Lab Report for
Measuring Manganese Using Spectrophotometry

Concentration of Mn\(^{2+}\) (aq) stock solution from bottle: \(\text{________ mg·mL}^{-1}\)

Size of volumetric flask used: \(\text{________ mL}\)

Volume of stock solution used (quantity pipetted into beaker): \(\text{________ mL}\)

Concentration of resulting standard solution: \(\text{________ mg·mL}^{-1} \text{ Mn}^{2+}\)

show calculation:

Wavelength chosen for analysis: \(\text{________ nm}\)

Justification for choice of wavelength: ________________________________

_________________________
Data Table:

<table>
<thead>
<tr>
<th>Solution</th>
<th>Concentration (mg·mL⁻¹)</th>
<th>Absorbance</th>
<th>Visual Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuvette (0) (blank)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuvette (1) (1 mL / 25 mL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuvette (2) (5 mL / 25 mL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuvette (3) (10 mL / 25 mL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuvette (4) (pure standard)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

show calculations for the concentrations of cuvettes (1-3) below:

Make a calibration curve by plotting concentration in milligrams per milliliter on the x-axis versus absorbance on the y-axis and attach it to your report. The plot should fill one sheet of paper and may be done by hand or on a computer program such as Excel. Draw a best-fit-line through your points being certain it goes through the origin because zeroing your instrument ensured that at zero concentration the absorbance was zero. (If you use Excel to make your plot you should set the intercept to zero using the trendline options menu).

Calculate the equation of your best-fit-line and show your work if you do this by hand. Give the final equation below (use points from the ends of your line and not two actual data points when doing this calculation or use linear regression analysis such as the "trend-line" function in Excel or on a graphing calculator setting the intercept to zero):

Slope of the line:

E = ___________ mL·mg⁻¹·cm⁻¹
Unknown Analysis:

Unknown ID Code: __________

Volume of unknown used: __________ mL

Volume of volumetric flask: __________ mL

Observed color of unknown solution after boiling: __________

Wavelength used to analyze unknown solution: __________ nm

Absorbance of unknown solution: __________

Concentration of Mn$^{2+}$ in MnO$_4^{-}$ in diluted unknown solution: __________ mg·mL$^{-1}$ Mn$^{2+}$

show calculations (hint: this is where you use the slope of your best-fit-line):

Concentration of Mn$^{2+}$(aq) in original undiluted unknown sample: __________ mg·mL$^{-1}$ Mn$^{2+}$

show calculations:

On the back of this page (or on a separate sheet of paper), write a brief one to two paragraph conclusion based on your findings. Include the concentration of manganese present in the ground water sample and your recommendations to the city based on these findings. Support your final recommendation using published standards and not merely the information given in this experiment. Be sure to properly cite all references consulted. Keep in mind that ground water is not the same as drinking water or well water when performing your research and writing your conclusions.