ภาคผนวก

1. ผลการฆ่าเชื้อเชื้อจุลินทรีย์ในน้ำทิ้งจากโรงพยาบาลด้วยกรดเปอร์อะซีติก

1.1 ผลการวิเคราะห์หาปริมาณเชื้อ *total coliform*

ครั้งที่	ค่า ***total coliform*** ก่อนการฆ่าเชื้อ (MPN /100 ml)	ค่า ***total coliform*** หลังการฆ่าเชื้อโดยใช้ PAA ที่ความเข้มข้นต่างกัน (MPN /100 ml)		
		3 ppm	5 ppm	7 ppm
1	7500	33	8	6
2	9200	79	10	6
3	4600	220	8	7
4	22000	220	17	4
5	5400	36	19	18
6	4600	540	27	7
7	3500	34	22	9
8	3500	35	9	2
9	16000	49	2	2
10	920	70	13	9

1.2 ผลการวิเคราะห์หาปริมาณเชื้อ *fecal coliform*

ครั้งที่	ค่า *fecal coliform* ก่อนการฆ่าเชื้อ (MPN /100 ml)	ค่า *fecal coliform* หลังการฆ่าเชื้อโดยใช้ PAA ที่ความเข้มข้นต่างกัน (MPN /100 ml)		
		3 ppm	5 ppm	7 ppm
1	3500	17	2	2
2	5400	27	9	2
3	1700	130	5	7
4	14000	27	4	4
5	140	5	2	2
6	1700	33	14	2
7	1800	11	4	2
8	1300	9	2	2
9	3400	5	2	2
10	240	26	9	4

1.3 ผลการวิเคราะห์หาปริมาณเชื้อ *E. coli*

ครั้งที่	ค่า *E. coli* ก่อนการฆ่าเชื้อ(MPN /100 ml)	ค่า *E. coli* หลังการฆ่าเชื้อโดยใช้ PAA ที่ความเข้มข้นต่างกัน (MPN /100 ml)		
		3 ppm	5 ppm	7 ppm
1	1800	7	2	2
2	3400	5	2	2
3	920	6	2	2
4	2700	4	2	2
5	110	5	2	2
6	1100	14	6	2
7	1100	5	2	2
8	340	5	2	2
9	920	2	2	2
10	110	12	6	2

2 ผลการฆ่าเชื้อจุลินทรีย์ในน้ำทิ้งจากโรงพยาบาลด้วยคลอรีน

2.1 ผลการวิเคราะห์หาปริมาณเชื้อ*Total coliform*

ครั้งที่	ค่า ***total coliform*** ก่อนการฆ่าเชื้อ (MPN /100 ml)	ค่า ***total coliform*** หลังการฆ่าเชื้อโดยใช้คลอรีน ที่ความเข้มข้นต่างกัน (MPN /100 ml)		
		33 ppm	54 ppm	75 ppm
1	1900	2	2	2
2	3400	2	2	2
3	5400	2	2	2
4	3500	2	2	2
5	24000	2	2	2
6	9200	17	2	2
7	350	4	2	2
8	13000	5	2	2
9	34000	17	4	2
10	3400	2	2	2

2.2 ผลการวิเคราะห์หาปริมาณเชื้อ fecal coliform

ครั้งที่	ค่า fecal coliform ก่อนการฆ่าเชื้อ (MPN /100 ml)	ค่า fecal coliform หลังการฆ่าเชื้อโดยใช้คลอรีน ที่ความเข้มข้นต่างกัน (MPN /100 ml)		
		33 ppm	54 ppm	75 ppm
1	3400	2	2	2
2	3500	2	2	2
3	1100	2	2	2
4	920	2	2	2
5	350	2	2	2
6	1400	4	3	2
7	1600	4	2	2
8	1900	2	2	2
9	1400	11	3	2
10	600	2	2	2

2.3 ผลการวิเคราะห์หาปริมาณเชื้อ *E. coli*

ครั้งที่	ค่า *E. coli* ก่อนการฆ่าเชื้อ(MPN /100 ml)	ค่า *E. coli* หลังการฆ่าเชื้อโดยใช้ คลอรีน ที่ความเข้มข้นต่างกัน (MPN /100 ml)		
		33 ppm	54 ppm	75 ppm
1	900	2	2	2
2	500	2	2	2
3	700	2	2	2
4	200	2	2	2
5	100	2	2	2
6	700	4	2	2
7	500	3	2	2
8	300	2	2	2
9	900	4	2	2
10	200	2	2	2

