

Acme Coke  
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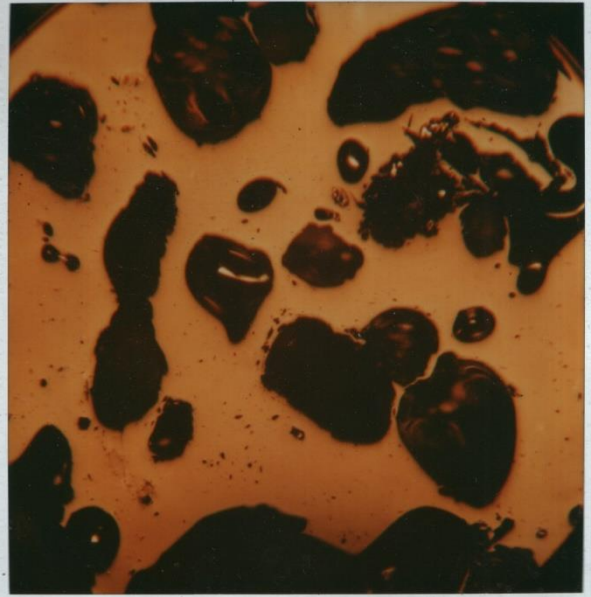


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“Use of Pet Coke in Cokemaking” (Addendum)  
Dated: 1984

FIGURE 2. ISOTROPIC TEXTURE OF COKE  
MADE OF ILLINOIS COAL  
MAGNIFICATION: 120  
MEAN MAXIMUM REFLECTANCE: .65%



*Coke made of  
Illinois Coal*

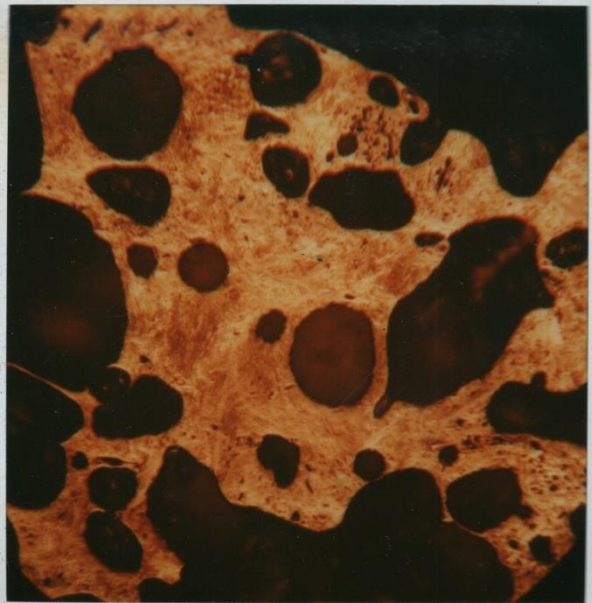
FIGURE 3. MEDIUM SIZE MOSAIC  
TEXTURE OF COKE MADE  
OF McCoy-Elkhorn Coal  
MAGNIFICATION: 120  
MEAN MAXIMUM REFLECTANCE: 0.99%



*Coke made of  
McCoy-Elkhorn Coal*

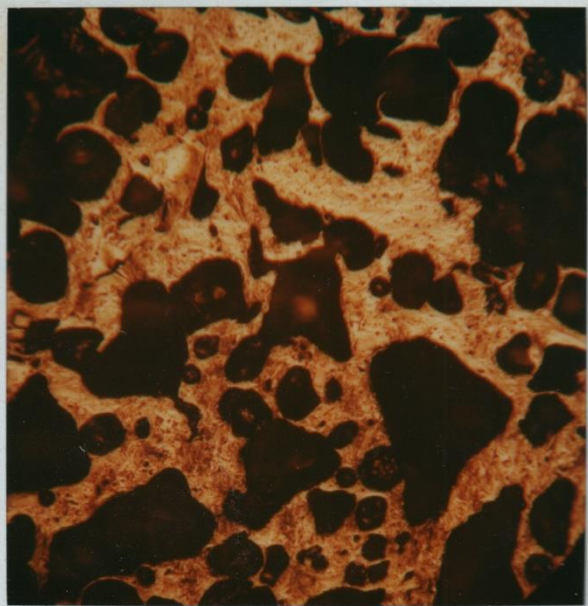


FIGURE 4. COARSE SIZE MOSAIC TEXTURE  
OF COKE MADE OF BISHOP COAL  
MAGNIFICATION: 120  
MEAN MAXIMUM REFLECTANCE: 1.40%



