

Recommendations for “M&M Chromatography”

Introduction:

This should contain a clear statement of the problem, its goals, and your general approach to solving the problem. A typical introduction might be a short paragraph in length. As you do more original work, the significance of the present work in the context of what is known should be stated. Do not copy the goals listed for the investigations in your report introduction. Those goals merely represent a checklist of items to complete during the investigation.

Statement of the problem and goals

Determine the FD&C Dyes in each M&M and food coloring.

General approach to the problem

Students should give a very brief statement of their approach to solving the above stated problem. This should NOT be an experimental section but should be more of a general approach to the problem.

An example might be “Separation and analysis by paper chromatography.
Determination by R_f values and UV-lamps.”

Form

Is this an introduction? These are discretionary stylistic points.

Experimental:

*Enough detail should be given in this section so that another chemist, not otherwise familiar with the work, could repeat the experiments. Do **not** write your experimental section in second person voice. You are describing what you did, not providing directions for someone else (another chemist with the same training as you have) to follow.*

- (a) *You must identify all materials used. Include any information you have on the purity and concentrations of the materials. You should list reagents, such as acids, bases, and solvents, that are normally available, but you need not describe them in detail. You should give formulas of all compounds, together with their chemical names, at least once.*
- (b) *Unless it is standard equipment, you should describe apparatus, with a drawing if necessary, and with names and sources of specific equipment if they are not widely known. You should list commercially available equipment, but you need not describe it in detail.*
- (c) *Include a description of how the work was done. For experiments involving established procedures, reference to the appropriate source of the procedure may suffice. You should include all the background data, equations, and formulas necessary to the experiment.*

The main idea here is TERSE, TERSE, TERSE! Another chemist should be able to reproduce the procedure AND data handling. It is important to realize that these are being written for other chemists so things such as glassware size etc. are not included unless integral to the procedure.

Logical description of the procedure as ACTUALLY followed

Could another chemist follow it?

Students must include at least one set of data for such things as:

Mark original line with pencil
Spot SMALL with each food coloring and standard dye
Dissolved M&M in minimal amount of water
Developed with 0.1% NaCl
Stopped before reaching top
Allowed to dry
Marked solvent and dye fronts
Analyzed under UV light if available

Form

Is this an experimental section? These are discretionary stylistic points. Is there extra information? MUST be past tense in paragraph form. 3rd person preferred, if person is used (“we” vs. “I”)

Calculations:

This section should include at least one worked-out sample calculation of all calculations performed in the lab. Include formulae in variable form as well as with an example set of data. It may be appropriate to include the theory behind your calculations.

R_f formula in variable form
Sample calculations for R_f determination

Data/Results:

The major experimental results, including the original data and the calculated results, should be presented. Include relevant data and describe assumptions you made in the collection of the data. Use tables, figures, and graphs where necessary for clarity and conciseness. Tables, figures, and graphs must be titled and should be referred to in the discussion as per their title. If not embedded in the text, it is recommended that all graphs be a full page.

All numerical data should be reported in accepted, self-consistent systems of units. Report the precision of the work, theoretical values if known, and the relative error of the experimental results.

Data

Food colorings analyzed
Standard dyes analyzed
M&M's analyzed
Distances traveled for ALL colors
Distances traveled for ALL solvent fronts
Colors present in each food dye
Colors present in each M&M
Colors seen under UV light
Copy/picture of sample

Discussion:

The discussion section states the major conclusions drawn from the results in light of how these results compare to or contrast with previous findings by other scientists. The discussion section is where the burden of proof falls on the researcher. Every article makes certain claims of results found. Here is where you must show that you were correct in making your conclusions and that your results mean what you say they mean.

If your results differ significantly from expected values, or if the precision is worse than should be obtained with your procedure, discuss the possible sources of error in detail.

Discussion

Some things that I feel the students should include:

What colors are in each M&M

What colors are in each food dye

What M&M's and food dyes contain tartrazine (yellow #5)

AND how they came to that conclusion

Discussion of R_f and its significance

Sources of error

Form

Is this a discussion section? These are discretionary stylistic points.

Conclusion:

A summary adds to the value of the presentation. It should be interpretive and not repetitious. Discuss how the results relate to the goals of the experiment and any conclusions that may be drawn from the experiment. Consider any alternate conclusions or explanations. The problem may not have been solved completely; if so, you might suggest an approach or a refinement that could be used for further study. The conclusion in a scientific report is much like a concluding paragraph on an essay and is a summary statement related to the purpose of the lab.

Conclusion

So, did you do it? This is much like a concluding paragraph on an essay and is a summary statement related to the purpose of the lab.

FD&C dyes in each M&M and each food dye

M&M's and food dyes that should be avoided if allergic to tartrazine

Form

Is this conclusion section? These are discretionary stylistic points. Is there extra information?