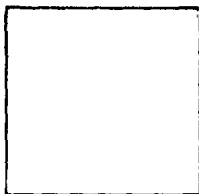


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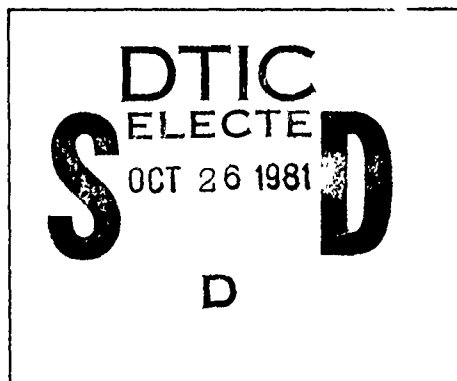
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REPORT NO. 356/2

AD A951440

CORROSION OF STEEL IN CUTTING OIL

By

INDEXED

U. B. Gruedis  
Jr. Chemist

Best Available Copy

April 28, 1938

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April 28, 1938

CORROSION OF STEEL IN CUTTING OIL

Object

To study the corrosive action of several cutting oils on steel.

Material

Plain lard oil, plain mineral oil, sulphurized cutting oil "Sultran SV-No. 2", sulphurized lard and sulphurized mineral oils (both prepared by digesting the plain oils at 150°F with an excess of flowers of sulphur).

Conclusions

The pure oils (sulphurized and unsulphurized) in the absence of moisture have no corrosive action on steel at room temperature or at 200°F.

In the presence of moisture, both sulphurized and plain oils cause tarnishing of steel at room temperature; at 200°F the action is more rapid, and etching of the steel occurs after 15 days.

### Method

Strips of steel, 70 mm. x 7 mm. x 1 mm., and finished with No. 00 emery cloth were partially immersed in the following combinations of oils contained in test tubes:

Plain lard oil  
Plain mineral oil  
Sultran S.V.-No. 2 ✓  
Sulphurized lard oil  
Sulphurized mineral oil  
Plain lard oil saturated with water  
Plain mineral oil saturated with water  
Sultran S.V.-No. 2 " " "  
Sulphurized lard oil " " "  
Sulphurized mineral " " " "

Tests were conducted at room temperature and in a constant-temperature oven held at 200°F. Periodic observations were made for a period of 15 days.

### Results

After 24 hours at 200°F, all of the oils containing moisture caused the steel to become tarnished. All other specimens both at room temperature and at 200°F were unchanged. After 24 hours at room temperature, the moisture-bearing oils had caused slight tarnishing; the oils containing no moisture had caused no change.

After 24 hours, the steel samples contained in the oils saturated with moisture at 200°F have become

badly tarnished. At the end of 15 days these steel specimens were etched at the air-oil interface. The action was especially severe in the Sultran SV-No. 2 oil which caused the formation of a black, gritty film on the steel. There was some indication that the attack in the sulphur-bearing oils had been more severe than in the plain oils, but further tests are necessary to confirm this.

The steel immersed in the oils which contained no moisture, both at room temperature and at 200°F, were unchanged after 15 days. Table 1 indicates the progressive changes which took place during the course of the tests.

Respectfully submitted,

*M. B. Gruzdis*

M. B. Gruzdis,  
Jr. Chemist.

200° F

ROOM TEMP. 75° F

TYPE OF OIL	TIME ELAPSED	ROOM TEMP. 75° F	200° F
PLAIN MINERAL	24 Hrs. no change	24 Hrs. no change	24 Hrs. no change
SULPHURIZED MINERAL	72 Hrs. no change	72 Hrs. no change	72 Hrs. no change
PLAIN LARD	"	"	"
SULPHURIZED LARD	"	"	"
SULTRAM SV-No. 2	"	"	"
PLAIN MINERAL + H <sub>2</sub> O	4 Hrs. slight tarnish	4 Hrs. tarnish	4 Hrs. bad tarnish
SULPHURIZED MINERAL + H <sub>2</sub> O	"	"	"
PLAIN LARD + H <sub>2</sub> O	"	"	"
SULPHURIZED LARD + H <sub>2</sub> O	"	"	"
SULTRAM SV-No. 2 + H <sub>2</sub> O	"	"	"

CORROSIVE EFFECT OF SEVERAL CUTTING OILS ON STEEL

(Sulphurized lard and sulphurized mineral oils were prepared by digesting the plain oils with flowers of sulphur at 150° F)