In [158…
```
SSA, A, a_degree = 13.98, 3, 2
SSB, B, b_degree = 10.18, 3, 2
SSC, C, c_degree = 1.19, 2, 1
SSAB, AB, ab_degree = 4.77, 9, 4
SSAC, AC, ac_degree = 2.91, 6, 2
SSBC, BC, bc_degree = 3.64, 6, 2
SSABC, ABC, abc_degree = 4.91, 18, 4
SSE, residual_df = 21.61, 36
SST, total_df =  63.19, 53
n = 54
```

Chosing A for Blocking

In [159…
```
## MEANSQUARE
MSE_A = SSA/a_degree
MSE_B = SSB/b_degree
MSE_C = SSC/c_degree
MSE_BC = SSBC/bc_degree
new_SSE = SSAB + SSAC + SSABC + SSE
print("SSE = ",new_SSE)
new_residual_df = ab_degree + ac_degree + abc_degree + residual_df #ab_degree + ac_degree + abc_degree + residu
new_MSE = new_SSE/new_residual_df
#new_residual_df
print("MSA(Blocking) = {:.2f}, MSB = {} , MSC = {}, MSBC = {:.2f}, MSE = {:.2f}".format(MSE_A, MSE_B, MSE_C, MS
print("residual_df = ",new_residual_df)
#print(new_SSE)
```

```
SSE =  34.2
MSA(Blocking) = 6.99, MSB = 5.09 , MSC = 1.19, MSBC = 1.82, MSE = 0.74
residual_df =  46
```

In [160…
```
## F-statistic
#Fa = MSE_A/new_MSE
Fb = MSE_B/new_MSE
Fc = MSE_C/new_MSE
Fbc = MSE_BC/new_MSE
print("F-statistics Fb = {:.2f}, Fc = {:.2f}, Fbc = {:.2f}".format(Fb,Fc,Fbc))
```

```
F-statistics Fb = 6.85, Fc = 1.60, Fbc = 2.45
```

In [161…
```
## P-value
B_pvalue = stats.f.sf(Fb, b_degree, new_residual_df)
C_pvalue = stats.f.sf(Fc, c_degree, new_residual_df)
BC_pvalue = stats.f.sf(Fbc, bc_degree, new_residual_df)
print("P-value B = {:.6f}, C = {:.6f}, BC = {:.6f}".format(B_pvalue,C_pvalue,BC_pvalue))
```

```
P-value B = 0.002496, C = 0.212192, BC = 0.097662
```

In [162…
```
#ANOVA_TABLE
print("Source of Variation \t SSE      df      MS     F-statistics   P-value ")
print("Blocks \t\t        {}     {}      {}       ".format(SSA, a_degree, MSE_A))
print("Main effect:")
print("B \t\t        {}     {}      {}     {:.6f}     \t{:.6f}".format(SSB, b_degree, MSE_B, Fb, B_pvalue))
print("C \t\t        {}      {}      {}     {:.6f}     \t{:.6f}".format(SSC, C_degree, MSE_C, Fc, C_pvalue))
print("Two-factor interaction:")
print("BC \t\t        {}      {}      {}     {:.6f}     \t{:.6f}".format(SSBC, BC_degree, MSE_BC, Fbc, BC_pvalu
print("Error \t\t        {}     {}      {:.6f}       ".format(SSE, new_residual_df, new_MSE))
print("Total \t\t        {}     {}".format(SST ,(n-1) ) )
```

```
Source of Variation      SSE      df      MS     F-statistics   P-value
Blocks                  13.98     2      6.99
Main effect:
B                       10.18     2      5.09     6.846199      0.002496
C                       1.19      1      1.19     1.600585      0.212192
Two-factor interaction:
BC                      3.64      2      1.82     2.447953      0.097662
Error                   21.61    46      0.743478
Total                   63.19    53
```

Conclusion

จาก P-value สามารถสรุปได้ว่า มีบางกลุ่มของ B (Catalyst) ที่มีค่าเฉลี่ย (Mean) ที่แตกต่างกันอย่างน้อย 1 กลุ่ม

และ factor B (Catalyst) กับ factor C (Washing time) ไม่มี interaction กัน