulsifier and then 'proved' this, by simply adding everything together and shaking; this is not a scientific test.</p> <p>The best way of doing this is to predict that ONE of the ingredients is the emulsifier - not the oil or the vinegar - as these were the two immiscible ingredients. Add the vinegar and oil to each other. Then add one ingredient at a time to see which is the emulsifier. Or have a sample of oil and vinegar in a number of glasses, and add one other ingredient to each glass and shake up. Either of these ways would show that the egg yolk is the emulsifier.</p> <p>Award marks for the set-up of the scientific method under the headings Hypothesis [2], Aim [2], Materials/apparatus [2], Method [4], Results [2], Conclusions [2].</p> <p>Award marks for logical thinking and for how the scientific investigation was arrived at, as described above. [6]</p>