

Reference: CLOV19Y
Crude: CLOV Blend



Crude Summary Report

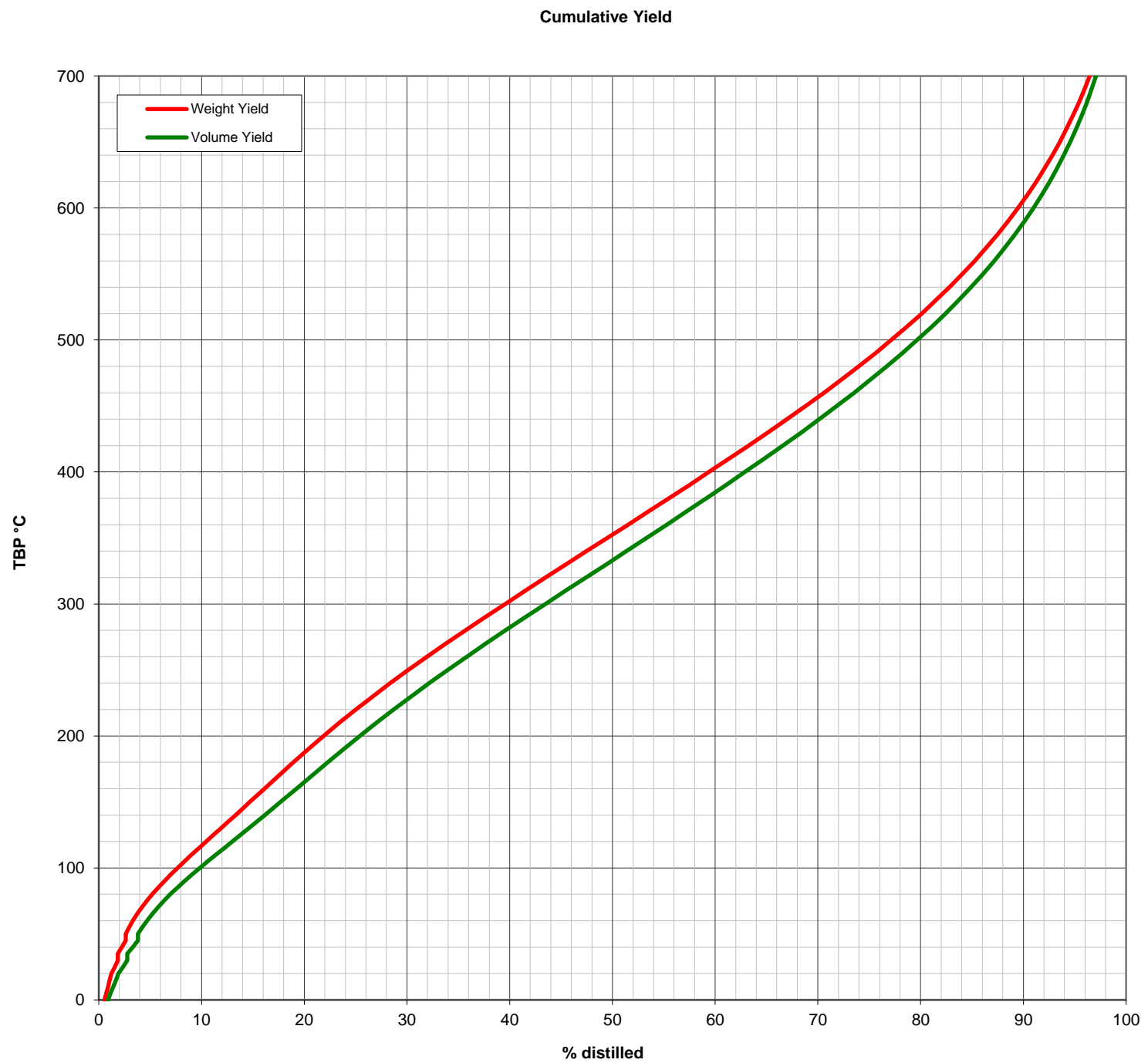
| General Information | | Molecules (%wt on crude) | | | | Whole Crude Properties | | | |
|---------------------|------------|--------------------------|------|-----------------------------|-------------|------------------------|--|--|--|
| Reference: | CLOV19Y | methane + ethane | 0.02 | Density @ 15°C (g/cc) | 0.8650 | | | | |
| Name: | CLOV Blend | propane | 0.31 | API Gravity | 32.0 | | | | |
| Origin: | Angola | isobutane | 0.24 | Total Sulfur (% wt) | 0.26 | | | | |
| Assay Date: | 4/18/2019 | n-butane | 0.71 | Pour Point (°C) | -11 | | | | |
| Comments: | | isopentane | 0.65 | Viscosity @ 20°C (cSt) | 13.8 | | | | |
| | | n-pentane | 0.78 | Viscosity @ 40°C (cSt) | 7.2 | | | | |
| | | cyclopentane | 0.12 | Nickel (ppm) | 7.3 | | | | |
| | | C6 paraffins | 1.50 | Vanadium (ppm) | 2.7 | | | | |
| | | C6 naphthenes | 0.99 | Total Nitrogen (ppm) | 1712 | | | | |
| | | benzene | 0.18 | Total Acid Number (mgKOH/g) | 0.71 | | | | |
| | | C7 paraffins | 1.35 | Mercaptan Sulfur (ppm) | 6.3 | | | | |
| | | C7 naphthenes | 1.81 | Hydrogen Sulfide (ppm) | 0.0 | | | | |
| | | toluene | 0.64 | Reid Vapor Pressure (kPa) | 49.0 | | | | |

