

OXIDATION OF ETHYLENE GLYCOL

PERCENTAGES OF OXIDIZED ETHYLENE GLYCOL

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ABOUT ETHYLENE GLYCOL

Ethylene glycol is an organic compound used as antifreeze and a raw material in the manufacture of polyester fibers. It has many other uses.

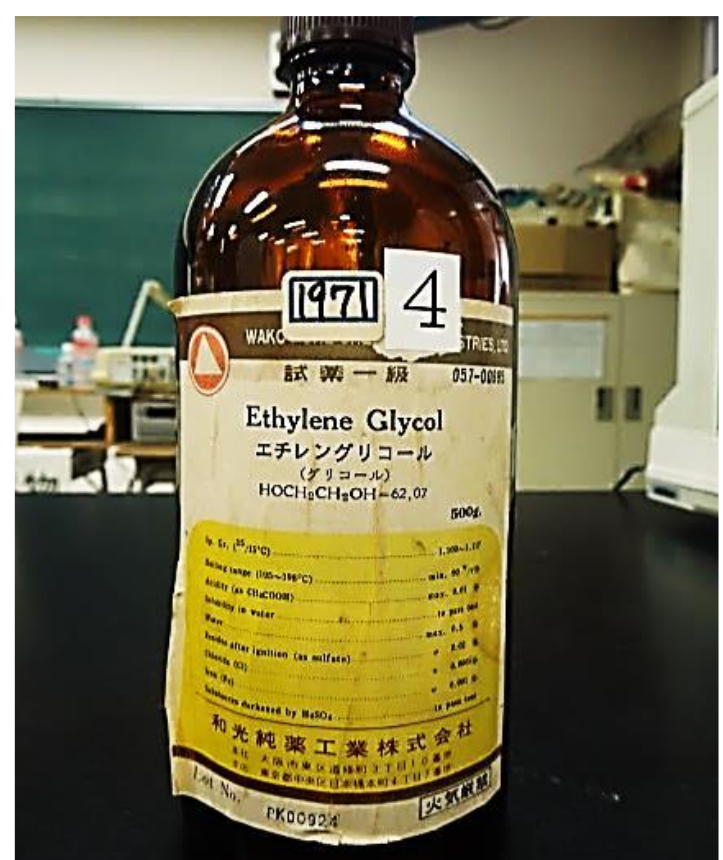
INTRODUCTION

When we oxidize ethylene glycol, we increase the percentage of oxidized ethylene glycol.

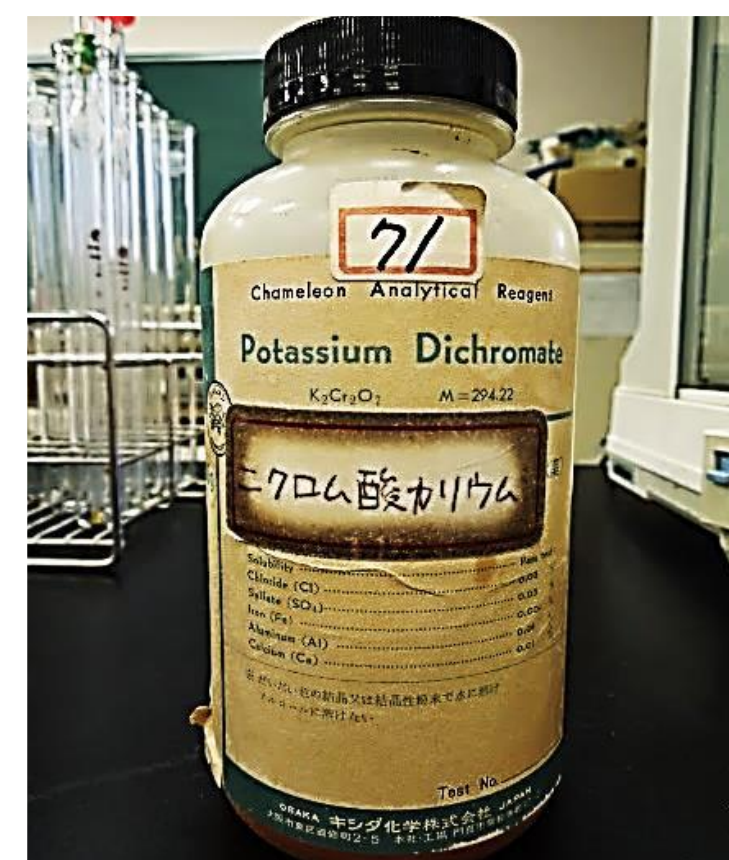
PURPOSE

To increase the percentage of oxidized ethylene glycol.

