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Experiment 4: COD determination of waste-water

Objective:
To determine chemical oxygen demand (COD) of water samples

Chemical Oxygen Demand (COD):

Theory:

COD is used as a measure of oxygen equivalent to organic matter content of a sample that is susceptible to oxidation by a strong chemical oxidant. For samples from a specific source, COD can be related empirically to BOD. COD determination has advantage over BOD determination in that the result can be obtained in about 5 hours as compared to 5 days required for BOD test.

The organic matter gets oxidized completely by $K_2Cr_2O_7$ in the presence of H_2SO_4 to produce CO_2 and H_2O. The excess of $K_2Cr_2O_7$ remained after the reaction is titrated with ferrous ammonium sulphate. The dichromate consumed gives the O_2 required for oxidation of organic matter.

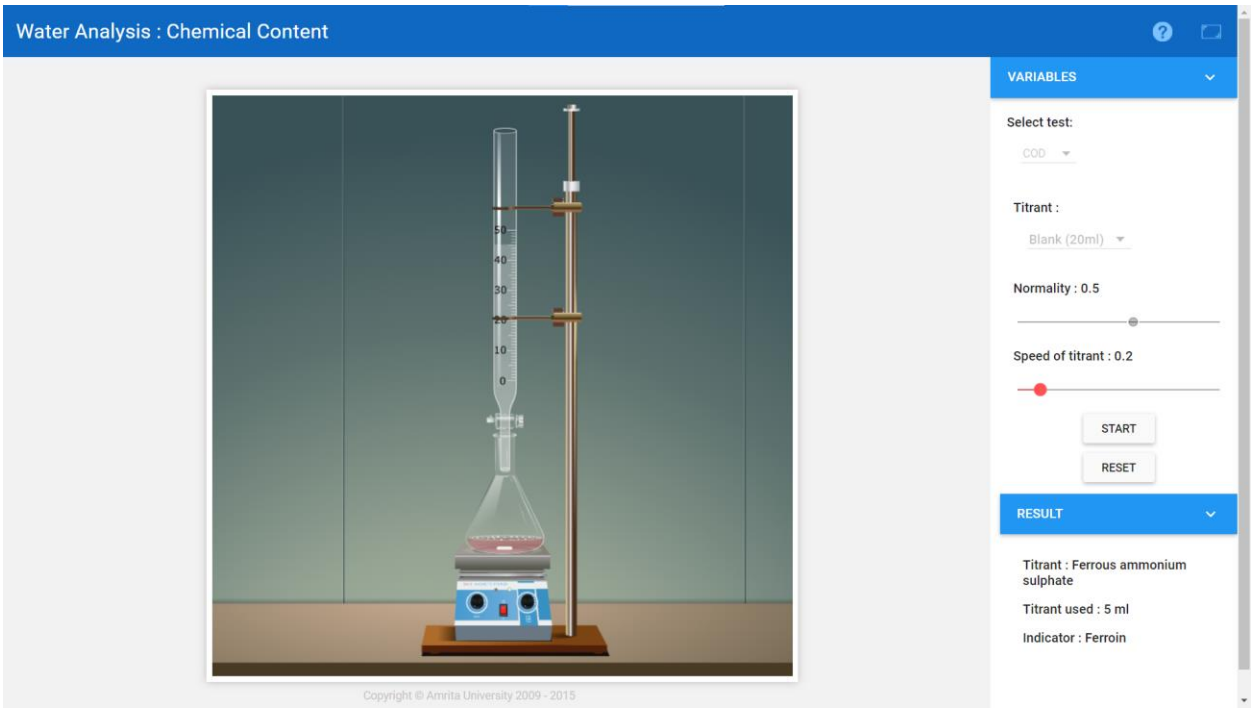
Procedure:
Determination of COD of water sample