3. ผลการวิเคราะห์ pH SS TOC ในน้ำทิ้งจากโรงพยาบาล

ครั้งที่	pH	SS	TOC
1	6.65	8.5	4.7
2	6.38	10.5	5.4
3	6.92	7.5	5.9
4	6.84	12	4.9
5	6.95	8.5	6.4
6	6.72	9	5.8
7	6.96	7.5	6.1
8	7.02	13.5	7.2
9	6.88	9.5	5.7
10	6.91	14.5	5.1

การวิเคราะห์ทางสถิติ

1. คลอรีน

NPar Tests

Notes

Output Created		07-MAR-2019 17:15:57
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\Chlorine result.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	90
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /K-W=Efficiency BY Concentration(1 3) /MEDIAN=Efficiency BY Concentration(1 3) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

[DataSet1] C:\Users\hsasspon\Desktop\ส่งงาน PAA\Chlorine result.sav

Kruskal-Wallis Test

Ranks

	Concentration	N	Mean Rank
Efficiency	1	30	41.50
	2	30	47.30
	3	30	47.70
	Total	90	

Test Statistics[a,b]

	Efficiency
Chi-Square	1.066
df	2
Asymp. Sig.	.587

a. Kruskal Wallis Test

b. Grouping Variable: Concentration

Median Test

Frequencies

		Concentration		
		1	2	3
Efficiency	> Median	13	16	16
	<= Median	17	14	14

Test Statistics[a]

	Efficiency
N	90
Median	99.7850
Chi-Square	.800[b]
df	2
Asymp. Sig.	.670

a. Grouping Variable: Concentration

b. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 15.0.

```
USE ALL.
COMPUTE filter_$=(Microorganism = 1).
VARIABLE LABELS filter_$ 'Microorganism = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
NPAR TESTS
```

```
/K-W=Efficiency BY Concentration(1 3)
/MEDIAN=Efficiency BY Concentration(1 3)
/MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		07-MAR-2019 15:34:04
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\Chlorine result.sav
	Active Dataset	DataSet4
	Filter	Microorganism = 1 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /K-W=Efficiency BY Concentration(1 3) /MEDIAN=Efficiency BY Concentration(1 3) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.02
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Kruskal-Wallis Test

Ranks

	Concentration	N	Mean Rank
Efficiency	1	10	13.10
	2	10	16.70
	3	10	16.70
	Total	30	

Test Statistics[a,b]

	Efficiency
Chi-Square	1.157
df	2
Asymp. Sig.	.561

a. Kruskal Wallis Test

b. Grouping Variable: Concentration

Median Test

Frequencies

		Concentration		
		1	2	3
Efficiency	> Median	4	5	5
	<= Median	6	5	5

Test Statistics[a]

	Efficiency
N	30
Median	99.9400
Chi-Square	.268[b]
df	2
Asymp. Sig.	.875

a. Grouping Variable: Concentration

b. 3 cells (50.0%) have expected frequencies less than 5. The minimum expected cell frequency is 4.7.

```
USE ALL.
COMPUTE filter_$=(Microorganism = 2).
VARIABLE LABELS filter_$ 'Microorganism = 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
NPAR TESTS
  /K-W=Efficiency BY Concentration(1 3)
  /MEDIAN=Efficiency BY Concentration(1 3)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		07-MAR-2019 15:38:29
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\Chlorine result.sav
	Active Dataset	DataSet4
	Filter	Microorganism = 2 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /K-W=Efficiency BY Concentration(1 3) /MEDIAN=Efficiency BY Concentration(1 3) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.03
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Kruskal-Wallis Test

Ranks

	Concentration	N	Mean Rank
Efficiency	1	10	13.20
	2	10	16.15
	3	10	17.15
	Total	30	

Test Statistics[a,b]

	Efficiency
Chi-Square	1.103
df	2
Asymp. Sig.	.576

a. Kruskal Wallis Test

b. Grouping Variable: Concentration

Median Test

Frequencies

		Concentration		
		1	2	3
Efficiency	> Median	3	4	6
	<= Median	7	6	4

Test Statistics[a]

