

Azeri Light Crude Oil

ASSAY

| SOURCE OF SAMPLE | | MOLECULES (%WT ON CRUDE) | | WHOLE CRUDE PROPERTIES | |
|------------------|---------------------------------|--------------------------|------|-----------------------------|--------|
| Reference | AZRLT21Y | methane + ethane | 0.00 | Density @ 15°C (g/cc) | 0.8463 |
| Crude Name | Azeri Light | propane | 0.29 | API Gravity | 35.6 |
| Origin | Azerbaijan | isobutane | 0.28 | Total Sulfur (% wt) | 0.18 |
| Sample Date | 02-Sept-24 | n-butane | 0.76 | Pour Point (°C) | -20 |
| Comments | Crude oil from the BTC pipeline | isopentane | 0.70 | Viscosity @ 20°C (cSt) | 9.3 |
| | | n-pentane | 0.83 | Viscosity @ 40°C (cSt) | 5.3 |
| | | cyclopentane | 0.14 | Nickel (ppm) | 3.1 |
| | | C6 paraffins | 1.67 | Vanadium (ppm) | 0.9 |
| | | C6 naphthenes | 1.10 | Total Nitrogen (ppm) | 1057 |
| | | benzene | 0.15 | Total Acid Number (mgKOH/g) | 0.48 |
| | | C7 paraffins | 1.80 | Mercaptan Sulfur (ppm) | 6.5 |
| | | C7 naphthenes | 1.88 | Hydrogen Sulfide (ppm) | 0.0 |
| | | toluene | 0.56 | Reid Vapor Pressure (kPa) | 35.1 |

| Cut data | | Atmospheric Cuts | | | | | | | | | Vacuum cuts | | | |
|--------------------------|--------|------------------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|--------|--------|--------|
| | | IBP | C5 | 65 | 100 | 150 | 200 | 250 | 300 | 350 | 370 | 370 | 450 | 500 |
| Start (°C) | IBP | C5 | 65 | 100 | 150 | 200 | 250 | 300 | 350 | 370 | 370 | 450 | 500 | 550 |
| End (°C) | FBP | 65 | 100 | 150 | 200 | 250 | 300 | 350 | 370 | FBP | 450 | 500 | 550 | FBP |
| Yield (% wt) | | 2.7 | 4.5 | 8.1 | 8.6 | 9.9 | 11.0 | 10.7 | 4.0 | 39.5 | 14.2 | 7.2 | 5.6 | 12.5 |
| Yield (% vol) | | 3.5 | 5.2 | 9.1 | 9.3 | 10.2 | 11.1 | 10.6 | 3.8 | 35.9 | 13.3 | 6.6 | 5.1 | 10.8 |
| Cumulative Yield (% wt) | | 0.9 | 3.6 | 8.1 | 16.3 | 24.9 | 34.8 | 45.8 | 56.5 | 60.5 | 60.5 | 74.7 | 81.9 | 87.5 |
| Volume Average B.P. (°C) | 317 | 42.2 | 84 | 125 | 175 | 226 | 275 | 324 | 360 | 509 | 408 | 474 | 524 | 646 |
| Density @ 15°C (g/cc) | 0.8463 | 0.6455 | 0.7330 | 0.7575 | 0.7860 | 0.8164 | 0.8371 | 0.8554 | 0.8769 | 0.9270 | 0.8988 | 0.9136 | 0.9234 | 0.9714 |
| API Gravity | 35.6 | 87.7 | 61.5 | 55.2 | 48.5 | 41.8 | 37.5 | 33.8 | 29.8 | 21.1 | 25.9 | 23.3 | 21.7 | 14.1 |
| UOPK | 12.05 | | | 11.81 | 11.84 | 11.81 | 11.89 | 11.97 | 11.90 | 12.08 | 11.90 | 12.08 | 12.21 | 12.17 |
| Molecular Weight (g/mol) | | | | 110 | 138 | 171 | 211 | 257 | 291 | 497 | 344 | 448 | 568 | 1020 |
| Total Sulfur (% wt) | 0.18 | 0.002 | 0.003 | 0.007 | 0.019 | 0.037 | 0.075 | 0.154 | 0.206 | 0.369 | 0.230 | 0.280 | 0.358 | 0.58 |
| Mercaptan Sulfur (ppm) | 6.5 | 9.4 | 6.4 | 9.1 | 26.3 | 17.2 | 6.9 | | | | | | | |
| Total Nitrogen (ppm) | 1057 | | | | | 3 | 38 | 165 | 333 | 2586 | 639 | 1027 | 1396 | 6233 |

