

# SEWAGE EFFLUENT TESTS

## Palintest Methods

**TEST FOR PERMANGANATE VALUE,  
pH, SUSPENDED SOLIDS, AND  
PROBABLE BOC, COD AND TOC**

**PV 0 – 30+  
pH 4 – 11  
0 – 45 mg/l**

Palintest Sewage Effluent Tests provide a simple means of checking the quality of sewage effluents. The tests cover the essential quality control checks required for the day to day operation of sewage works and effluent treatment plants.

Increasing attention is being paid to the quality of sewage effluents. This is coupled with the imposition of more stringent quality standards. It is important that the condition of sewage effluent discharges be checked to ensure they conform to consent limits. Similarly the importance of regular testing by sewage works operators as a check on the efficiency of the works is widely recognised.

Palintest Sewage Effluent Tests have been developed to meet this need. Palintest methods are particularly useful at sewage works and other locations without full laboratory facilities. Each of the tests is performed simply without the use of complicated equipment and are suitable for operators without formal training in water testing and analysis.

Palintest Sewage Effluent Tests are based on those recommended by the Department of the Environment and the Water Research Centre, and accord generally with the methods laid down in "Analysis of Raw, Potable and Waste Waters" published by Her Majesty's Stationery Office. The tests offer simplified methods for Permanganate Value, pH value, Turbidity and Suspended Solids; and indications of probable BOD, COD and TOC values.

Palintest Sewage Effluent Test Kit SP 304 is a complete kit containing tablet reagents and equipment for all of the tests described in this test instruction sheet.

## PERMANGANATE VALUE

The Palintest Permanganate Value test is a simplified version of the standard AO test for indicating the general quality of final effluents. The test enables the Permanganate Value (PV) to be determined and the effluent classified as to its acceptability for discharge.

## Reagents and Equipment

Palintest Permanganate Value Tablets

Palintest Acidifying SE Tablets

3 Sample Containers, 100/50/10 ml plastic (PT 510)

## Test Procedure

- 1 Take three sample containers and fill each to the 100 ml mark with sewage effluent.
- 2 Add two Acidifying SE tablets to each tube, cap and shake to disintegrate.
- 3 To the first container add one Permanganate Value tablet, to the second container add two Permanganate Value tablets and to the third container add three Permanganate Value tablets. Cap each tube and shake until the tablets have dissolved.
- 4 Stand 30 minutes then note how many containers have remained pink. Read the result from the following table :-

<i>Containers Pink</i>	<i>Permanganate Value</i>	<i>Grading</i>
All three	0 - 10	Excellent
Two	10 - 20	Satisfactory
One	20 - 30	Dubious
None	Over 30	Unsatisfactory

## Notes

- 1 When testing crude sewage, add 10 ml sample to each container and make up to 100 ml mark with deionised water. Proceed with the test as described above then multiply the Permanganate Value obtained by 10.
- 2 When testing settled sewage, add 20 ml sample to each container and make up to the 100 ml mark with deionised water. The tube is not marked at 20 ml but this can be easily estimated. Proceed with the test as described above and multiply the Permanganate Value obtained by 5.

## pH TEST

Chemical and biological reactions at sewage works are profoundly influenced by pH. A regular check on the pH of sewage effluent is therefore essential. A pH test will also check, for example, on the effect of acid or alkaline trade wastes in the effluent flow. The pH test is carried out using a Universal pH test tablet in conjunction with a printed colour strip.

## Reagents and Equipment

Palintest Universal pH Tablets Test Tube 10 ml, plastic (PT 511)

## Test Procedure

- 1 Fill the plastic test tube to the top line mark (10 ml).
- 2 Add one Universal pH tablet, cap tube and shake to dissolve.
- 3 Compare the solution colour against the printed colour strip provided on the tablet carton.

The test covers the pH range 4 to 10. The expected pH range for raw sewage is 6 to 8, and the pH of final effluents should also fall within the 6 to 8 pH range unless other consent limits are specified.



TURBIDITY  
TUBE  
PT 514

## TURBIDITY AND SUSPENDED SOLIDS

The Turbidity Test is designed to give a measure of the suspended solids content of the final effluent. It is also useful in following the day to day variation in the quality of sewage and effluent.

The Palintest Turbidity Test uses a specially calibrated plastic tube. This provides the simplest possible method of performing this important test. Test kit SP 304 includes a tube graduated at 30 to 500 turbidity units. A double length tube with additional graduations from 5 to 25 turbidity units is optionally available. The Palintest Turbidity Tubes were calibrated by the Department of Public Health Engineering, University of Newcastle upon Tyne.

### Equipment

Palintest Turbidity Tube, 13" (PT 514) or  
Palintest Turbidity Tube, 26" (PT 513)

### Test Procedure

- 1 Hold the tube vertically over a white surface and view downwards.
- 2 Gradually pour in the effluent sample until the black cross is just no longer visible.
- 3 Read off the graduation corresponding to the height of the sample in the tube. This represents the turbidity of the effluent in Jackson Turbidity units (JTU). For sewage effluents the graduations may also be taken as being approximately equivalent to the Suspended Solids Content as milligrams per litre.

The Royal Commission Standards for Effluents recommend that the suspended solids content of sewage effluent should not be more than 30 mg/l.

The tube should be rinsed after use. Any staining may be removed by the use of a household detergent.

## BOD, COD AND TOC

It is possible to derive an indication of the Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Organic Carbon (TOC) from the result of the Permanganate Value test. This is based on the relationship between these measures of organic pollution obtained experimentally for domestic sewage and effluents. (Notes on Water Research, Number 14, Tests for Assessing the Oxygen Demand of effluents, Steven-age Laboratory, Water Research Centre, February 1978.

To convert the Permanganate Value (PV) for domestic sewage and effluent to probable BOD, COD and TOC values multiply by the following factors.

	<i>Sewage</i>	<i>Effluent</i>
Probable BOD	PV x 5	PV x 1.5
Probable COD	PV x 10	PV x 7
Probable TOC	PV x 3	PV x 2

There is generally a close relationship between turbidity and the BOD value of settled sewage and effluent. The probable BOD can be calculated from the result of the turbidity test using the following formula :-

$$\text{Probable BOD} = \frac{\text{Turbidity}}{2} + 5$$

This probable BOD value can be used as a cross check on the probable BOD value obtained from the relationship with the Permanganate Value test.

The Royal Commission Standard for Effluents recommends a BOD value of not more than 20 mg/l.

## **TEMPERATURE**

A check should be maintained on the temperature of effluent discharges and these should always be close to ambient temperatures. A check is particularly important on industrial effluents where heated processes are involved.

Sewage Effluent Test Kit SP 304 contains a 0 to 50°C thermometer complete in a brass protecting case (PT 684). Replacement thermometers (PT 683) are available in the event of breakage.

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