1. Select the water sample.
2. To reflux the contents in the RB flask click the "switch on mantle" button.
3. Click "start titration" to titrate the contents.
4. Select the normality of ferrous ammonium sulphate (FAS).
5. Start titration & note the volume of titrant consumed when colour changes from bluish green to wine red. (Let the volume of titrant be V_2 mL).
6. Repeat the same with the blank (Let the volume of the titrant be V_1mL).
7. COD calculated using the equation.

$$COD\ (\frac{mg}{L}) = \frac{Vol.FAS\ for\ sample \times Normality\ of\ FAS \times 8000}{Vol.\ of\ sample}$$

Observations and Calculations:

	Sample Type	Vol. of sample (mL)	Burette Reading (mL)		Vol. of FAS (mL)
			Initial	Final	
Sample (3 h)	Well water	20	0.0	4.8	4.8
	Tap	20	0.0	4.9	4.9
	Domestic	20	0.0	2.5	2.5
Blank (0 min)	Well water	20	0.0	5	5
	Tap	20	0.0	5	5
	Domestic	20	0.0	5	5



COD of well-water

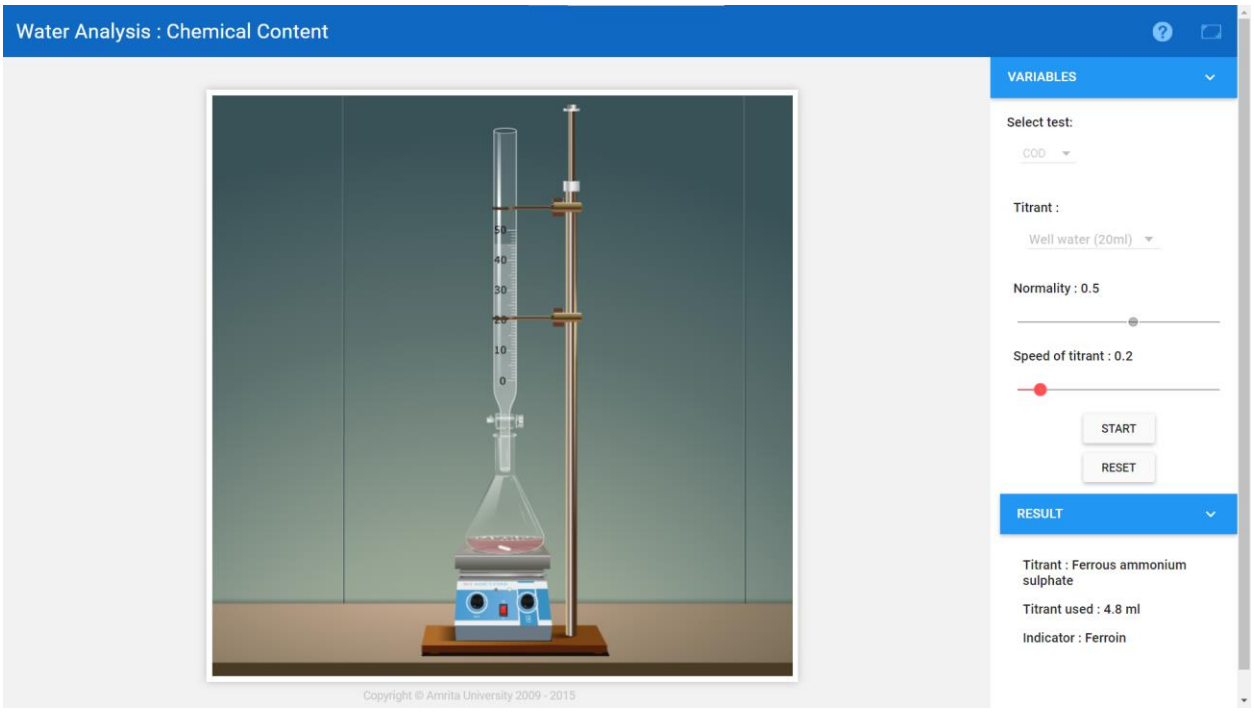
Potassium dichromate consumed = (V_{blank}-V_{sample}) =0.2

Normality of FAS =.....0.5....N.

Volume of the water sample =.....20.....mL.

