



NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE
EXPRESS WAY,
JABI - ABUJA.
FACULTY OF SCIENCES
DEPARTMENT OF CHEMISTRY
2025_2 EXAMINATIONS

COURSE CODE: CHM 316
COURSE TITLE: INDUSTRIAL CHEMICAL TECHNOLOGY I
COURSE UNIT: 2
TIME: 2 HOURS
INSTRUCTION: Answer question one and any other two questions.

QUESTION ONE

- 1(a) Explain the following terms: (i) Heat (ii) Heat transfer (iii) Thermodynamics (6 Marks)
- 1(a(ii)) Name and define the three modes of heat transfer. (6 marks).
- 1(bi) Explain Newton's law of cooling and its application in convection (4 marks)
- 1(bii) Discuss the second law of thermodynamics and its implications for heat flow (3 marks)
- 1(ci) State Fourier's law of heat conduction and include an equation (3 marks)
- 1 (cii) Differentiate between adsorption and absorption. (2 marks)
- 1(di) Describe three properties of radiant heat and its similarity to light. (4 Marks)
- 1(dii) Define an exothermic reaction and give one example to explain. (3 Marks)

QUESTION TWO

- 2(a) Explain the principle of distillation and its role in the chemical industry (5 marks)
- (2b) Explain distillation and identify four other terms for the word "distillate" (6 marks)
- (2c) State the ideal gas law and its equation. (5 marks)
- (2d) Explain eddy diffusion with an example (4 marks)

QUESTION THREE

- (3a) Give three examples of everyday experiences of mass transfer process (6 marks)
- (3b) Explain mass transfer by diffusion and use an example for illustration. (4 marks)
- (3c) Define molar concentration, mass concentration and differentiate between the two (5 marks)
- (3d) Provide five examples of industrial processes involving mass transfer. (5 marks)

QUESTION FOUR

- (4a) Describe the structure, dimensions and two applications of typical industrial distillation towers. (6 marks)
- (4b) Provide two examples each of physical processes in sugar, pharmaceutical, and salt industries. (6 marks)
- (4c) Differentiate between continuous and batch process reactors. (4 marks)
- (4d) Explain the plug flow reactor (PFR) model and its applications. (4 marks)

QUESTION FIVE

- (5a) Discuss the continuous stirred-tank reactor (CSTR) model and highlight two differences between it and a plug flow reactor (PFR). (5 marks)
- (5b) Define chemical reactors and their role in chemical engineering. (4 marks)
- (5c) Provide four examples of industrial processes that utilize different types of chemical reactors. (6 marks)
- (5d) Highlight two types of chemical reactors and three key process variables of a chemical reactor. (5 marks)