

# Process Systems Engineering

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## Exercise #3

Calculate the economic potential of level-2 related to the process conditions used in previous lessons considering the following costs of raw materials and products:

Composition	Cost [€/kmol]
Benzene	12.5
Toluene	8.8
Hydrogen	2.1
Biphenyl	7.4

In the assessment of EP2, consider the value of heat of combustion of products i.e. 4€/MBtu.

Composition	$\Delta H_c$ [MBtu/kmol]
Hydrogen	0.123
Methane	0.383
Benzene	1.41
Toluene	1.68
Biphenyl	2.688

Consider 8000 working hours per year.

Produce the following diagrams:

- purge (splitting) ratio / EP2 imposing minimum selectivity of 0.96
- molar fraction of hydrogen in vent / EP2 imposing the minimum selectivity of 0.96
- conversion / EP2 as a function of the molar fraction of hydrogen in the vent
- temperature / EP2 as a function of the molar fraction of hydrogen in the vent