| | | | | | | | | | | | | | | |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|------|
| Basic Nitrogen (ppm) | 319 | | | | | 3 | 23 | 67 | 121 | 770 | 249 | 462 | 629 | 1603 |
| Total Acid Number (mgKOH/g) | 0.48 | 0.02 | 0.06 | 0.14 | 0.33 | 0.54 | 0.65 | 0.72 | 0.74 | 0.52 | 0.72 | 0.63 | 0.52 | 0.24 |
| Viscosity @ 20°C (cSt) | 9.29 | | | | 1.37 | | | | | | | | | |
| Viscosity @ 40°C (cSt) | 5.33 | | | | 1.06 | 1.64 | 2.90 | 5.95 | 11.1 | | | | | |
| Viscosity @ 50°C (cSt) | 4.24 | | | | | 1.43 | 2.42 | 4.68 | 8.27 | 163 | 19.8 | 69.0 | 183 | |
| Viscosity @ 60°C (cSt) | | | | | | | | | | 96.5 | 14.2 | 44.1 | 108 | |
| Viscosity @ 100°C (cSt) | | | | | | | | | | 20.8 | 5.19 | 11.8 | 22.6 | 470 |
| Viscosity @ 130°C (cSt) | | | | | | | | | | | | | | 117 |
| Viscosity @ 150°C (cSt) | | | | | | | | | | | | | | 57.4 |
| RON (Clear) | | 76.9 | 41.4 | 60.6 | 31.5 | | | | | | | | | |
| MON (Clear) | | 75.2 | 59.0 | 58.1 | 31.0 | | | | | | | | | |
| Paraffins (% wt) | 32.9 | 94.4 | 58.7 | 35.8 | 51.0 | | | | | | | | | |
| Naphthenes (%wt) | 38.5 | 5.6 | 37.8 | 46.4 | 33.4 | | | | | | | | | |
| Aromatics (% wt) | 28.5 | 0.0 | 3.5 | 17.8 | 15.6 | | | | | | | | | |
| Pour Point (°C) | -20 | | | | | -45 | -23 | -3 | 10 | 25 | 26 | 42 | 51 | 37 |
| Cloud Point (°C) | | | | | | -43 | -21 | -1 | | | | | | |
| Freeze Point (°C) | | | | | -57 | -38 | -17 | | | | | | | |
| Smoke Point (mm) | | | | | 26 | 23 | 21 | | | | | | | |
| Cetane Index (D4737A) | | | | | 40 | 47 | 55 | 63 | 64 | | | | | |
| Naphthalenes (% vol) | | | | | 0.1 | 2.9 | 5.3 | 5.7 | | | | | | |
| Aniline Point (°C) | | | | 51.4 | 57.5 | 66.5 | 74.5 | 81.0 | 84.6 | | 91.2 | 100.2 | 105.5 | |
| Hydrogen (% wt) | 13.6 | 16.5 | 15.2 | 14.0 | 14.2 | 13.8 | 13.8 | 13.5 | 13.2 | | 12.9 | 12.8 | 12.9 | |
| Total Wax (% wt) | 14.1 | | | | | | | | | 9.3 | 11.5 | 8.4 | 8.9 | 7.5 |
| C7 Asphaltenes (% wt) | 0.0 | | | | | | | | | | 0.0 | 0.0 | 0.0 | 0.1 |
| Micro Carbon Residue (% wt) | 1.5 | | | | | | | | | | 3.8 | 0.1 | 1.2 | 11.5 |
| Vanadium (ppm) | 0.9 | | | | | | | | | | 2.3 | 0.0 | 0.0 | 7.2 |
| Nickel (ppm) | 3.1 | | | | | | | | | | 8.0 | 0.0 | 0.0 | 25.2 |
| Iron (ppm) | 1.0 | | | | | | | | | | 2.6 | 0.0 | 0.0 | 8.1 |