Tikrit University

The College of Petroleum Processes Engineering

Petroleum Systems Control Engineering Department

Properties of Petroleum & Natural Gas

Third Class

Lecture 12

By

Jasim I. Humadi

Q3: For a blend of naphtha-kerosene sample TBP distillation curve are given in the Table below. Use the Riazi-Daubert methods to predict EFV curve from TBP curve.

V% distilled	IBP	10	30	50	70	90
TBP °C	10.1	71.10	143.7	204.5	250.2	291.5

Answer

First we should find ASTM D86 from TBP, then calculate EFV from ASTM D86.

$$ASTM\ D86 = (\frac{1}{a})^{1/b}\ TBP^{1/b}$$

$$ASTM\ at\ 0\% = [\frac{1}{0.9177}(10.1+273.15)]^{\frac{1}{1.0019}} = 308\ k = 35\ C$$

|	vol %	a	b	TBPC	ASTM D86 K	ASTM D86 C
IBP	0	0.9177	1.0019	10.1	308	35
	10	0.5564	1.09	71.1	352.4	79.4
	30	0.7617	1.0425	143.7	418.6	145.6
	50	0.9013	1.0176	204.5	474.7	201.7
	70	0.8821	1.0226	250.2	508.6	235.6
FBP	90	0.9552	1.011	291.5	543.6	270.6

