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| Definition |  |
|  | Monomer production reactor, characterised by: |
|  | Minimum production rate of reactor |
|  | Maximum production rate of reactor |
|  | Conversion of monomers of reactor |
|  | Operation cost of reactor |
|  |  |
|  | Polymer production reactor, characterised by : |
|  | The rate of production of grade in polymer reactor (tons/time) |
|  | Minimum runtime producing grade in polymer reactor (time) |
|  | Operation cost coefficient of producing grade in reactor |
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|  | Polymer grades, characterised by: , , |
|  | Conversion ratio between monomers and the grade polymer |
|  | Sale price of grade to customer |
|  | Demand of for customer during time period |
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|  | Different types of materials including monomers, characterised by: , |
|  | Sale price of monomers |
|  | Purchase price of monomers |
|  |  |
|  | Time periods, characterised by: |
|  | Length of the period in days |
|  | fraction of the time available in polymer reactor for period |
|  |  |
|  | Customers, characterised by: and |
|  |  |
|  | IHP points, characterised by: |
|  | Lead time to the UAE gateway |

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| Variables |  |
|  | Amount of material consumed in unit over period |
|  | Production amount of monomer plant over period |
|  | Production amount of grade in polymer reactor over period |
|  | Plant inventory level of material over period |
|  | Amount of material purchased over period |
|  | Amount of material sold by export over period |
|  | Shipment of grade to IHP over period |
|  | inventory level of grade at over period |
|  | Supply of grade from IHP to customer at period |

Objective function (Maximisation):

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Production constraint for each monomer plant

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The sum of different feedstocks to a plant must equal to the operating capacity over that period

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Minimal constraint for producing grade in

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Maximal constraint for producing grade in

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Sum of all grades production in a particular unit must be less than the overall time available at duration

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Material inventory balance at the plant

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For the grade inventory balance at the UAE gateway ()

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For the grade inventory balance at other locations ()

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Demand constraints: Demand cannot be exceeded.

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