

```

data filterdata;
  input filter $ flowrate;
  cards;
A 8.41
A 8.19
A 8.59
A 7.97
B 7.43
B 6.97
B 7.49
B 7.03
C 7.69
C 7.22
C 7.41
C 7.84
D 7.85
D 8.31
D 8.49
D 7.75
E 8.77
E 8.82
E 8.41
E 8.36
F 6.87
F 7.25
F 7.41
F 6.87
;

proc glm;
  class filter;
  model flowrate=filter;
  lsmeans filter / alpha=0.05 adjust=tukey pdiff cl;
  means filter / alpha=0.05 tukey cldiff;
  means filter / alpha=0.05 dunnett('F');
  means filter / alpha=0.05 dunnett1('F');
  means filter / alpha=0.05 dunnettu('F');
run;

proc means;
  class filter;
  var flowrate;
run;

```

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	7.34513333	1.46902667	18.36	<.0001
Error	18	1.44000000	0.08000000		
Corrected Total	23	8.78513333			

Least Squares Means  
Adjustment for Multiple Comparisons: Tukey

filter	flowrate LSMEAN	LSMEAN Number
A	8.29000000	1
B	7.23000000	2
C	7.54000000	3
D	8.10000000	4
E	8.59000000	5
F	7.10000000	6

Least Squares Means for effect filter  
Pr > |t| for H0: LSMean(i)=LSMean(j)

Dependent Variable: flowrate

i/j	1	2	3	4	5	6
1		0.0006	0.0156	0.9277	0.6686	0.0002
2	0.0006		0.6388	0.0044	<.0001	0.9852
3	0.0156	0.6388		0.1032	0.0007	0.2850
4	0.9277	0.0044	0.1032		0.1913	0.0011
5	0.6686	<.0001	0.0007	0.1913		<.0001
6	0.0002	0.9852	0.2850	0.0011	<.0001	

filter	flowrate LSMEAN	95% Confidence Limits	
A	8.290000	7.992885	8.587115
B	7.230000	6.932885	7.527115
C	7.540000	7.242885	7.837115
D	8.100000	7.802885	8.397115
E	8.590000	8.292885	8.887115
F	7.100000	6.802885	7.397115

Least Squares Means for Effect filter

i	j	Difference Between Means	Simultaneous 95% Confidence Limits for LSMean(i) - LSMean(j)	
1	2	1.060000	0.424393	1.695607
1	3	0.750000	0.114393	1.385607
1	4	0.190000	-0.445607	0.825607
1	5	-0.300000	-0.935607	0.335607
1	6	1.190000	0.554393	1.825607
2	3	-0.310000	-0.945607	0.325607
2	4	-0.870000	-1.505607	-0.234393
2	5	-1.360000	-1.995607	-0.724393
2	6	0.130000	-0.505607	0.765607
3	4	-0.560000	-1.195607	0.075607
3	5	-1.050000	-1.685607	-0.414393
3	6	0.440000	-0.195607	1.075607
4	5	-0.490000	-1.125607	0.145607
4	6	1.000000	0.364393	1.635607
5	6	1.490000	0.854393	2.125607

Tukey's Studentized Range (HSD) Test for flowrate

NOTE: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	18
Error Mean Square	0.08
Critical Value of Studentized Range	4.49442
Minimum Significant Difference	0.6356

Comparisons significant at the 0.05 level are indicated by \*\*\*.

filter Comparison	Difference		Simultaneous 95%		
	Between Means		Confidence	Limits	
E - A	0.3000		-0.3356	0.9356	
E - D	0.4900		-0.1456	1.1256	
E - C	1.0500		0.4144	1.6856	***
E - B	1.3600		0.7244	1.9956	***
E - F	1.4900		0.8544	2.1256	***
A - E	-0.3000		-0.9356	0.3356	
A - D	0.1900		-0.4456	0.8256	
A - C	0.7500		0.1144	1.3856	***
A - B	1.0600		0.4244	1.6956	***
A - F	1.1900		0.5544	1.8256	***
D - E	-0.4900		-1.1256	0.1456	
D - A	-0.1900		-0.8256	0.4456	
D - C	0.5600		-0.0756	1.1956	
D - B	0.8700		0.2344	1.5056	***
D - F	1.0000		0.3644	1.6356	***
C - E	-1.0500		-1.6856	-0.4144	***
C - A	-0.7500		-1.3856	-0.1144	***
C - D	-0.5600		-1.1956	0.0756	
C - B	0.3100		-0.3256	0.9456	
C - F	0.4400		-0.1956	1.0756	
B - E	-1.3600		-1.9956	-0.7244	***
B - A	-1.0600		-1.6956	-0.4244	***
B - D	-0.8700		-1.5056	-0.2344	***
B - C	-0.3100		-0.9456	0.3256	
B - F	0.1300		-0.5056	0.7656	
F - E	-1.4900		-2.1256	-0.8544	***
F - A	-1.1900		-1.8256	-0.5544	***
F - D	-1.0000		-1.6356	-0.3644	***
F - C	-0.4400		-1.0756	0.1956	
F - B	-0.1300		-0.7656	0.5056	

Dunnett's t Tests for flowrate

NOTE: This test controls the Type I experimentwise error for comparisons of all treatments against a control.

Alpha	0.05
Error Degrees of Freedom	18
Error Mean Square	0.08
Critical Value of Dunnett's t	2.76150
Minimum Significant Difference	0.5523

Comparisons significant at the 0.05 level are indicated by \*\*\*.

filter Comparison	Difference		Simultaneous 95%		
	Between Means		Confidence	Limits	
E - F	1.4900		0.9377	2.0423	***
A - F	1.1900		0.6377	1.7423	***
D - F	1.0000		0.4477	1.5523	***
C - F	0.4400		-0.1123	0.9923	
B - F	0.1300		-0.4223	0.6823	

Dunnett's One-tailed t Tests for flowrate

NOTE: This test controls the Type I experimentwise error for comparisons of all treatments against a control.

Alpha	0.05
Error Degrees of Freedom	18
Error Mean Square	0.08
Critical Value of Dunnett's t	2.40711
Minimum Significant Difference	0.4814

Comparisons significant at the 0.05 level are indicated by \*\*\*.

filter Comparison	Difference Between Means	Simultaneous 95% Confidence Limits
E - F	1.4900	-Infinity 1.9714
A - F	1.1900	-Infinity 1.6714
D - F	1.0000	-Infinity 1.4814
C - F	0.4400	-Infinity 0.9214
B - F	0.1300	-Infinity 0.6114

Dunnett's One-tailed t Tests for flowrate

NOTE: This test controls the Type I experimentwise error for comparisons of all treatments against a control.

Alpha	0.05
Error Degrees of Freedom	18
Error Mean Square	0.08
Critical Value of Dunnett's t	2.40711
Minimum Significant Difference	0.4814

Comparisons significant at the 0.05 level are indicated by \*\*\*.

filter Comparison	Difference Between Means	Simultaneous 95% Confidence Limits
E - F	1.4900	1.0086 Infinity ***
A - F	1.1900	0.7086 Infinity ***
D - F	1.0000	0.5186 Infinity ***
C - F	0.4400	-0.0414 Infinity
B - F	0.1300	-0.3514 Infinity