Coke made of  
Bishop Coal

FIGURE 5. FLOW TYPE AND DOMAIN TEXTURE  
OF COKE MADE OF POCAHONTAS  
COAL  
MAGNIFICATION: 120  
MEAN MAXIMUM REFLECTANCE: 1.90%



Coke made of  
100% Pocahontas



PRECURSOR OF NEEDLE STRUCTURE

AMORPHOUS

FIGURE 6. PETROLEUM COKE  
120X

PRECURSOR OF SUPRA  
MOSAIC



FIGURE 7. PETROLEUM COKE  
120X

PRECURSOR OF DOMAIN





FIGURE 8. PETROLEUM COKE  
120X



FIGURE 9. PETROLEUM COKE  
INSIDE COKE, 120X

- Note:
- (1) Loose Petroleum Coke Structure
  - (2) Built-in Cracks Inside Petroleum Coke
  - (3) Cracks In Coke Due To The Exist Of Petroleum Coke

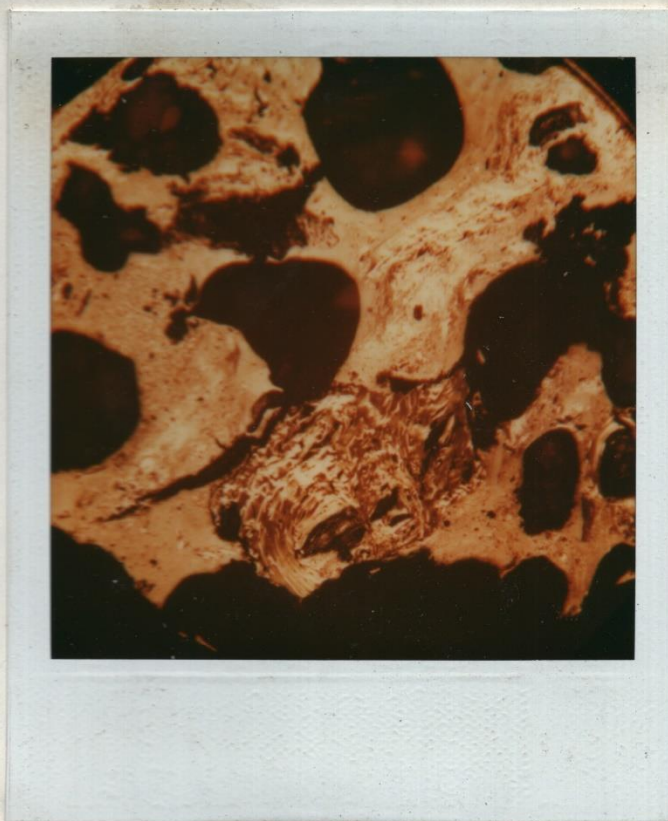




FIGURE 10. COKE MADE FROM  
TAR PITCH 120X

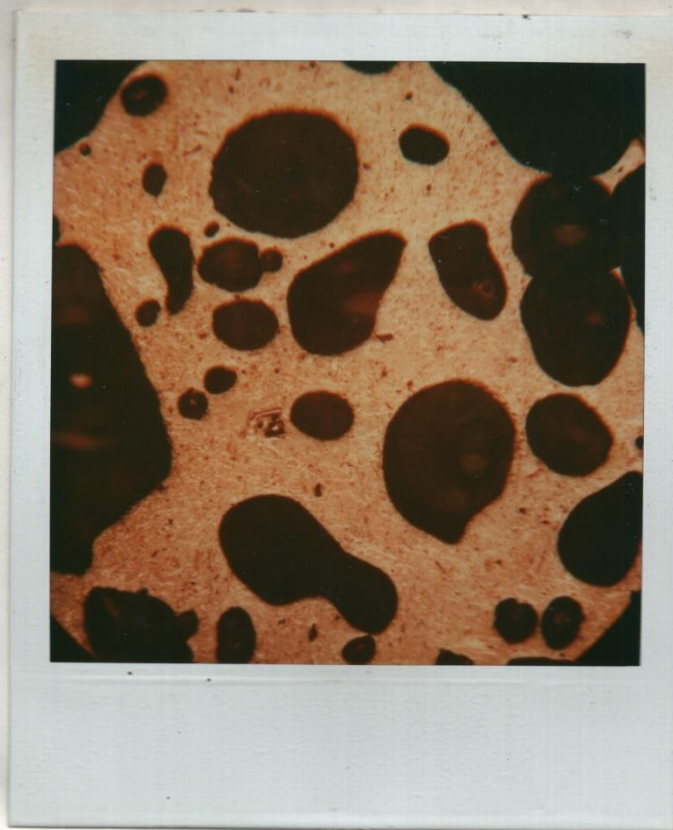


FIGURE 11. COKE MADE FROM  
TAR 120X





FIGURE 12. COKE MADE FROM  
IRANIAN LIGHT  
CRUDE RESIDUE  
120X

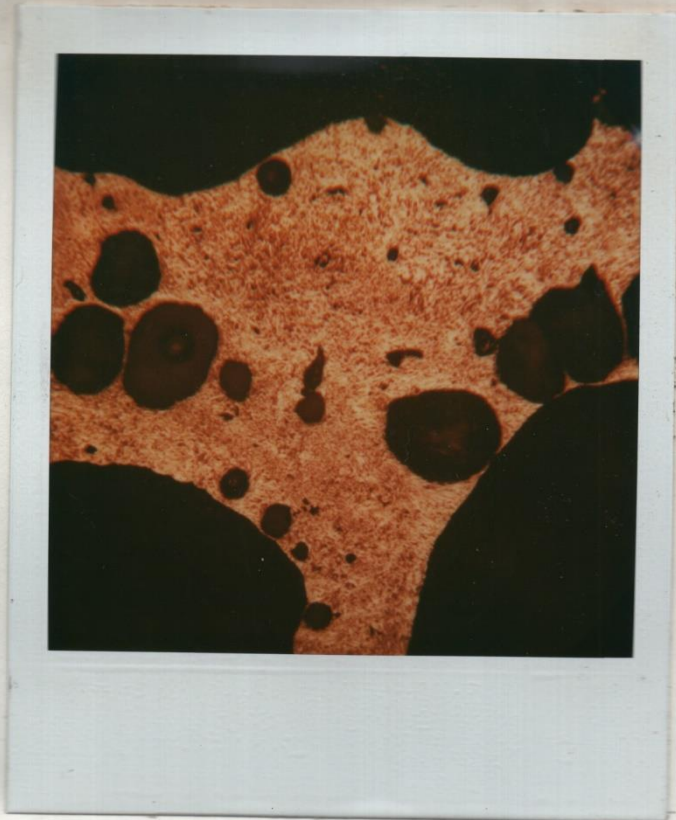


FIGURE 13. CO<sub>2</sub> ONLY CAUSES  
GENERAL CORROSION  
OR PIT CORROSION  
ON MOSAIC TEXTURE.  
HOWEVER, CO<sub>2</sub>  
CORRODES PETROLEUM  
COKE ALONG THE  
BOUNDARY (INITIAL  
STAGE) 120X

