Phosphorus analysis in water is critical for general water quality assessments. Additionally, phosphorus is widely regarded as the primary culprit for sea and lake water eutrophication. The Water Pollution and Control Act established the acceptable levels of phosphorus in industrial wastewater at 1 to 6 mg/L. Here we demonstrate the analysis of total phosphorus in wastewater using the Hitachi U-5100 spectrophotometer and total phosphorus reagent kit from Kyoritsu Chemical.

### Experimental:

1. **UV Decomposition Method**

   - **Water sample 2mL**
   - Add 2 drops of reagent R-1
   - Add 1 mL of reagent R-2
   - Add 2 drops of reagent R-3
   - Stir
   - UV reactor (*4)
   - Decompose for 20 min
   - Collect the decomposition solution

   **Method**
<table>
<thead>
<tr>
<th>Analyte / Sample</th>
<th>Total Phosphorus / Wastewater</th>
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</table>
   | Measurement method | Acidic potassium peroxodisulfate-UV decomposition method
   |                  | Molybdenum blue spectrophotometric method (Simple analysis by using the UV reactor and Set for Total Phosphorus from Kyoritsu Chemical-check Lab) |
   | Reagent | Kyoritsu Chemical-check Lab set for Total Nitrogen/Total Phosphorus Decomposition reagent-DPR reagent for total phosphorus. |
   | Spectrophotometer | U-5100 |
   | Wavelength | 700nm (slit 5nm) |
   | Assay range | 0.1 ~ 2.0 mg/L |

2. **Molybdenum Blue Spectrophotometer Method**

   - **Decomposition solution**
   - Add 4 drops of reagent K-1
   - Stir
   - Mix with powered $PO_4^-$ reagent
   - Add 2mL of ultrapure water

   **Solution for measurement**

3. **U-5100 Measurement**

   - A linear calibration curve (0.0 to 2.0 $\mu$g/mL) was generated with the correlation coefficient of 0.9995. Total phosphorus in the wastewater sample was determined to be 0.35 $\mu$g/mL. The Hitachi U-5100 and the total phosphorus kit offer an improved method for a traditionally complex water analysis.

### Conclusion:

A linear calibration curve (0.0 to 2.0 $\mu$g/mL) was generated with the correlation coefficient of 0.9995. Total phosphorus in the wastewater sample was determined to be 0.35 $\mu$g/mL. The Hitachi U-5100 and the total phosphorus kit offer an improved method for a traditionally complex water analysis.

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**Table: Total Phosphorus in Wastewater**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Absorbance</th>
<th>Concentration ((\mu)g/mL)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>0.07</td>
<td>0.35</td>
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