Redox Titration Practice Name _____

Part 1: BOD

The Winkler Method:

$$2\ Mn^{2+}(aq) + 4\ OH^-(aq) + O_2(aq) \rightarrow 2\ MnO_2(s) + 2\ H_2O(l)$$

$$MnO_2(s) + 2\ I^-(aq) + 4\ H^+(aq) \rightarrow Mn^{2+}(aq) + I_2(aq) + 2\ H_2O(l)$$

$$2\ S_2O_3^{2-}(aq) + I_2(aq) \rightarrow S_4O_6^{2-}(aq) + 2\ I^-(aq)$$

1. A 100.0 mL sample of water was analyzed using the Winkler method to determine its BOD. Initially the water had an oxygen content of 12.3 ppm. After 5days, it took 6.00 mL of 0.0100 M $Na_2S_2O_3$ to react with the iodine. Calculate the BOD for this water sample in ppm.

Initial oxygen content: 12.3 ppm

Oxygen content after 5 days (show work):

BOD =

Using the chart below, would you drink this water? _____

1. A 200.0 mL sample of water was analyzed using the Winkler method to determine its BOD. Initially the water had an oxygen content of 7.0 ppm. After 5days, it took 8.00 mL of 0.0200 M $Na_2S_2O_3$ to react with the iodine. Calculate the BOD for this water sample in ppm.

Initial oxygen content: 7.0 ppm

Oxygen content after 5 days (show work)

BOD =

Using the chart below, would you drink this water? _____

BOD Level *(in ppm)*	Water Quality
1 - 2	**Very Good** There will not be much organic waste present in the water supply.
3 - 5	**Fair: Moderately Clean**
6 - 9	**Poor: Somewhat Polluted** Usually indicates organic matter is present and bacteria are decomposing this waste.
10 or greater	**Very Poor: Very Polluted** Contains organic waste.

(over)

Part 2: Redox titration

3.) 0.2640 g of sodium oxalate is dissolved in a flask and requires 30.74 mL of potassium permanganate (from a buret) to titrate it and cause it to turn pink (the end point).
The equation for this reaction is:

$$5Na_2C_2O_4(aq) + 2KMnO_4(aq) + 8H_2SO_4(aq) \longrightarrow 2MnSO_4(aq) + K_2SO_4(aq) + 5Na_2SO_4(aq) + 10\ CO_2(g) + 8\ H_2O(l)$$

(a) How many moles of sodium oxalate are present in the flask?

(b) How many moles of potassium permanganate have been titrated into the flask to reach the end point?

(c) What is the molarity of the potassium permanganate?

4.) Potassium dichromate is used to analyze a 1.2765 g sample of a substance known to contain iron. The sample is dissolved in H_3PO_4/H_2SO_4 mixture to reduce all of the iron to Fe^{2+} ions. This acidified solution is then titrated with 0.01625 M $K_2Cr_2O_7$, producing Fe^{3+} and Cr^{3+} ions. It is found that the titration requires 32.26 mL of $K_2Cr_2O_7$ for the sample to reach its endpoint.

(a) Balance the net ionic equation using the half-reaction method in acidic solution.

(b) Determine the percent iron in the sample.

(c) Is the sample ferrous iodate, ferrous phosphate, or ferrous acetate? [Hint: determine and compare the percent composition of iron in each of these compounds.]