| Cut Data | IBP | Atmospheric Cuts | | | | | | | | | Vacuum Cuts | | | |
|-----------------------------|--------|------------------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|--------|--------|--------|
| | | C5 | 65 | 100 | 150 | 200 | 250 | 300 | 350 | 370 | 370 | 450 | 500 | 550 |
| Start (°C) | | | | | | | | | | | | | | |
| End (°C) | FBP | 65 | 100 | 150 | 200 | 250 | 300 | 350 | 370 | FBP | 450 | 500 | 550 | FBP |
| Yield (% wt) | | 2.7 | 3.9 | 7.0 | 7.2 | 8.2 | 9.4 | 9.9 | 4.0 | 46.5 | 15.3 | 8.4 | 6.9 | 15.9 |
| Yield (% vol) | | 3.5 | 4.6 | 7.9 | 7.7 | 8.6 | 9.5 | 9.9 | 3.9 | 42.8 | 14.6 | 7.8 | 6.4 | 13.9 |
| Cumulative Yield (% wt) | | 1.1 | 3.7 | 7.7 | 14.7 | 21.9 | 30.1 | 39.6 | 49.5 | 53.5 | 53.5 | 68.8 | 77.1 | 84.1 |
| Volume Average B.P. (°C) | 340 | 41.7 | 84 | 125 | 175 | 226 | 275 | 325 | 360 | 514 | 409 | 474 | 524 | 641 |
| Density @ 15°C (g/cc) | 0.8650 | 0.6493 | 0.7330 | 0.7712 | 0.8025 | 0.8309 | 0.8562 | 0.8684 | 0.8893 | 0.9371 | 0.9019 | 0.9195 | 0.9312 | 0.9866 |
| API Gravity | 32.0 | 86.4 | 61.5 | 51.9 | 44.8 | 38.7 | 33.7 | 31.4 | 27.5 | 19.4 | 25.3 | 22.3 | 20.4 | 11.8 |
| UOPK | 11.94 | | | 11.60 | 11.60 | 11.60 | 11.62 | 11.80 | 11.74 | 11.98 | 11.87 | 12.00 | 12.11 | 11.96 |
| Molecular Weight (g/mol) | | | | 109 | 137 | 169 | 207 | 253 | 286 | 506 | 344 | 445 | 562 | 973 |
| Total Sulfur (% wt) | 0.26 | 0.004 | 0.006 | 0.009 | 0.018 | 0.039 | 0.089 | 0.200 | 0.271 | 0.463 | 0.300 | 0.359 | 0.444 | 0.68 |
| Mercaptan Sulfur (ppm) | 6.3 | | 12.7 | 12.1 | 21.4 | 15.6 | 7.9 | | | | | | | |
| Total Nitrogen (ppm) | 1712 | | | | | 10 | 43 | 143 | 315 | 3613 | 804 | 1547 | 2320 | 7953 |
| Basic Nitrogen (ppm) | 447 | | | | | 8 | 31 | 79 | 155 | 923 | 283 | 461 | 750 | 1856 |
| Total Acid Number (mgKOH/g) | 0.71 | 0.03 | 0.07 | 0.13 | 0.35 | 0.72 | 0.83 | 1.24 | 1.35 | 0.76 | 1.19 | 1.04 | 0.83 | 0.17 |
| Viscosity @ 20°C (cSt) | 13.8 | | | | 1.31 | | | | | | | | | |
| Viscosity @ 40°C (cSt) | 7.20 | | | | 1.01 | 1.60 | 2.93 | 6.24 | 11.6 | | | | | |
| Viscosity @ 50°C (cSt) | 5.52 | | | | | 1.39 | 2.44 | 4.88 | 8.57 | 249 | 19.9 | 69.1 | 222 | |
| Viscosity @ 60°C (cSt) | | | | | | | | | | 140 | 14.2 | 44.0 | 127 | |
| Viscosity @ 100°C (cSt) | | | | | | | | | | 26.2 | 5.17 | 11.6 | 24.6 | 894 |
| Viscosity @ 130°C (cSt) | | | | | | | | | | | | | | 182 |
