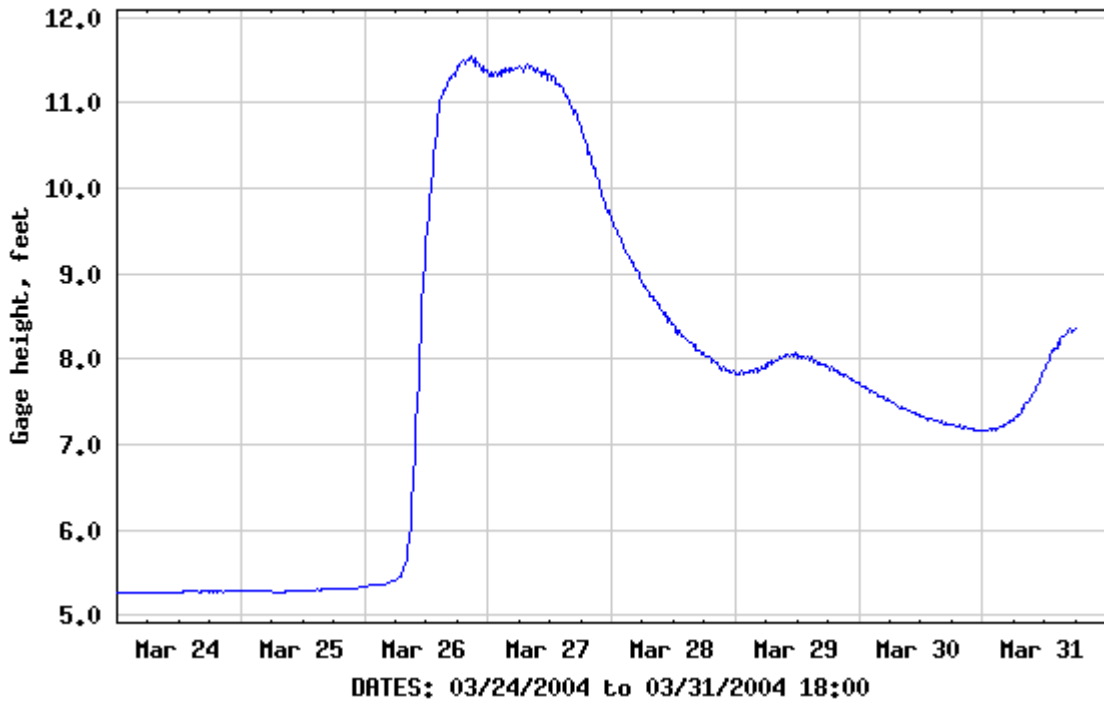
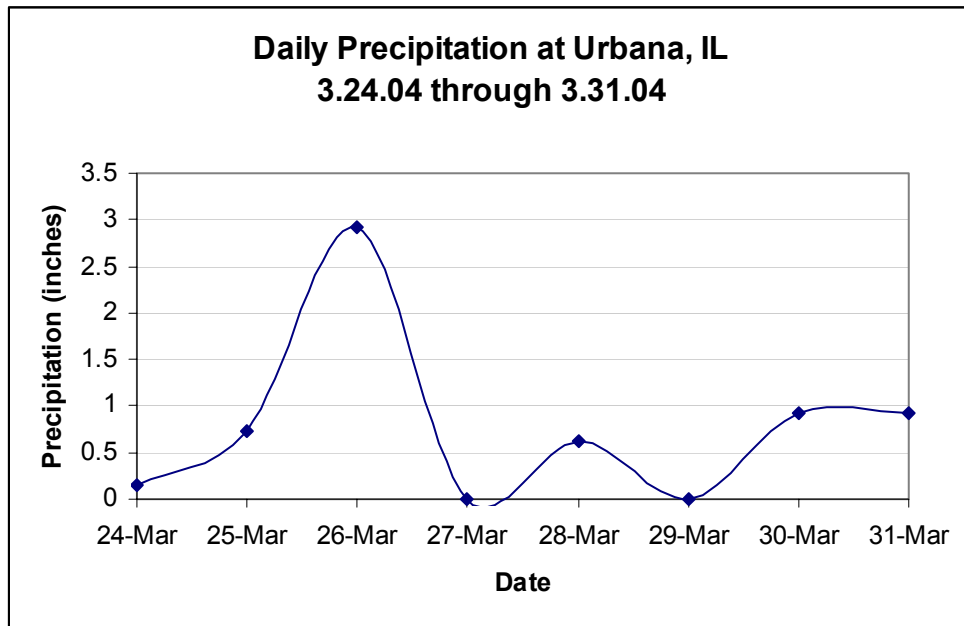