	Efficiency
N	30
Median	99.8200
Chi-Square	1.900[b]
df	2
Asymp. Sig.	.387

a. Grouping Variable: Concentration

b. 3 cells (50.0%) have expected frequencies less than 5. The minimum expected cell frequency is 4.3.

```
USE ALL.
COMPUTE filter_$=(Microorganism = 3).
VARIABLE LABELS filter_$ 'Microorganism = 3 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
NPAR TESTS
  /K-W=Efficiency BY Concentration(1 3)
  /MEDIAN=Efficiency BY Concentration(1 3)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		07-MAR-2019 15:39:50
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\Chlorine result.sav
	Active Dataset	DataSet4
	Filter	Microorganism = 3 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /K-W=Efficiency BY Concentration(1 3) /MEDIAN=Efficiency BY Concentration(1 3) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.06
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Kruskal-Wallis Test

Ranks

	Concentration	N	Mean Rank
Efficiency	1	10	13.70
	2	10	16.40
	3	10	16.40
	Total	30	

Test Statistics[a,b]

	Efficiency
Chi-Square	.642
df	2
Asymp. Sig.	.725

a. Kruskal Wallis Test

b. Grouping Variable: Concentration

Median Test

Frequencies

		Concentration		
		1	2	3
Efficiency	> Median	3	6	6
	<= Median	7	4	4

Test Statistics[a]

	Efficiency
N	30
Median	99.5800
Chi-Square	2.400[b]
df	2
Asymp. Sig.	.301

a. Grouping Variable: Concentration

b. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 5.0.

```
FILTER OFF.
USE ALL.
EXECUTE.
DATASET ACTIVATE DataSet3.
USE ALL.
COMPUTE filter_$=(Microorganism = 1).
VARIABLE LABELS filter_$ 'Microorganism = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
```

2. กรดเปอร์อะซีติก

NPar Tests

Notes

Output Created		07-MAR-2019 16:48:29
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 1 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /K-W=Efficiency BY Concentration(4 6) /MEDIAN=Efficiency BY Concentration(4 6) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Kruskal-Wallis Test

Ranks

	Concentration	N	Mean Rank
Efficiency	4	10	7.30
	5	10	17.65
	6	10	21.55
	Total	30	

Test Statistics[a,b]

	Efficiency
Chi-Square	14.014
df	2
Asymp. Sig.	.001

a. Kruskal Wallis Test

b. Grouping Variable: Concentration

Median Test

Frequencies

		Concentration		
		4	5	6
Efficiency	> Median	1	6	8
	<= Median	9	4	2

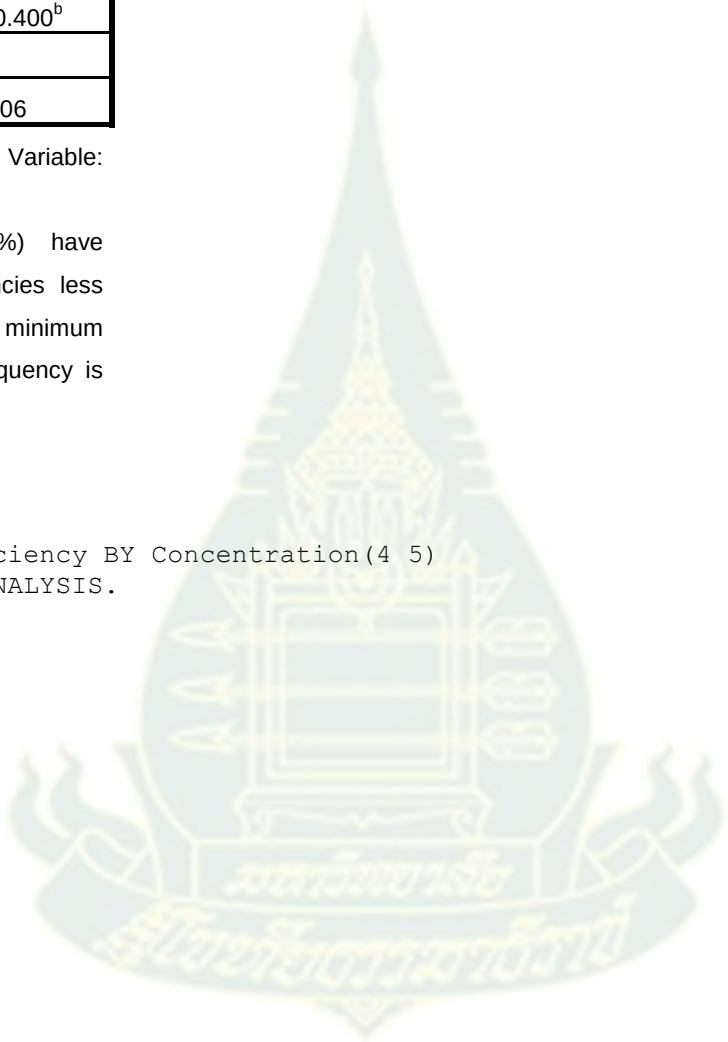
Test Statistics[a]

	Efficiency
N	30
Median	99.6800
Chi-Square	10.400[b]
df	2
Asymp. Sig.	.006

a. Grouping Variable: Concentration

b. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 5.0.