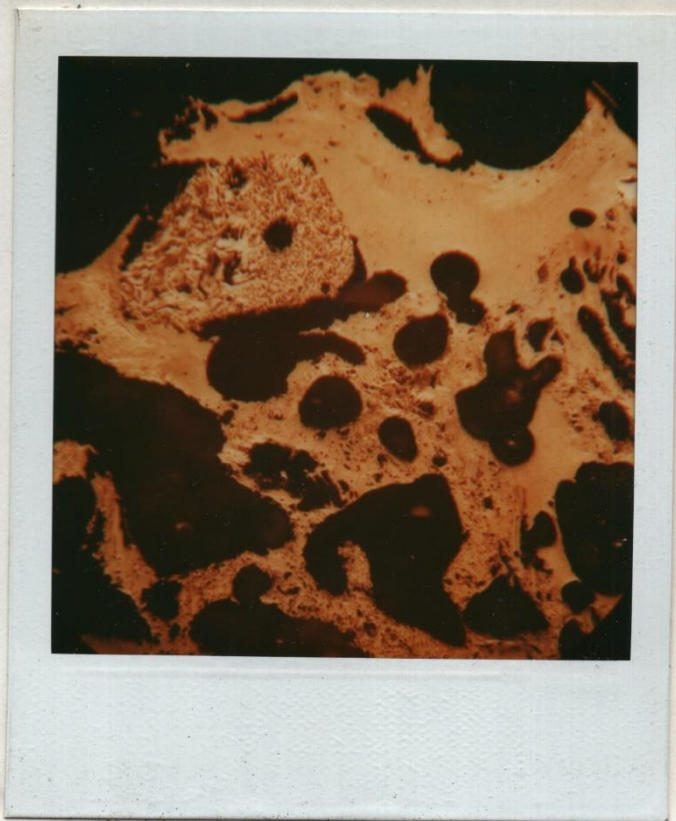




FIGURE 14. CO<sub>2</sub> CORROSION  
ALONG BOUNDARY  
(FINAL STAGE)  
120X

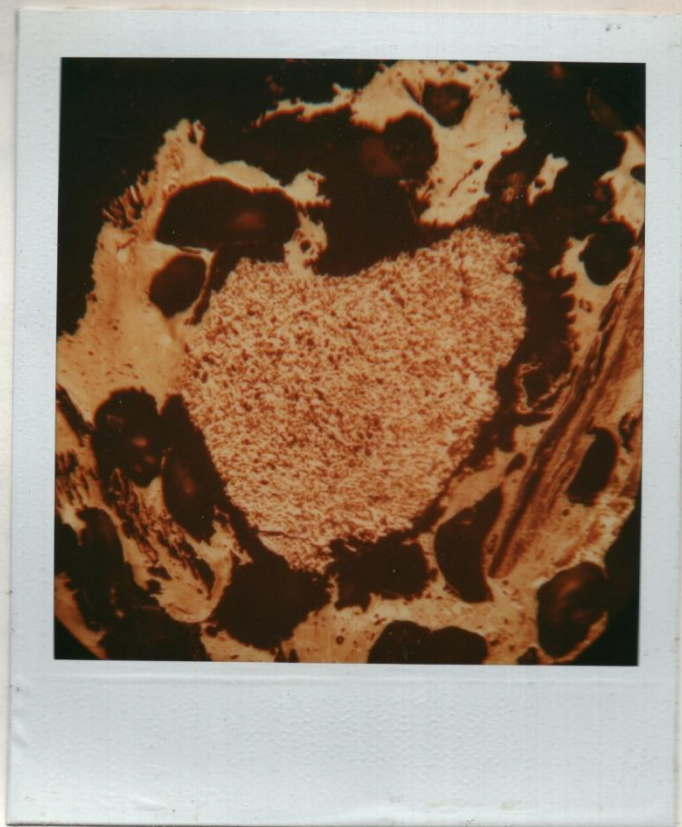
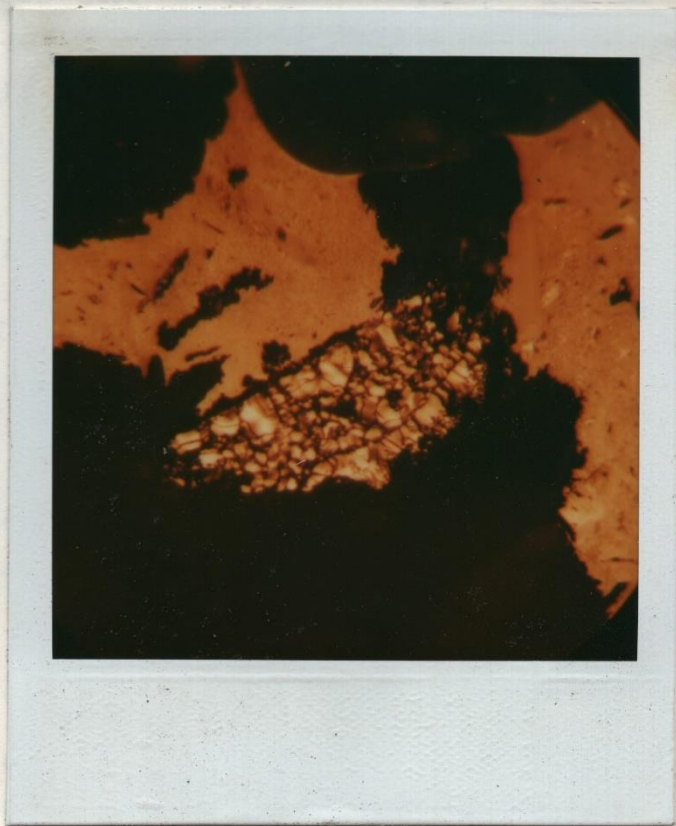


