CHEMICAL PROCESS CALCULATIONS-I

Course Code: 13CH1104

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Course Educational Objectives:

This course introduces the student the following aspects

- To develop systematic problem solving skills.
- To learn what material balance are, how to formulate, apply and solve them.
- To learn how to deal with the complex process problems.

Course Outcomes:

After completion of this course

- Student is able to solve simple problems on Stoichiometry.
- Able to solve the material balance problems.

UNIT-I (12 Lectures)

STOICHIOMETRIC RELATION:

basis of calculations, methods of expressing compositions of mixtures and solutions, density and specific gravity, Baume and API gravity scales.

UNIT-II (14 Lectures)

BEHAVIOR OF IDEAL GASES:

Kinetic theory of gases, application of ideal gas law, gaseous mixtures, gases in chemical reactions.

UNIT-III (10 Lectures)

VAPOR PRESSURE:

Liquefaction and liquid state, vaporization, boiling point, effect of temperature on vapor pressure, Antoine equation, vapor pressure plots, estimation of critical properties, vapor pressure of immiscible liquids and ideal solutions, Raoult's law. Non volatile solutes.

UNIT-IV (12 Lectures)

HUMIDITY AND SATURATION:

Relative and percentage saturation or dew point, wet bulb and dry bulb temperature, use of humidity charts for engineering calculations.

UNIT-V (12 Lectures)

MATERIAL BALANCES:

Tie substance, Yield, conversion, processes involving chemical reactions.

TEXTBOOKS:

1. Hougen. O. A, Watson K.M. and Ragatz R.A. "*Chemical Process Principles, Part -I, Material and Energy Balance*", 2nd Ed. John Wiley and Sons Inc, New York, 1963.
2. Himmelblau D.H. "*Basic principles and calculations in chemical engineering*", 5th Edition, PHI, 2001.

REFERENCES:

1. Bhatt B.I. and Vora S.M. "*Stoichiometry*", 3rd Edition, Tata McGraw Hill publishing company, Ltd. New Delhi,1996.
2. Richard M.Felder, Ronald W.Rousseau, "*Elementary Principles of Chemical Processes*", 3rd Edition, Wiley, 2004.