

## COMPOSITIONS OF UREA PLASTIC LUBRICANTS

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The samples of urea lubricants were synthesized by interaction of amidated rapeseed oil phosphatide concentrates with polyisocyanate in the olive media [1–2]. Aminoamides of fatty acids with polyisocyanate form urea dispersion phase of thixotropic systems, and calcium glycerolphosphatides perform the function of tribological additives. Physico-chemical properties of the developed urea lubricants (UL) were studied and comparative analysis of their quality indicators with the Maspol brand lubricant was performed (table).

Table. Physical-chemical properties of developed urea lubricants

| Indicator  | Testing method     | Values of indicators |        |
|--|--------------------|----------------------|--------|
|  |                    | UL                   | Maspol |
| Penetration at 25 °C at stirring, mm·10 <sup>-1</sup> :<br>– 60 double cycles ( <i>P</i> <sub>1</sub> )<br>– 100,000 doubles cycles ( <i>P</i> <sub>2</sub> )<br>– mechanical stability, change $\Delta P$ | ISO 2137           | 278                  | 270    |
|  |                    | 320                  | 342    |
|  |                    | 42                   | 72     |
| Dropping temperature, °C   | ISO 2176           | 248                  | 228    |
| Colloidal stability, % of extracted oil  | GOST 7142 method A | 5.2                  | 10.0   |
| Tribological characteristics on four ball machine at the temperature of (20±5) °C:<br>– critical load ( <i>P</i> <sub>c</sub> ), N<br>– welding loading ( <i>P</i> <sub>w</sub> ), N                       | GOST 9490          | 1,039                | 921    |
|  |                    | 1,744                | 1,568  |
| Water resistance at temperature 79 °C, %   | ASTM D 1264        | 0.8                  | 0.9    |
| Resistance to oxidation: increase in acid number (120 °C, 10 hours), mg KOH/g  | GOST 5734          | 0.14                 | 0.22   |
| Corrosive action on copper   | ASTM D 4048        | 1a                   | 1a     |

The synthesized urea lubricants are characterized by high mechanical (a change in penetrations after moving of 100,000 double cycles of 42 mm·10<sup>-1</sup>), colloidal stability (5.2 % of extracted oil) and high-temperature properties (dropping temperature above 248 °C). In addition, these thixotropic systems are resistant to oxidation, do not cause corrosion of non-ferrous metals, and are able to operate in contact with water. Phosphorous residues improve the lubricating properties of synthesized compositions without any additional introduction of tribological modifiers (critical load is 1,039 N, welding load – 1,744 H).

## References

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