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NONCORROSIVE GRAPHITE EMULSIONS

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This invention relates to non-corrosive aqueous suspensions of graphite useful as lubricants.

Graphite has long been known as an excellent lubricant. It has been used alone or as a dispersion in oil with good results. In many cases however the use of oil as a diluent must be avoided because of the hazard of inflammability, especially where high temperatures or oxygen are involved. Under the latter conditions suspensions of graphite in water have been found suitable. These graphite-water dispersions permit the easy lubrication even of oxygen valves built from light metal but the water content causes corrosion of the metal with which it comes in contact.

Methods heretofore known for preventing corrosion by a water phase have been of no use with the graphite-water dispersion. The admixture of inorganic salts such as sodium nitrite has been tried but without the production of any particularly beneficial results. Instead, this addition has merely caused the deposit of crystals upon the metallic surface when the water evaporated. In like manner the addition of organic amines fails to prevent corrosion of light metals. It is accordingly the principal object of this invention to develop a method of preventing the corrosive effect of graphite-water lubricating emulsions upon metals and especially upon light or non-ferrous metals.

A non-corroding graphite-water mixture can be obtained by adding to the ordinary emulsion a small amount of a compound of the composition:

$$R_1—SO_2—NH—R_2$$

In this formula R_1 represents a soluble saturated aliphatic hydrocarbon radical with a length of more than eight carbon atoms and R_2 represents an aliphatic or aromatic carboxylic acid radical or salt thereof, that is, the acid or salt less one hydrogen atom.

The new non-corroding graphite-water emulsions combine the advantages of the usual graphite-water emulsion with the advantages of the graphite oil emulsion, that is, the lubricating effect and high temperature resistance of the graphite film combined with corrosion prevention without a hazardous oily layer on the lubricated surface.

The following examples are given to illustrate the effects of the addition of the corrosive resisting agents in the manner of the present invention:

Example 1

The parts of a light metal valve regulating a flow of liquid oxygen were lubricated with a graphite-oil paste. Under active working conditions an explosion-like inflammation of the oil film occurred, burning out the valve.

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Example 2

A valve similar in construction to that of Example 1 was lubricated with a graphite-water paste. After evaporation of the water content, the valve worked safely in contact with oxygen. Corrosion, however, was visible on the light metal parts.

Example 3

The lubrication of Example 2 was repeated except that the graphite-water paste applied contained 0.1% of octadecyl-sulfamido acetic acid sodium salt. The light metal valve worked safely in contact with oxygen with no corrosion at all.

Example 4

The highly polished surface of metal dies used to cure rubber was covered with a graphite-water paste containing 0.5% by weight of hexadecyl sulfamido butyric acid potassium salt. No corrosion occurred during a long storage period and the dies could be used instantaneously without cleaning.

Example 5

On the elevator blades of a rocket stagnation temperatures of about 400° C. have been observed. A lubricant of usual composition cannot be used at this temperature because of its inflammability and lack of heat resistance. A water-graphite mixture containing 0.5%

$$R_3—SO_2—NH—CH_2COONa$$

inhibitor acted as a sufficiently heat resistive lubricant but caused no corrosion to the blades after a long storage time. R_3 in this formula represents a saturated aliphatic hydrocarbon radical with a chain length of between 12 and 18 carbon atoms.

The foregoing examples merely illustrate the advantages of the present invention which is limited solely by the scope of the appended claims.

What we claim is:

1. The method of inhibiting the corrosive properties of a suspension of graphite in water which comprises supplying thereto a minor corrosion inhibiting amount of a compound of the formula

$$R_1—SO_2—NH—R_2$$

where R_1 represents a saturated aliphatic hydrocarbon radical with a chain length of between eight and twenty-four carbon atoms and R_2 represents a member chosen from the group consisting of aliphatic and aromatic carboxylic acid radicals of low molecular weight and the water soluble salts thereof.

2. A composition of matter comprising water as a dispersing and solvent medium, graphite colloidally suspended in the water, and a minor corrosion inhibiting amount of a dissolved compound of the formula

$$R_1—SO_2—NH—R_2$$

where R_1 represents a saturated aliphatic hydrocarbon radical with a chain length of between eight and twenty-four carbon atoms and R_2 represents a member chosen from the group consisting of aliphatic and aromatic carboxylic acid radicals of low molecular weight and the water soluble salts thereof.

