

Exercise 4

1. Compare the following phenol manufacturing processes using the appropriate green chemistry metrics and using the green chemistry principles: benzene sulfonation, benzene chlorination, Hock process
2. Discuss the advantages of the following alternative processes in terms of greenness: Solutia and ExxonMobil processes

Chemical	MW
Benzene	78.1
Phenol	94
NaHSO ₃	104
Na ₂ SO ₃	126
SO ₂	64.1
NaOH	40
H ₂ O	18
Cl ₂	70.9
HCl	36.5
NaCl	58.4
propene	42.1
oxygen	32
acetone	58.1
N ₂ O	44
N ₂	28
Hydrogen	2
H ₂ SO ₄	98.1
Cyclohexanone	98.1