```
NPAR TESTS
  /M-W= Efficiency BY Concentration(4 5)
  /MISSING ANALYSIS.
```



NPar Tests

Notes

Output Created		07-MAR-2019 16:49:06
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 1 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= Efficiency BY Concentration(4 5) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.03
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Concentration	N	Mean Rank	Sum of Ranks
Efficiency	4	10	6.70	67.00
	5	10	14.30	143.00
	Total	20		

Test Statistics[a]

	Efficiency
Mann-Whitney U	12.000
Wilcoxon W	67.000
Z	-2.875
Asymp. Sig. (2-tailed)	.004
Exact Sig. [2*(1-tailed Sig.)]	.003[b]

a. Grouping Variable: Concentration

b. Not corrected for ties.

```
NPAR TESTS
  /M-W= Efficiency BY Concentration(4 6)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		07-MAR-2019 16:49:32
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 1 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= Efficiency BY Concentration(4 6) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Concentration	N	Mean Rank	Sum of Ranks
Efficiency	4	10	6.10	61.00
	6	10	14.90	149.00
	Total	20		

Test Statistics[a]

	Efficiency
Mann-Whitney U	6.000
Wilcoxon W	61.000
Z	-3.329
Asymp. Sig. (2-tailed)	.001
Exact Sig. [2*(1-tailed Sig.)]	.000[b]

a. Grouping Variable: Concentration

b. Not corrected for ties.

```
NPAR TESTS
  /M-W= Efficiency BY Concentration(5 6)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		07-MAR-2019 16:49:53
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 1 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= Efficiency BY Concentration(5 6) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Concentration	N	Mean Rank	Sum of Ranks
Efficiency	5	10	8.85	88.50
	6	10	12.15	121.50
	Total	20		

Test Statistics[a]

	Efficiency
Mann-Whitney U	33.500
Wilcoxon W	88.500
Z	-1.250
Asymp. Sig. (2-tailed)	.211
Exact Sig. [2*(1-tailed Sig.)]	.218[b]

a. Grouping Variable: Concentration

b. Not corrected for ties.

```
MEANS TABLES=Efficiency BY Concentration
  /CELLS=COUNT MEDIAN.
```

Means

Notes

Output Created		07-MAR-2019 16:50:26
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 1 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	For each dependent variable in a table, user-defined missing values for the dependent and all grouping variables are treated as missing.
	Cases Used	Cases used for each table have no missing values in any independent variable, and not all dependent variables have missing values.
Syntax		MEANS TABLES=Efficiency BY Concentration /CELLS=COUNT MEDIAN.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Efficiency * Concentration	30	100.0%	0	0.0%	30	100.0%

Report

Efficiency

Concentration	N	Median
4	10	99.0150
5	10	99.7850
6	10	99.8850
Total	30	99.6800

```
USE ALL.
COMPUTE filter_$=(Microorganism = 2).
VARIABLE LABELS filter_$ 'Microorganism = 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
NPAR TESTS
  /K-W=Efficiency BY Concentration(4 6)
  /MEDIAN=Efficiency BY Concentration(4 6)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		07-MAR-2019 16:51:16
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 2 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /K-W=Efficiency BY Concentration(4 6) /MEDIAN=Efficiency BY Concentration(4 6) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Kruskal-Wallis Test

Ranks

	Concentration	N	Mean Rank
Efficiency	4	10	9.50
	5	10	16.90
	6	10	20.10
	Total	30	

Test Statistics[a,b]

	Efficiency
Chi-Square	7.656
df	2
Asymp. Sig.	.022

a. Kruskal Wallis Test

b. Grouping Variable: Concentration

Median Test

Frequencies

		Concentration		
		4	5	6
Efficiency	> Median	2	6	7
	<= Median	8	4	3

Test Statistics[a]

	Efficiency
N	30
Median	99.7450
Chi-Square	5.600[b]
df	2
Asymp. Sig.	.061

a. Grouping Variable: Concentration

b. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 5.0.

```
NPAR TESTS
  /M-W= Efficiency BY Concentration(4 5)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		07-MAR-2019 16:51:58
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 2 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= Efficiency BY Concentration(4 5) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Concentration	N	Mean Rank	Sum of Ranks
Efficiency	4	10	8.05	80.50
	5	10	12.95	129.50
	Total	20		

Test Statistics[a]

	Efficiency
Mann-Whitney U	25.500
Wilcoxon W	80.500
Z	-1.853
Asymp. Sig. (2-tailed)	.064
Exact Sig. [2*(1-tailed Sig.)]	.063[b]

a. Grouping Variable: Concentration

b. Not corrected for ties.