Therefore COD of the water sample = $\frac{Vol.FAS\ for\ sample \times Normality\ of\ FAS \times 8000}{Vol.\ of\ sample}$

= …40……..ppm

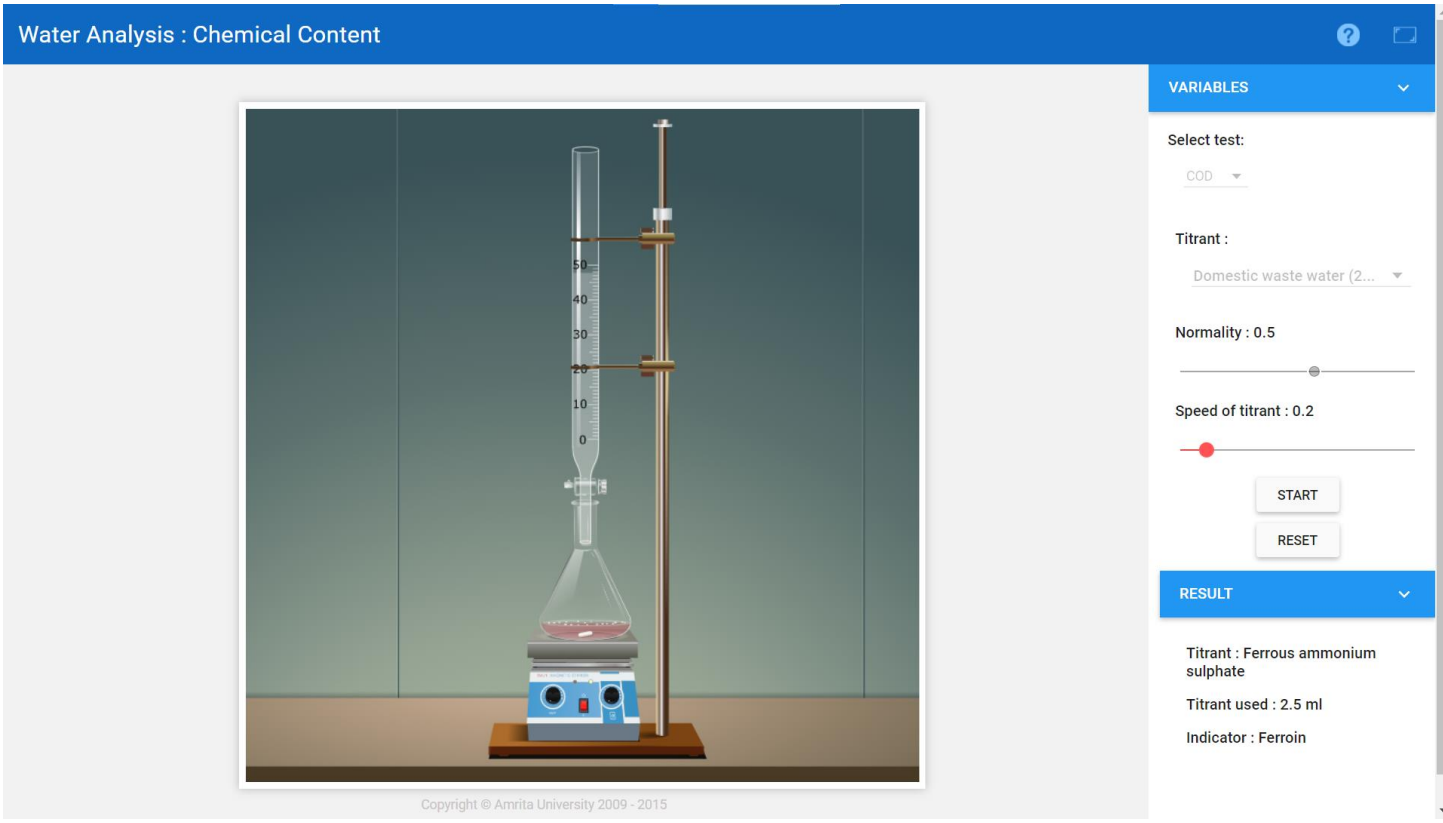


COD of Domestic-water

Volume of FAS used= (V_2-V_1) =.....2.5.....mL.
Normality of FAS =.....0.5.....N.
Volume of the water sample =.....20.....mL.