3. A composition of matter comprising water, graphite colloidally dispersed therein and a minor corrosion inhibiting amount of dissolved octadecyl-sulfamido acetic acid sodium salt.

4. A composition of matter comprising water, graphite colloidally dispersed therein and a minor corrosion inhibiting amount of hexadecyl-sulfamido butyric acid potassium salt.

5. A composition of matter comprising water, graphite colloidally dispersed therein and a minor corrosion inhibiting amount of a compound of the formula

$$R_3—SO_2—NH—CH_2COONa$$

where R_3 represents a saturated aliphatic hydrocarbon radical with a chain length of between 12 and 18 carbon atoms.

6. A lubricant comprising water, colloidally dispersed graphite and a minor corrosion inhibiting amount of a dissolved compound of the formula

$$R_1—SO_2—NH—R_2$$

where R_1 represents a saturated aliphatic hydrocarbon radical with a chain length of between eight and twenty-four carbon atoms and R_2 represents a member chosen from the group consisting of aliphatic and aromatic carboxylic acid radicals of low molecular weight and the water soluble salts thereof.

7. The method of inhibiting the corrosive properties of a suspension of graphite in water which comprises supplying thereto between about 0.1% and about 0.5% of a compound of the formula

$$R_1—SO_2—NH—R_2$$

where R_1 represents a saturated aliphatic hydrocarbon radical with a chain length of between eight and twenty-four carbon atoms and R_2 represents a member chosen from the group consisting of aliphatic and aromatic carboxylic acid radicals of low molecular weight and the water soluble salts thereof.

8. The method of protecting light metals against the corrosive attack of a water-graphite paste which consists in supplying to said paste between about 0.1% and 0.5% by weight of a compound of the formula

$$R_1—SO_2—NH—R_2$$

where R_1 represents a saturated aliphatic hydrocarbon radical with a chain length of between eight and twenty-four carbon atoms and R_2 represents a member chosen from the group consisting of aliphatic and aromatic carboxylic acid radicals of low molecular weight and the water soluble salts thereof.

9. A composition of matter consisting essentially of water as a dispersing and solvent medium, graphite colloidally suspended in the water, and a minor corrosion inhibiting amount of a dissolved compound of the formula

$$R_1—SO_2—NH—R_2$$

where R_1 represents a saturated aliphatic hydrocarbon radical with a chain length of between eight and twenty-four carbon atoms and R_2 represents a member chosen from the group consisting of aliphatic and aromatic carboxylic acid radicals of low molecular weight and the water soluble salts thereof.

10. A composition of matter consisting essentially of water as a dispersing and solvent medium, graphite colloidally suspended in the water and between about 0.17% and about 0.5% by weight of a dissolved compound of the formula

$$R_1—SO_2—NH—R_2$$

where R_1 represents a saturated aliphatic hydrocarbon radical with a chain length of between eight and twenty-four carbon atoms and R_2 represents a member chosen from the group consisting of aliphatic and aromatic carboxylic acid radicals of low molecular weight and the water soluble salts thereof.

11. A composition of matter consisting essentially of water, graphite colloidally dispersed therein and between about 0.1% and 0.5 % of dissolved hexadecyl sulfamido butyric acid potassium salt.

12. A lubricant consisting essentially of a graphite-water paste containing 0.1% by weight of octadecyl-sulfamido acetic acid sodium salt.

13. A lubricant consisting essentially of a graphite-water paste containing 0.5% by weight of hexadecyl sulfamido butyric acid potassium salt.

14. A lubricant non-corrosive towards light metals consisting essentially of a graphite-water paste carrying dissolved therein between about 0.1% and 0.5% by weight of a compound of the formula

$$R_1—SO_2—NH—R_2$$

where R_1 represents a saturated aliphatic hydrocarbon radical with a chain length of between eight and twenty-four carbon atoms and R_2 represents a member chosen from the group consisting of aliphatic and aromatic carboxylic acid radicals of low molecular weight and the water soluble salts thereof.

15. A lubricant non-corrosive towards light metal consisting essentially of a graphite-water paste carrying dissolved therein between about 0.1% and 0.5% by weight of a member of the group consisting of octadecyl sulfamido acetic acid sodium salt and hexadecyl sulfamido butyric acid potassium salt.

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