higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

CHEMICAL PLANT OPERATION N5

11 February 2022

This marking guideline consists of 5 pages.

QUESTION 1

1.1 Kinetic energy
1.2 Calorie
1.3 Helical conveyor centrifuge
1.4 Hess' law
1.5 Impact wheels

(5 × 2) **[10]**

QUESTION 2

2.1 E
2.2 A
2.3 F
2.4 B
2.5 C

(5 × 1) **[5]**

QUESTION 3

3.1 3.1.1
- This is the temperature at which water will change to steam.
- The saturation temperature will depend on the pressure on the surface of the water.

3.1.2
- It is steam at saturation temperature
- and corresponds with the pressure.

3.1.3
- This steam does not contain suspended water at all.
- This means that the steam is at the saturation temperature and has absorbed all the latent heat of evaporation.

3.1.4
- If the steam produced contains particles of water suspended in it, it is called wet steam, however it is still at the saturation temperature and it can still absorb some of the latent heat.
- The dryness fraction (x) of the steam represents the percentage of dry saturated steam in the wet mixture.

3.1.5
- Steam that is heated to a temperature (t_{su}) higher than the saturation temperature is called superheated steam.
- The sensible heat that increases the temperature to produce superheated steam is called specific heat capacity.

(5 × 2) (10)

3.2 Basis = 100 mole feed

Input		Output	
Subs	**Mole**	**Subs**	**Mole**
C_8	= 100 × 0,4	C_8	= 0,6 D
C_{10}	= 100 × 0,6	C_{10}	= 0,4 D
		C_8	= 0,3 B
		C_{10}	= 0,7 B

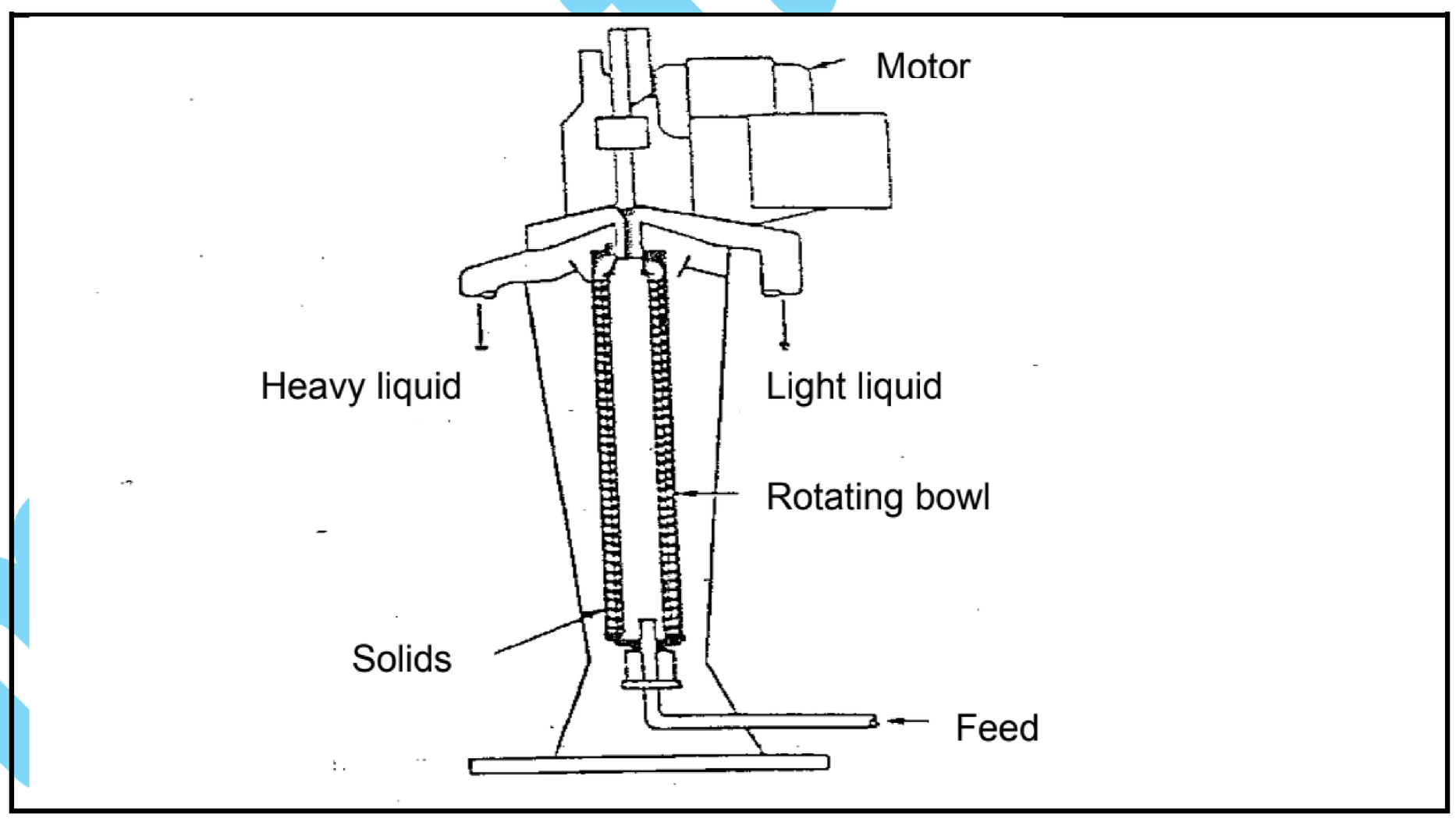
C_8 Balance: 40 = 0,6D + 0,3B ✓✓ ……(1)
C_{10} Balance:60 = 0,4D + 0,7B✓✓ …… (2)
[2] × 1,5 90 = 0,6D + 1,05B✓✓ …..(3)
(3-1] 50 = 0,7B
B = 66,67 mol✓

Distillates production: Substitute B in …. (1)
40 = 0,6D + 0,3B
40 = 0,6D + 0,3 (66,67)
D = 33,33 ✓
Bottoms production: = 66,67 mol✓
∴ Distillates production: 100 – 66,67 = 33,33 mol✓

(10)
[20]

QUESTION 4

4.1



TUBULAR CENTRIFUGE
(One mark for each correct labelling)(6 × 1) (6)