**REAL-TIME DATA ACQUISITION IN YOUR BACKYARD:
Readings collected from USGS Station # 03338780**

USGS 03338780 NORTH FORK VERMILION RIVER NEAR BISMARCK, IL



<http://waterdata.usgs.gov/nwis> *United States Geological Survey*



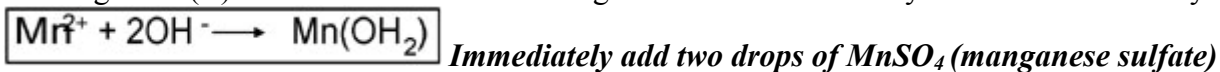
<http://mcc.sws.uiuc.edu/Illinois/urbana.txt> *Midwest Regional Climate Center*

For more info and activities about fertilizer runoff, dissolved oxygen and water quality please visit:
<http://gk12.ncsa.uiuc.edu/teams2002.html> or http://peer.tamu.edu/curriculum_modules/water_quality/module_5/index.htm

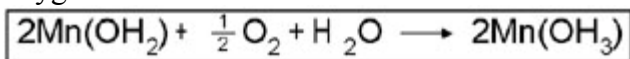
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A closer look at the chemistry involved in the Winkler method for dissolved oxygen determination

1. Manganese (II) ions liberated from the manganese sulfate are loosely bound with excess hydroxide.

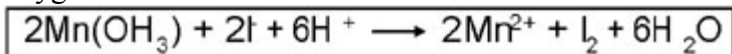


2. Manganese (II) is oxidized to Manganese (III) in the presence of a strong base and binds the dissolved oxygen.



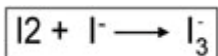
Add two drops of KI/KOH solution (potassium iodide/potassium hydroxide) and examine the sample: do you see anything interesting? What is forming?

3. Free iodine is produced upon acidification of the sample at a rate of one I₂ molecule for each atom of oxygen.



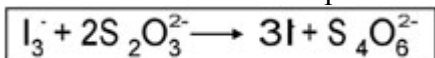
To continue the reaction add two drops of sulfuric acid to your sample to dissolve the solid, and transfer approximately 2/3 of your sample to another vial or ideally an Erlenmeyer Flask to complete the titration.

4. Free iodine complexes with excess iodide ions.



Add 3 to 4 drops of Na₂S₂O₃ solution (sodium-thiosulfate) until the sample becomes a pale straw color (record the number of drops that you use!) Then add a few drops of starch solution (what happens?)

5. The iodine/iodide complex is reduced to iodide with thiosulfate.



Continue adding drops of Na₂S₂O₃ solution until the solution becomes clear and the reaction reaches its endpoint

Standard Methods for the Examination of Water and Wastewater, 1995, New York, American Public Health Association.

Grasshoff, K. 1983. Determination of oxygen (chapter 4). In: Grasshoff, K., Ehrhardt, M., Kremling, K. (eds.). Methods of seawater analysis. Second, revised and extended edition. Verlag Chemie, New York

Please record your information below and make a calculation of dissolved oxygen (2 drops from the beryl pipet equals approximately one mg/L of dissolved oxygen)

Sample # and Location	Drops of Na ₂ S ₂ O ₃ added	Dissolved Oxygen (mg/L)	Distance (ft or m)	Start Time	End Time	Velocity	Area (w*d)	Flow Rate

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