MATERIALS



0.050~0.40g of
Ethylene glycol
(C₂H₆O₂)



1.0~1.6g of
Potassium dichromate
(K₂Cr₂O₇)



4.0g of solution of
Sulfuric acid
(H₂SO₄(aq))
3.0mol/L~6.0mol/L

EQUIPMENT

- Test tubes
- Pipettes
- Glass tube with a cork
- Powder paper
- Spoon
- Electronic balance

METHOD

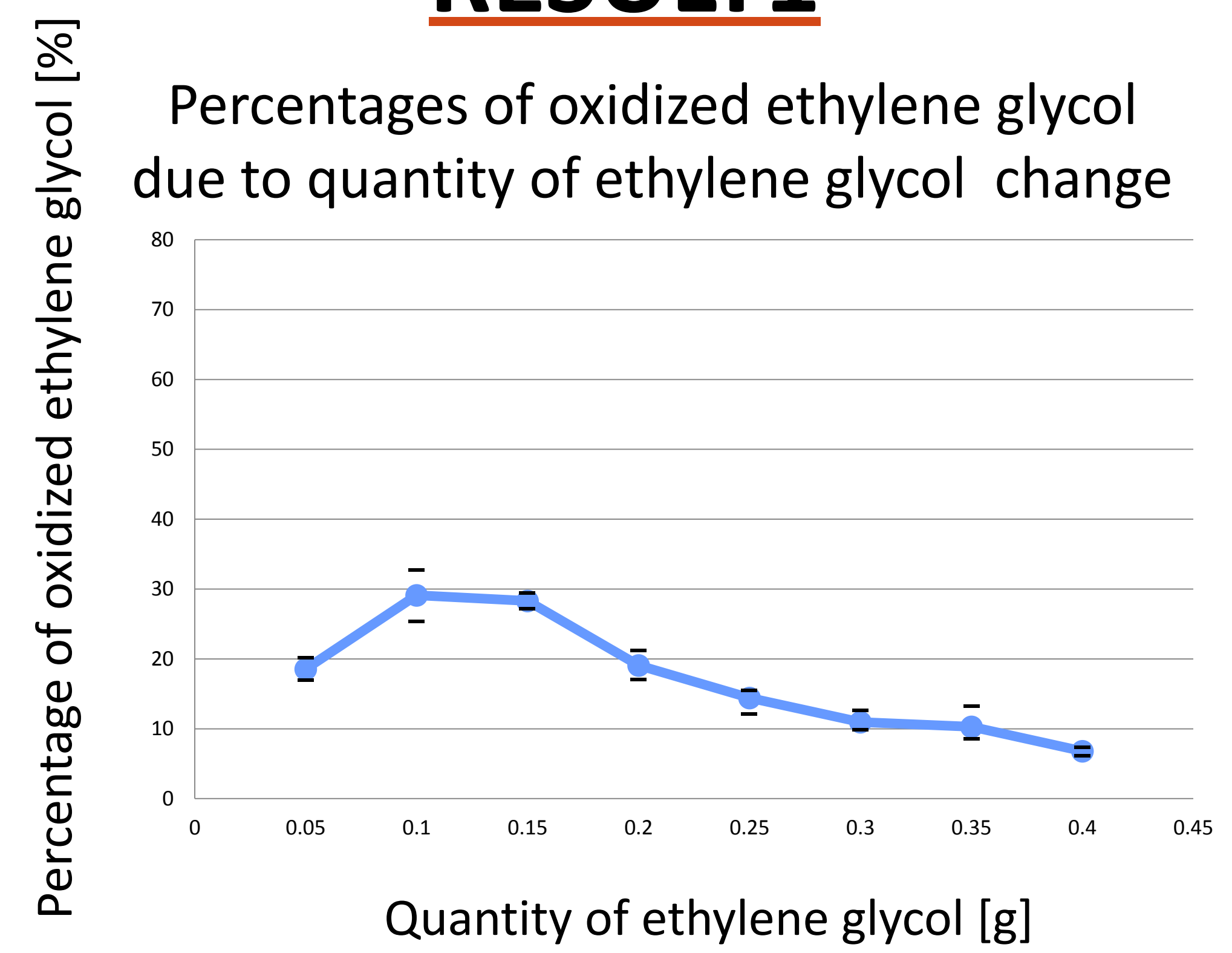
1. Put ethylene glycol into a test tube
2. Add potassium dichromate into the test tube.
3. Pour solution of sulfuric acid into the same test tube.
4. Plug the test tube with a cork.
5. Measure the total weight before the reaction starts.
6. Shake the test tube until the reaction starts.
7. Measure the total weight after the reaction.

