

Grade 8 Natural Science Worksheet

Investigation into ink

Black is black is black – isn't it?

Maybe not!

Collect a number of black non-permanent/water soluble markers/felt-tipped koki pens, made by different manufacturers.

Separate the inks by chromatography, as described below.

Do all manufacturers of black felt-tipped pens use the same mixtures of chemicals to make their black ink?

Design and perform an investigation to answer this question. Write up your investigation as a scientific report.

Practical guidelines:

You can separate the different chemicals from the mixture in a non-permanent dye quite easily. This process is known as chromatography.

You will need:

Some blotting paper (available from art or stationery shops), cut into 5 strips – 10 cm x 3 cm

Different NON-PERMANENT/WATER SOLUBLE felt tipped pens (kokis or overhead transparency markers)

5 small glass jars (like Purity baby food bottles)

Water

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What to do:

1. Mark each strip of blotting paper with a blob of ink about 3 cm from the bottom of the strip.



2. At the top of each strip, write the name of the marking pen.
3. Put the strips into the jar filled with about 2cm of water. DO NOT let the water actually touch the dot. Let the water seep up the paper.
4. Leave undisturbed for a while, watching carefully what happens.

Rubric to assess scientific investigation

Criteria	Level 4	Level 3	Level 2	Level 1
RESEARCH QUESTION	Well articulated, based on careful observation, excellent scope for investigation.	Well stated, based on observation, good scope for investigation.	Fairly well stated, observations made, will permit investigation.	Vaguely stated, not really based on observation, limited scope for investigation.
	5	4	3	2
HYPOTHESIS	Well stated prediction, testable.	Prediction is stated, testable.	Vague statement, not really testable.	None.
	3	2	1	0
METHOD:	Fully listed.	Incomplete.		None.
MATERIALS				
	2	1		0
METHOD:	Logical detailed description of methods, can be clearly followed, innovative, valid hypothesis testing.	Detailed description of methods, easy to follow, some evidence of innovation, largely valid hypothesis testing.	Basic description of methods, generally logical, not very innovative, does address hypothesis in tenuous way.	Vague description of methods, flaws in logic, no innovation, no real valid hypothesis testing.
STEPS TAKEN				

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	10	8	5	3
METHOD:	Excellent steps taken to ensure fair test and reliability.	Good steps taken to ensure fair test and reliability.	Some steps taken to ensure fair test and reliability.	Not a fair test.
FAIR TEST	6	4	2	0
RESULTS AND DISCUSSION	Results recorded in a meaningful manner and displayed in a way which communicated findings logically and clearly, results discussed intelligently showing understanding of the information.	Results accurately recorded, displayed appropriately, discussed in a basic way showing a good grasp of the information investigated.	Results adequately recorded, adequate display of results, discussion covered most of the results and showed a fair grasp of the information investigated.	Results not accurately or appropriately recorded or displayed discussion inadequate with flaws in thinking and grasp of information.
	10	7	5	3
CONCLUSIONS	Well drawn from the research, sensible inferences made, relate back to hypothesis.	Drawn fairly well from research, makes some reference to hypothesis.	Faulty reasoning in conclusion, no relation to hypothesis.	No conclusions offered.
	4	3	2	0

[40 marks]

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Suggested Solutions

Possible marks	Solution
40	<p>As the water is soaked up by the blotting paper, it carries the inks with it. The different chemicals making up the ink travel at different speeds, because of the different sizes of their particles. Also, some particles are attracted to the paper, and travel slower. As the water evaporates from the paper, so the solutes (the chemicals making up the inks) are left in different places on the paper. You are able to see the different dyes making up each colour.</p> <p>See rubric in Appendix of Assessment Tools.</p>

Appendix of Assessment Tools

Rubric to assess scientific investigation

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	5	4	3	2
HYPOTHESIS	Well stated prediction, testable.	Prediction is stated, testable.	Vague statement, not really testable.	None.
	3	2	1	0
METHOD:	Fully listed.	Incomplete.		None.
MATERIALS				
	2	1		0
METHOD:	Logical detailed description of methods, can be clearly followed, innovative, valid hypothesis testing.	Detailed description of methods, easy to follow, some evidence of innovation, largely valid hypothesis testing.	Basic description of methods, generally logical, not very innovative, does address hypothesis in tenuous way.	Vague description of methods, flaws in logic, no innovation, no real valid hypothesis testing.
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FAIR TEST	6	4	2	0
RESULTS AND DISCUSSION	Results recorded in a meaningful manner and displayed in a way which communicated findings logically and clearly, results discussed intelligently showing understanding of the information.	Results accurately recorded, displayed appropriately, discussed in a basic way showing a good grasp of the information investigated.	Results adequately recorded, adequate display of results, discussion covered most of the results and showed a fair grasp of the information investigated.	Results not accurately or appropriately recorded or displayed discussion inadequate with flaws in thinking and grasp of information.
	10	7	5	3
CONCLUSIONS	Well drawn from the research, sensible inferences made, relate back to hypothesis.	Drawn fairly well from research, makes some reference to hypothesis.	Faulty reasoning in conclusion, no relation to hypothesis.	No conclusions offered.
	4	3	2	0