

## **Bacteriological examination of water**

### **Total bacteria count and investigation of fecal bacteria contaminated the water**

This test important because give us information about types and number of microorganisms ,some of these microbes pathogenic to human caused disease such as typhoid , cholera , hepatitis, dysentery in addition cause industries damage .

Fecal contamination: find microorganisms came from intestine, such *E. coli*, *Streptococcus faecalis*, *Enterococcus* and *clostridium perfringens* .

The *E. coli* consider evidence of water contaminated from sewage because of:

1. *E. coli* normal flora in intestine .
2. It is not find normally in soil and water.
3. Resistance of this bacteria Inca rage other pathogenic type.

Presence of *E. coli* in water indicate the existence of new fecal contaminated. While presence of *Clostridium* indicate of old contamination because of it resistance by spore form. While presence of *Streptococcus* indicates of human or animal water contamination .

### **Isolation and count coliform**

*E.coli* Gram-negative, non capsulated short, plump bacilli 2 to 4  $\mu \times 0.4$  to 0.7  $\mu$  in diameter and are motile. Spores are not formed, it is aerobic and facultative anaerobe growing on simple media Optimum temperature is 37°C gas and acid forming .

Coliform count using most probable number ( MPN)

### **Presumptive test**

1. Take 9 tube each contain 10ml of lactose water or MacConkey broth , and divided it for three group each three tube.
2. Take water sample and shaken it 25 times.
3. Transport 10 ml from sample to the first group , 1ml to the second group and 0.1ml to the last group.
4. Incubate test tubes at 35C for 24hr. .
5. Examine the test tube and recorded number of tube contain gas in each group.

6. Calculate the value MPN of stander tube .

**Confirmative test :**

1. Choose one of positive test tube from Presumptive test and cultured in EMB agar ,this media contain methylene blue and lactose that inhabit growth of gram positive bacteria.
2. Incubate culture at 35C for 24 hr. .
3. If there is growth of coliform small colony , greenish black with metallic sheen. And if there is no growth the water consider good for drink .

**Notes**

**Note 1**

If have three tubes contain gas in first group and one in the second and gas appear in the third group , the result read (3-1-0 ) ,the MPN value is 43, this mean the sample contain 43 microbes per 100ml.

**Note 2**

If the sample turbid or sever pollution add new group of tub three inoculated with 0.1ml from sample and neglect the firs group and read the MPN value multiplication 10.

# MPN DETERMINATION FROM MULTIPLE TUBE TEST

NUMBER OF TUBES GIVING POSITIVE REACTION OUT OF			MPN INDEX per 100 ml	95 PERCENT CONFIDENCE LIMITS	
3 of 10 ml each	3 of 1 ml each	3 of 0.1 ml each		LOWER	UPPER
0	0	0	0	<0.5	0
1	1	0	0.5	<0.5	1.3
1	0	0	4	<0.5	20
2	0	0	7	1	21
2	1	0	11	1	23
2	0	0	15	3	36
2	1	0	18	3	38
2	0	0	24	1	38
2	1	0	34	3	57
3	0	0	38	7	69
3	1	0	41	4	47
3	0	0	58	10	150
3	1	0	65	4	130
3	0	0	89	7	130
3	1	0	64	15	380
4	0	0	43	7	210
4	1	0	75	14	230
4	0	0	120	50	380
4	1	0	60	15	380
4	0	0	150	80	440
4	1	0	210	95	470
5	0	0	240	86	1300
5	1	0	480	71	2400
5	0	0	1100	150	4800

FROM: STANDARD METHODS FOR THE EXAMINATION OF WATER AND  
WASTEWATER, TWELFTH EDITION. (NEW YORK: THE AMERICAN PUBLIC  
HEALTH ASSOCIATION, INC., p. 608)