FIGURE 15. NOT ONLY  
PETROLEUM COKE  
CAN SEPARATE FROM  
COKE EASILY, BUT  
ALSO IT CAN SPLIT  
INTO EVEN FINER  
PARTICLES ITSELF  
(CO<sub>2</sub> ATTACK ON ITS  
LOOSE STRUCTURE)  
300X





## Appendix I

### Testing Method Of Reactivity And Strength After Reaction

#### 1. Summary Of Method

A sized sample of coke is reacted with CO<sub>2</sub> gas in the electric furnace at a specified time of duration and temperature. The indexes of its reactivity is determined by weight measurement of the coke before and after the treatment and strength after reaction is determined by sieve analysis of coke after the treatment and drum rotation.

#### 2. Apparatus

a) Reaction Apparatus -- The reaction apparatus shall consist of a reaction pipe 76.3 mm in outside diameter, 650 mm in height made of stainless-steel tube 4 mm in thickness, and an electric furnace as shown in Figure 1. The reaction pipe shall be equipped with an inlet of CO<sub>2</sub> gas and an outlet of reacted gas. Three sets of ring roaster made of stainless-steel plate are set in the reaction pipe so that the uniform flow of CO<sub>2</sub> gas into the sample is maintained.

b) Tumbler Machine -- The tumbler machine shall consist of a steel drum 130 mm in inside diameter and 700 mm in length as shown in Figure 1.

c) Sieve -- For sieving the coke after the reaction, square-mesh having 9.52 mm actual openings shall be used.

#### 3. Sampling

The gross sample collected shall be sufficient to obtain approximately 15 kg of coke.



#### 4. Preparation Of Sample

The coke shall be crushed and sized by sieving on 19 mm and 21 mm square-mesh sieves.

#### 5. Procedure

##### a) Reactivity

Accurately weigh 200 g of the coke sample that has been sized in accordance with Section 4 and previously dried at a temperature of 150°C, and place it in the reaction pipe. Thermo-couple with a protection pipe shall be set at the center of the sample. The reaction pipe shall be set in the electric furnace and N<sub>2</sub> gas shall be flowed into the sample until the temperature rises up to 1100°C. At the temperature 1100°C, CO<sub>2</sub> gas shall be flowed into the reaction pipe for two hours. The coke after reaction shall be weighed accurately.

##### b) Strength After Reaction

All of the coke after reaction shall be placed in the drum which shall be rotated at 20 rpm for a total of 600 revolutions. The coke shall be sieved using 10 mm square-mesh sieve.