HOW TO FIND THE PERCENTAGES OF OXIDISED ETHYLENE GLYCOL

- We found the percentages of oxidized C₂H₆O₂ from the weight of released CO₂.
- The reaction formula:
$$3\text{C}_2\text{H}_6\text{O}_2 + 5\text{K}_2\text{Cr}_2\text{O}_7 + 20\text{H}_2\text{SO}_4 \rightarrow 6\text{CO}_2 + 5\text{Cr}_2(\text{SO}_4)_3 + 5\text{K}_2\text{SO}_4 + 29\text{H}_2\text{O}$$
- The formula for the percentage of oxidized ethylene glycol[%]
$$\frac{\text{weight of released CO}_2[\text{g}] \times \frac{1}{44} \times \frac{3}{6} \times 62}{\text{weight of C}_2\text{H}_6\text{O}_2 \text{ which is put into a test tube}} \times 100$$

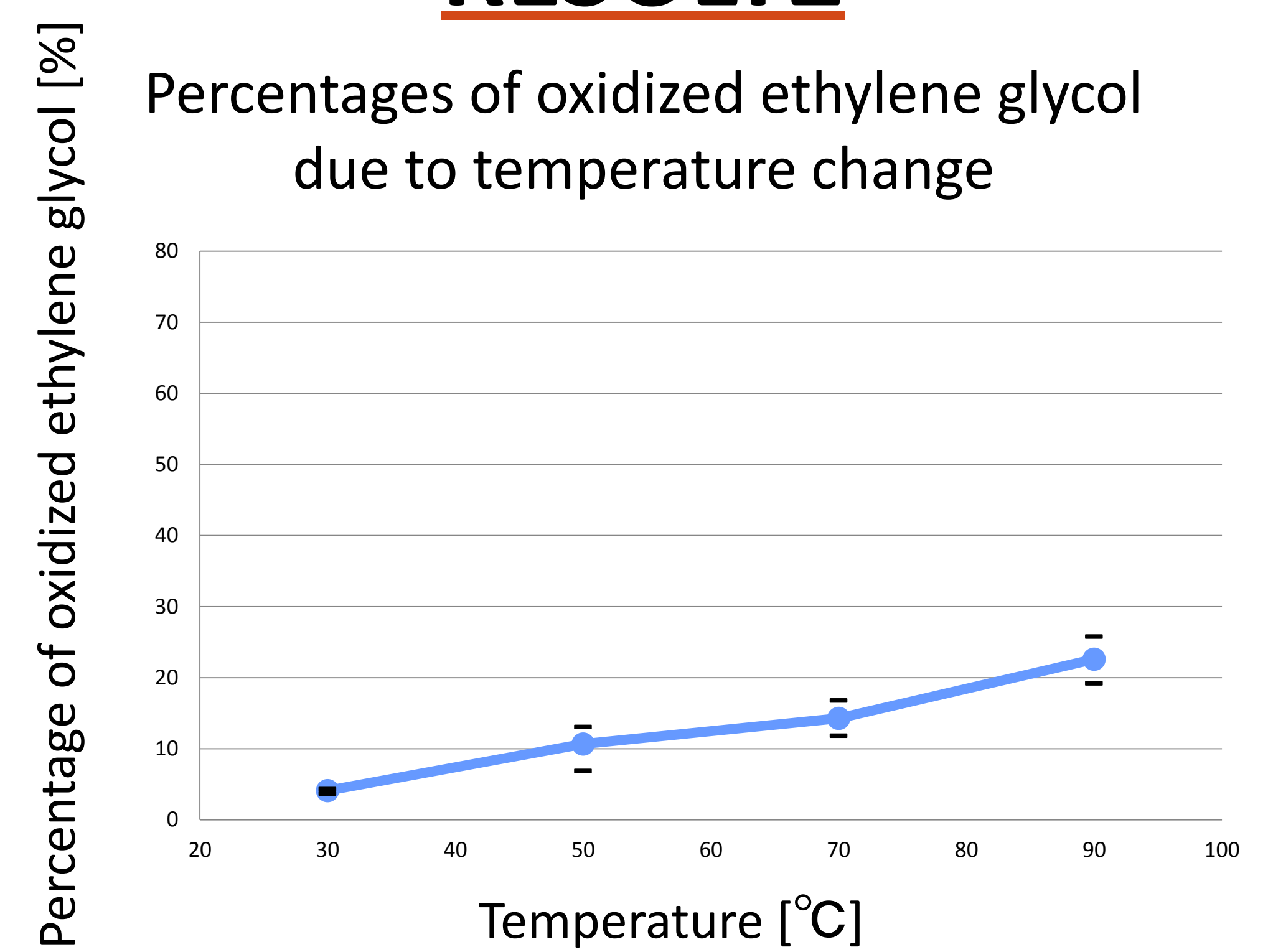
RESULT1

Percentages of oxidized ethylene glycol due to quantity of ethylene glycol change