Therefore COD of the water sample = $\frac{Vol.FAS\ for\ sample \times Normality\ of\ FAS \times 8000}{Vol.\ of\ sample}$

= …….....500.....ppm



COD of Tap-water

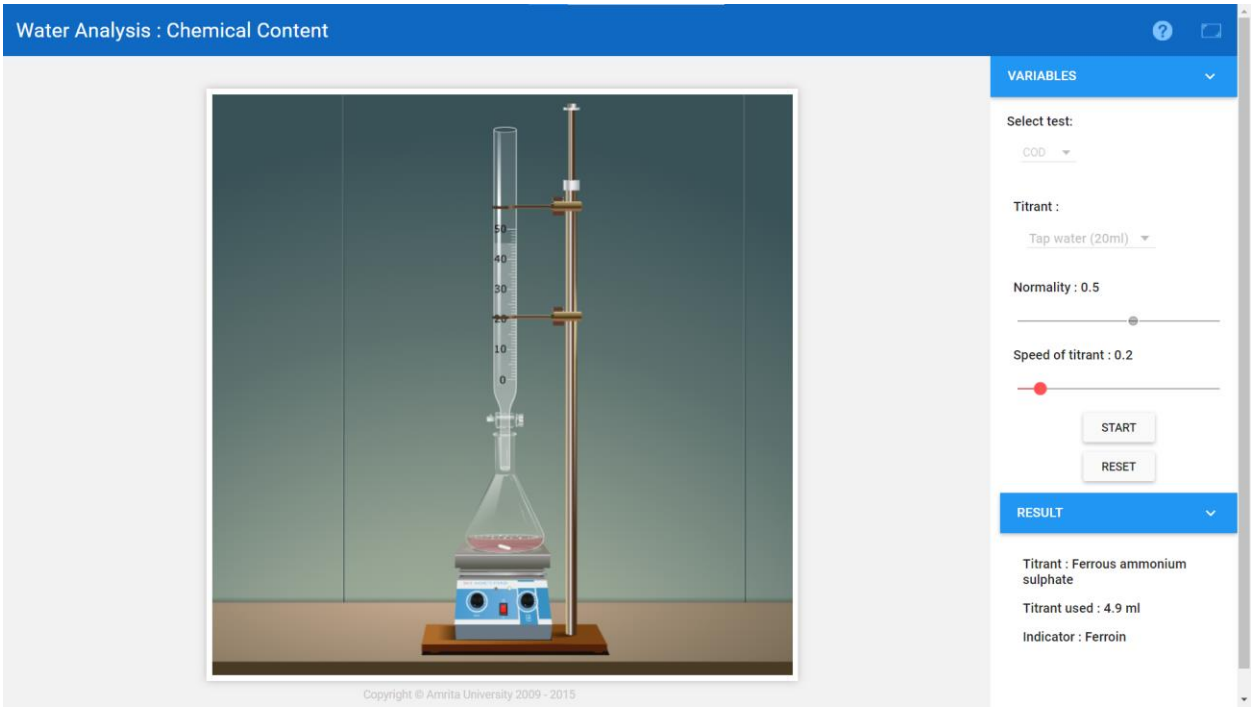
Volume of FAS used= (V_2-V_1) =....0.1.....mL.

Normality of FAS =....0.5.....N.

Volume of the water sample =.....20.....mL.

Therefore COD of the water sample = $\frac{Vol.FAS\ for\ sample \times Normality\ of\ FAS \times 8000}{Vol.\ of\ sample}$

= ……..20.....ppm



Result:

COD of well-water sample = ...40.....ppm.

COD of Domestic-water sample = ...500.....ppm.

COD of tap-water sample = ...20.....ppm.