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Phenylthiocarbamide (PTC) paper used in genetics

Posted by Anonymous on Tue, 2015-07-28 09:25

Phenylthiocarbamide (PTC) paper used in genetics: Are we still allowed to purchase them and do the experiment? We are looking at ordering some PTC papers and an SDS does not appear to be supplied with the papers.

Voting:



No votes yet

Australian Curriculum:

Transmission of heritable characteristics from one generation to the next involves DNA and genes

People use scientific knowledge to evaluate whether they accept claims, explanations or predictions, and advances in science can affect people's lives, including generating new career opportunities

Year Level:

9

10

Senior Secondary

Laboratory Technicians:

Laboratory Technicians

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phenylthiocarbamide paper

Submitted by sat on 31 July 2015

Use of PTC paper in schools

There are conflicting views as to whether Phenylthiocarbamide (PTC) papers are safe to use in school genetics classes.¹

Although phenylthiocarbamide is toxic if swallowed, the amount of PTC on commercially produced PTC paper is very small (less than 0.3 mg per strip) and far below the toxicity level.² Schools must not attempt to make their own PTC papers due the extreme risks associated with the pure chemical.

PTC paper is used to test genetic variability in humans because for some people it is intensely bitter, while for others it is tasteless. Students who can taste the bitterness would be able to detect it immediately from one test paper. For non-tasters, there may be a temptation to repeat the test with one or more papers, but this can be avoided by only handing out one test strip per student.

Recommendations

Your school should first check with your own jurisdiction to see if you are permitted to use them. Your school should also conduct your own risk assessment of this activity before considering purchasing and consider alternatives listed below. If you purchase PTC papers you should request a Safety Data Sheet with the name, Australian address and business telephone number of either the manufacturer or the importer.

Schools choosing to conduct this activity should

- only use commercially available test papers.
- conduct it in a food safe area and not a science laboratory
- use clean and sterile forceps to transfer the exact number of strips required into a covered container for use
- closely supervise and restrict the distribution of one test paper per student.^{3,4}

Alternatives

To test for bitterness-tasting ability: we suggest that schools consider

- substituting non-hazardous substances such as the juice of broccoli or kale which contain glucosinolate compounds that chemically resemble phenylthiocarbamide.⁵
- substituting with genetics test papers which contain sodium benzoate, which is a food preservative and flavour. The taste detected varies from sweet, salty, to bitter, depending upon the individual.

To observe physical genetic traits^{6,7} we suggest that the students look at:

- ear lobe attachment,
- widow's peak hairline;
- tongue rolling;
- pigmented iris of the eye;
- naturally curly or straight hair;
- hand clasping;
- dimples.

References

- 1 Science Teachers' Association of Ontario blog, (nd) '*Safety Questions – PTC Paper*' Retrieved (16 February 2023) from the Science Teachers' Association of Ontario website: <https://stao.ca/safety-questions-ptc-paper/>
- 2 Carolina Biological Supply Company. (2018 , August) *PTC papers Safety Data Sheet*, Retrieved from the Southern Biological website: <https://www.southernbiological.com/ptc-papers-sds/>
- 3 CLEAPSS. (2020, February) Taste tests using PTC (phenylthiocarbamide) strips, Retrieved from the CLEAPSS website: <https://science.cleapss.org.uk/Resource-Info/PP084-PTC-taste-test.aspx> (login required)
- 4 CLEAPSS. (2022). *Humans as the subject of investigation (3)*, Retrieved from the CLEAPSS website: <https://science.cleapss.org.uk/Resource-Info/SSS008-Humans-as-the-subjec...>
- 5 Adam Drewnowski, Carmen Gomez-Carneros, Bitter taste, phytonutrients, and the consumer: a review, *The American Journal of Clinical Nutrition*, Volume 72, Issue 6, December 2000, Pages 1424–1435, <https://doi.org/10.1093/ajcn/72.6.1424>
- 6 Genetic Science Learning Centre. (2016, March 1) '*Observable Human Characteristics*'. Retrieved from the University of Utah, website: <https://learn.genetics.utah.edu/content/basics/observable/>
- 7 Science Prof Online. (2017, October) '*10 Human Genetic Traits of Simple Inheritance*' Retrieved from the Science Prof Online website <https://www.scienceprofonline.com/genetics/ten-human-genetic-traits-simp...>

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