

Total No. of Questions : 12]

SEAT No. :

P1199

[Total No. of Pages :4

[4659] - 255

B.E. (Petrochemical Engineering)

c : NATURAL GAS TECHNOLOGY

(2008 Course) (Elective - II) (Semester - I) (Regular) (412405)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q.No. 1 or 2, 3 or 4,5 or 6, 7 or 8, 9 or 10, 11 or 12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) a) Elaborate on different types of natural gas composition and regional disparities. **[8]**

b) Describe origin of natural gas. **[8]**

OR

Q2) a) Discuss unconventional reservoirs. **[8]**

b) Discuss the outlook for world gas production. **[8]**

Q3) a) Explain in detail sampling methods of natural gas. **[8]**

b) Discuss sour gas and sweet gas. **[6]**

c) Discuss measurements taken during sampling. **[4]**

OR

Q4) a) Explain in detail method for measuring interfacial tension. **[8]**

P.T.O.

- b) Find the viscosity for a gas with composition in mole % of $C_1 = 90.5$, $C_2 = 2.3$, $C_3 = 2.3$ at 3000 psia and 540^0 R. [6]

Data:

Component	Mi	Pci	Tci	μ_i gi
C_1	16.043	667.8	343.1	0.0110
C_2	30.070	707.8	549.8	0.0092
C_3	44.097	616.3	665.7	0.0082

- c) Draw phase diagrams of a dry gas and a wet gas showing conditions in the reservoir as well as at the surface and describe the same in brief. [4]

Q5) a) Elaborate on hydrate structures. [6]

- b) Explain in detail predicting hydrate formation by equilibria chart method. [6]

- c) Write a short note on water content of natural gas. [4]

OR

Q6) a) Describe in detail nucleation step in hydrate formation. [6]

- b) Explain in detail equilibrium cell for determining hydrate formation point. [6]

- c) Write a short on hydrate inhibitors. [4]

SECTION - II

Q7) a) Explain in detail dehydration of natural gas by absorption. [8]

- b) Describe with flow sheet compression refrigeration cycle for natural gas. [8]

OR

Q8) a) A separator to be operated at 1000 psia, is required to handle a well stream with gas flow rate 7 mmscfd at GLR 40 bb1/mmscf. Determine the separator size required for [8]

- i) vertical separator
- ii) horizontal single-tube separator
- iii) spherical separator

Assume a liquid (oil+water) density of 52 lbm/ft³, ideal gas with gravity 0.8, operating temperature equal to 110 °F, a retention time 3 min and ½ full of liquid conditions.

- b) Write a short note on removal of nitrogen, helium, mercury from natural gas. [8]

- Q9)** a) Explain with flow sheet natural gas liquefaction using conventional cascade cycle. [6]
b) Explain in detail construction and working of reciprocating compressor. [6]
c) Elaborate on existing LNG terminal in India. [6]

OR

- Q10)** a) Describe in detail steady state flow in pipeline. [6]
b) Explain with flow sheet natural gas liquefaction using TEALARC process with one pressure level. [6]
c) Write a short note on design of pipeline transport installations. [6]

- Q11)** a) Describe in detail production of higher alcohols and ethers from methane. [8]
b) Write a short note on:
i) Production of synthesis gas by indirect conversion process
ii) Thermal coupling process. [8]

OR

- Q12)** a) Describe with flow sheet routes for the chemical conversion of methane. [8]
b) Describe with flow sheet Fisher - Tropsh synthesis process in fixed-bed reactors. [8]

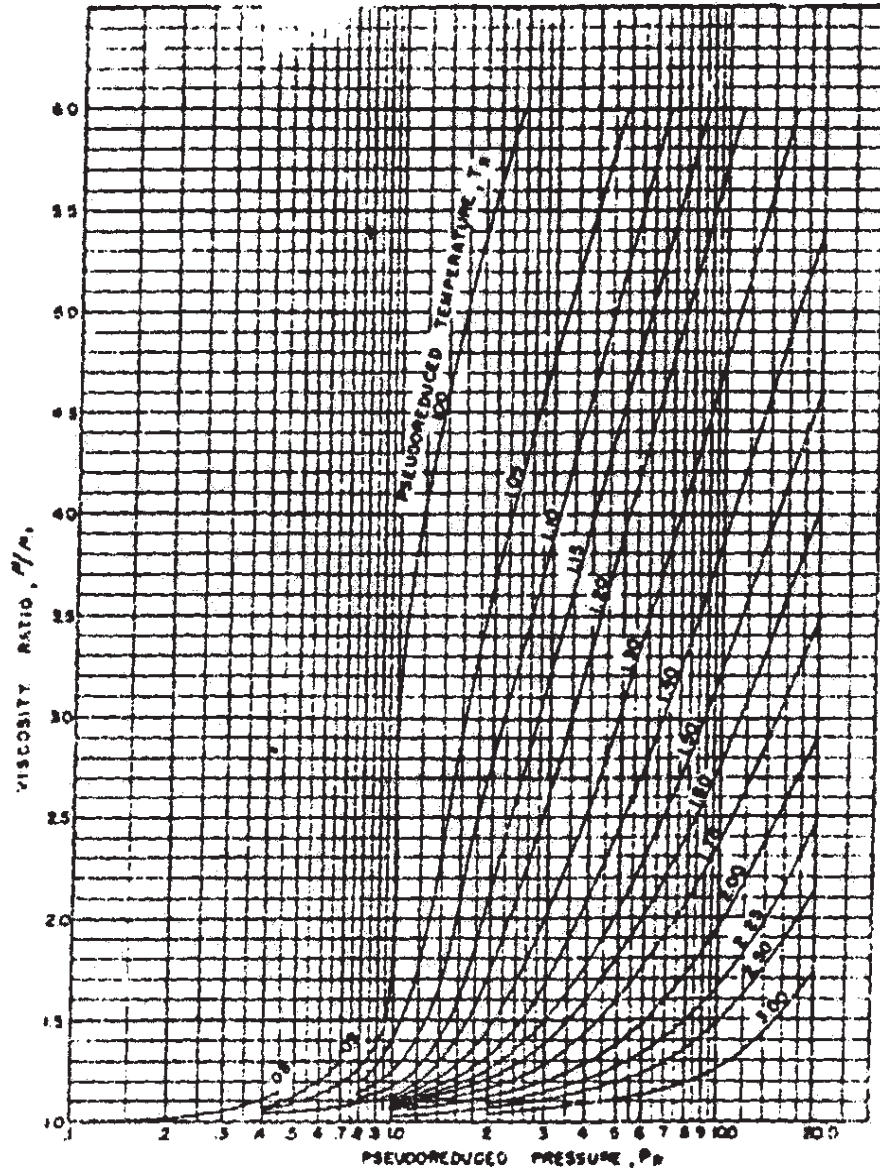


Figure 4. b Viscosity ratio versus pseudoreduced pressure