$$EFV = a(ASTM\ D86\ °K)^{b}\ SG^{c}$$

$$EFV\ at\ 0\% = 2.9747(308)^{0.8466}\ 0.7860^{0.4209} = 341.5$$

$$EFV\ at\ 50\% = 3.268\ (474.7)^{0.8274}\ 0.7860^{0.6214} = 455.35$$

a	b	c	T10	T50	SG
0.10431	0.1255	0.20862	344	477	0.786062

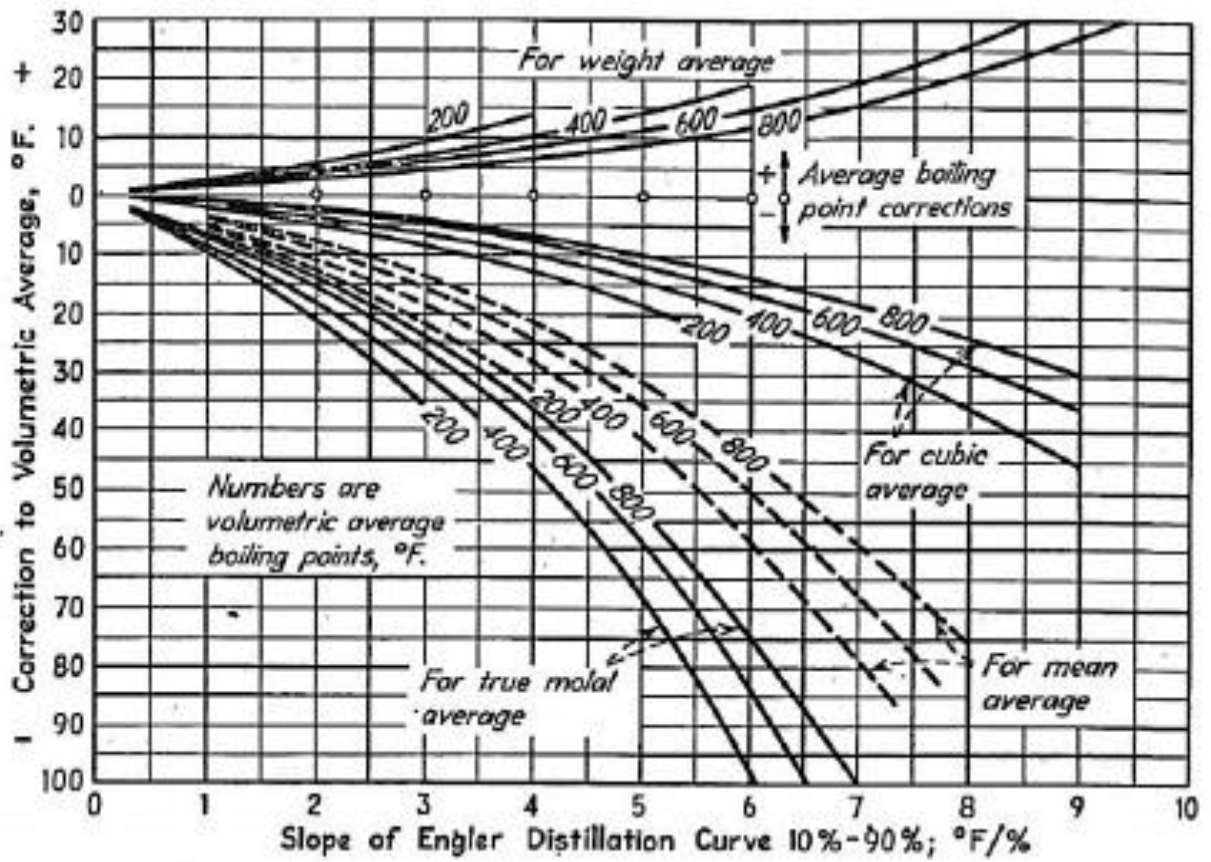| vol %	ASTM D86	EFV K	a	b	c	SG	EFV C
0	308	341.45	2.9747	0.8466	0.4209	0.87606	68.3
10	352.4	380.35	1.4459	0.9511	0.1287	0.87606	107.2
30	418.6	424.25	0.8506	1.0315	0.0817	0.87606	151.1
50	474.7	455.35	3.268	0.8274	0.6214	0.87606	182.2
70	508.6	480.35	8.2873	0.6871	0.934	0.87606	207.2
90	543.6	501.45	10.6266	0.6529	1.1025	0.87606	228.3
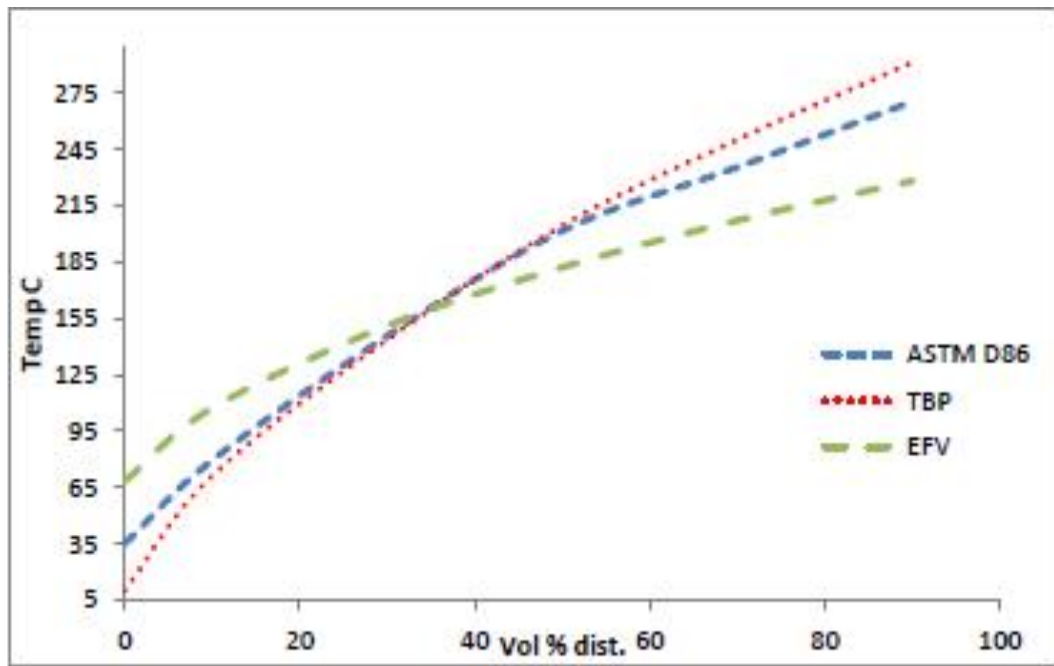
Figure (1): Characterizing Boiling Points of Petroleum Fractions