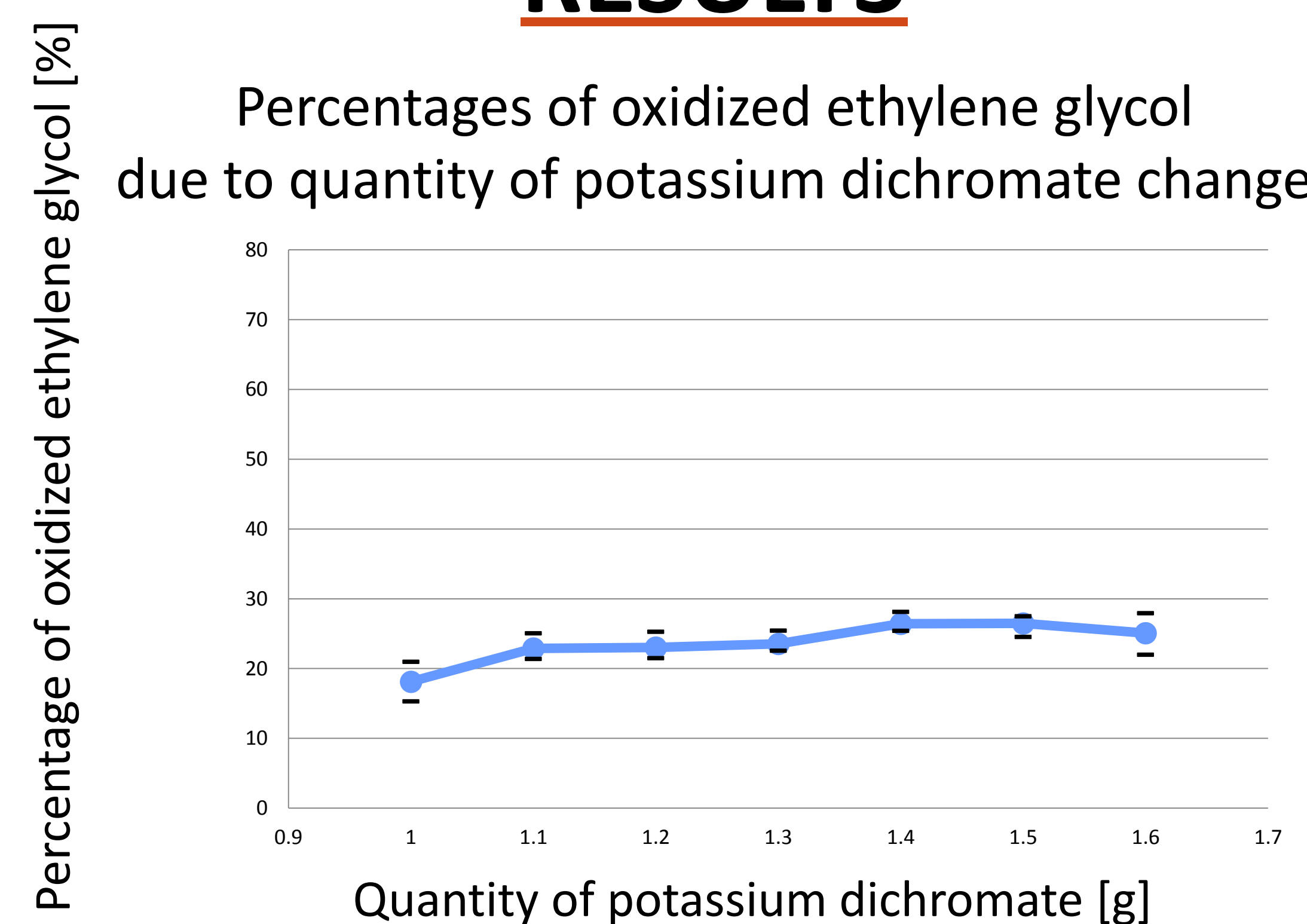
RESULT2

Percentages of oxidized ethylene glycol due to temperature change



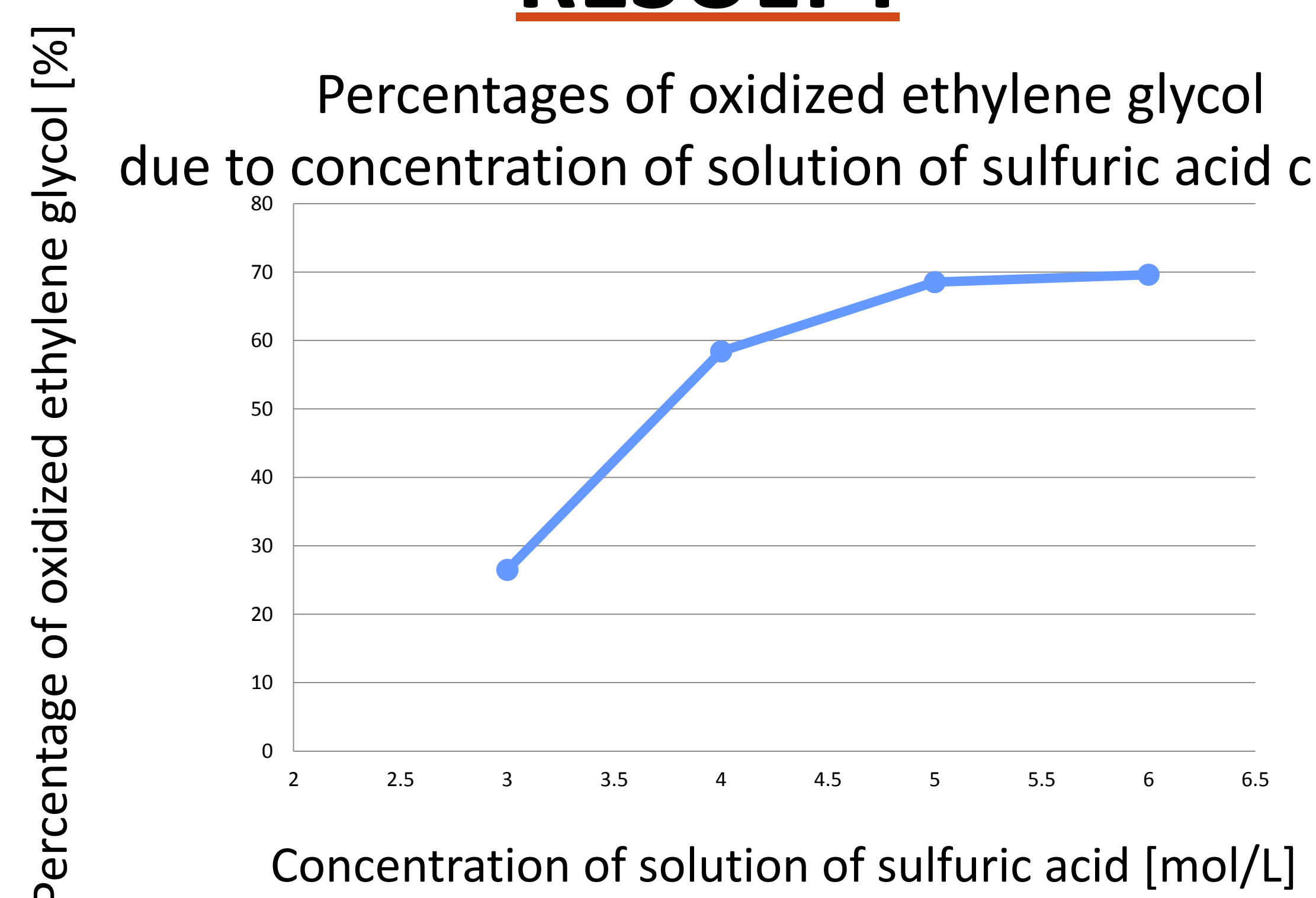
RESULT3

Percentages of oxidized ethylene glycol due to quantity of potassium dichromate change



RESULT4

Percentages of oxidized ethylene glycol due to concentration of solution of sulfuric acid change



ACKNOWLEDGMENT

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REFERENCE

実教出版編修部 『サイエンスビュー 化学総合資料』
(2013 Mar. 28) p.320 実教出版株式会社