| Viscosity @ 150°C (cSt) | | | | | | | | | | | | | | 81.6 |
| RON (Clear) | | 76.8 | 50.4 | 68.7 | 55.4 | | | | | | | | | |
| MON (Clear) | | 75.0 | 63.8 | 63.2 | 51.6 | | | | | | | | | |
| Paraffins (% wt) | 24.6 | 94.9 | 52.4 | 27.0 | 34.2 | | | | | | | | | |
| Naphthenes (%wt) | 39.4 | 5.1 | 42.9 | 50.8 | 43.1 | | | | | | | | | |
| Aromatics (% wt) | 36.0 | 0.0 | 4.7 | 22.2 | 22.7 | | | | | | | | | |
| Pour Point (°C) | -11 | | | | | -53 | -32 | -7 | 7 | 32 | 25 | 42 | 52 | 42 |
| Cloud Point (°C) | | | | | | -51 | -30 | -6 | | | | | | |
| Freeze Point (°C) | | | | | | -62 | -46 | -24 | | | | | | |
| Smoke Point (mm) | | | | | | 21 | 18 | 15 | | | | | | |
| Cetane Index (D4737A) | | | | | | 33 | 40 | 47 | 56 | 58 | | | | |
| Naphthalenes (% vol) | | | | | | 0.1 | 4.3 | 10.1 | 11.8 | | | | | |
| Aniline Point (°C) | | | | 44.1 | 49.0 | 58.3 | 65.9 | 73.8 | 79.7 | | 86.8 | 94.8 | 100.4 | |
| Hydrogen (% wt) | 13.2 | 16.5 | 15.0 | 13.6 | 13.7 | 13.4 | 13.3 | 13.1 | 12.8 | | 12.8 | 12.8 | 12.7 | |
| Total Wax (% wt) | 6.6 | | | | | | | | | 5.3 | 8.1 | 7.7 | 5.7 | 1.2 |
| C7 Asphaltenes (% wt) | 0.1 | | | | | | | | | 0.2 | 0.0 | 0.0 | 0.7 | |
| Micro Carbon Residue (% wt) | 2.5 | | | | | | | | | 5.4 | 0.0 | 0.8 | 15.5 | |
| Vanadium (ppm) | 2.7 | | | | | | | | | 5.7 | 0.0 | 0.0 | 16.7 | |
| Nickel (ppm) | 7.3 | | | | | | | | | 15.8 | 0.0 | 0.0 | 46.1 | |
| Iron (ppm) | 2.3 | | | | | | | | | 5.0 | 0.0 | 0.0 | 14.6 | |
| Sodium (ppm) | 2.4 | | | | | | | | | | | | | |
| Mercury (ppb) | 2.0 | | | | | | | | | | | | | |
| Arsenic (ppb) | 12 | | | | | | | | | | | | | |

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Yield Distribution



Cumulative Volume % Distilled at 10 Degree C (TBP) Intervals

| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|-----|------|------|------|------|------|------|------|------|------|------|
| 0 | | | | 2.8 | 3.3 | 3.8 | 4.7 | 5.7 | 7.0 | 8.3 |
| 100 | 9.8 | 11.4 | 13.0 | 14.6 | 16.2 | 17.7 | 19.2 | 20.7 | 22.3 | 23.8 |
| 200 | 25.4 | 27.0 | 28.7 | 30.4 | 32.2 | 34.0 | 35.8 | 37.7 | 39.6 | 41.5 |
| 300 | 43.5 | 45.4 | 47.4 | 49.4 | 51.4 | 53.3 | 55.3 | 57.2 | 59.1 | 61.0 |
| 400 | 62.9 | 64.8 | 66.6 | 68.4 | 70.1 | 71.8 | 73.5 | 75.1 | 76.7 | 78.2 |
| 500 | 79.7 | 81.1 | 82.4 | 83.7 | 84.9 | 86.1 | 87.2 | 88.2 | 89.2 | 90.1 |