```
NPAR TESTS
  /M-W= Efficiency BY Concentration(4 6)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		07-MAR-2019 16:52:16
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 2 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= Efficiency BY Concentration(4 6) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.03
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Concentration	N	Mean Rank	Sum of Ranks
Efficiency	4	10	6.95	69.50
	6	10	14.05	140.50
	Total	20		

Test Statistics[a]

	Efficiency
Mann-Whitney U	14.500
Wilcoxon W	69.500
Z	-2.686
Asymp. Sig. (2-tailed)	.007
Exact Sig. [2*(1-tailed Sig.)]	.005[b]

a. Grouping Variable: Concentration

b. Not corrected for ties.

```
NPAR TESTS
  /M-W= Efficiency BY Concentration(5 6)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		07-MAR-2019 16:52:33
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 2 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /M-W= Efficiency BY Concentration(5 6) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Mann-Whitney Test

Ranks

	Concentration	N	Mean Rank	Sum of Ranks
Efficiency	5	10	9.45	94.50
	6	10	11.55	115.50
	Total	20		

Test Statistics[a]

	Efficiency
Mann-Whitney U	39.500
Wilcoxon W	94.500
Z	-.798
Asymp. Sig. (2-tailed)	.425
Exact Sig. [2*(1-tailed Sig.)]	.436[b]

a. Grouping Variable: Concentration

b. Not corrected for ties.

```
MEANS TABLES=Efficiency BY Concentration
  /CELLS=COUNT MEDIAN.
```

Means

Notes

Output Created		07-MAR-2019 16:52:51
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ส ง ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 2 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	For each dependent variable in a table, user-defined missing values for the dependent and all grouping variables are treated as missing.
	Cases Used	Cases used for each table have no missing values in any independent variable, and not all dependent variables have missing values.
Syntax		MEANS TABLES=Efficiency BY Concentration /CELLS=COUNT MEDIAN.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Efficiency * Concentration	30	100.0%	0	0.0%	30	100.0%

Report

Efficiency

Concentration	N	Median
4	10	99.3500
5	10	99.8050
6	10	99.8850
Total	30	99.7450

```
USE ALL.
COMPUTE filter_$=(Microorganism = 3).
VARIABLE LABELS filter_$ 'Microorganism = 3 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
NPAR TESTS
  /K-W=Efficiency BY Concentration(4 6)
  /MEDIAN=Efficiency BY Concentration(4 6)
  /MISSING ANALYSIS.
```

NPar Tests

Notes

Output Created		07-MAR-2019 16:53:26
Comments		
Input	Data	C:\Users\hsasspon\Desktop\ง า น PAA\PAA result.sav
	Active Dataset	DataSet3
	Filter	Microorganism = 3 (FILTER)
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each test are based on all cases with valid data for the variable(s) used in that test.
Syntax		NPAR TESTS /K-W=Efficiency BY Concentration(4 6) /MEDIAN=Efficiency BY Concentration(4 6) /MISSING ANALYSIS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01
	Number of Cases Allowed[a]	112347

a. Based on availability of workspace memory.

Kruskal-Wallis Test

Ranks

	Concentration	N	Mean Rank
Efficiency	4	10	11.90
	5	10	16.70
	6	10	17.90
	Total	30	

Test Statistics[a,b]

	Efficiency
Chi-Square	2.621
df	2
Asymp. Sig.	.270

a. Kruskal Wallis Test

b. Grouping Variable: Concentration

Median Test

Frequencies

		Concentration		
		4	5	6
Efficiency	> Median	2	4	5
	<= Median	8	6	5

Test Statistics[a]

	Efficiency
N	30
Median	99.7800
Chi-Square	2.010[b]
df	2
Asymp. Sig.	.366

a. Grouping Variable: Concentration

b. 3 cells (50.0%) have expected frequencies less than 5. The minimum expected cell frequency is 3.7.

```
FILTER OFF.
USE ALL.
EXECUTE.
```