#### 6. Report

Reactivity and strength after reaction are as follows:

Reactivity ----

$$\frac{\text{Weight before reaction} - \text{weight after reaction}}{\text{Weight before reaction}} \times 100$$



Strength After Reaction ---

$$\frac{+10 \text{ mm weight after revolution}}{\text{Weight after reaction}} \times 100$$

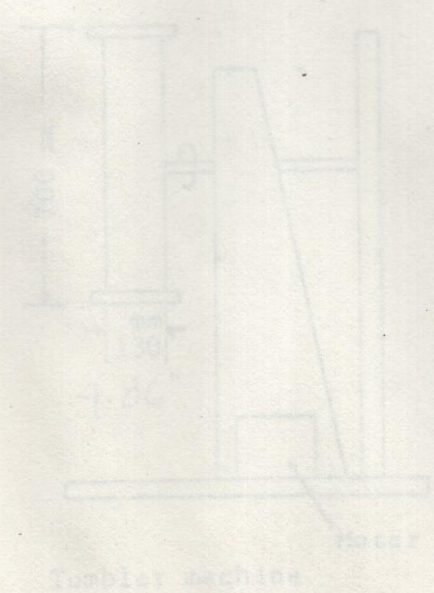
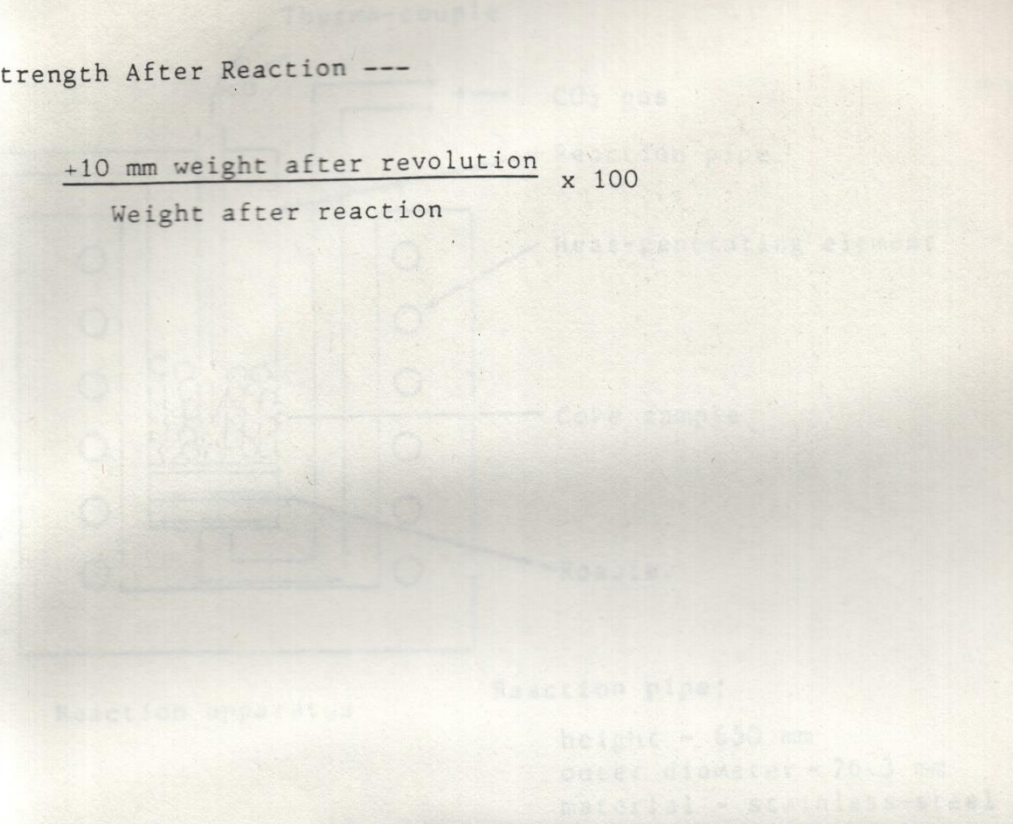
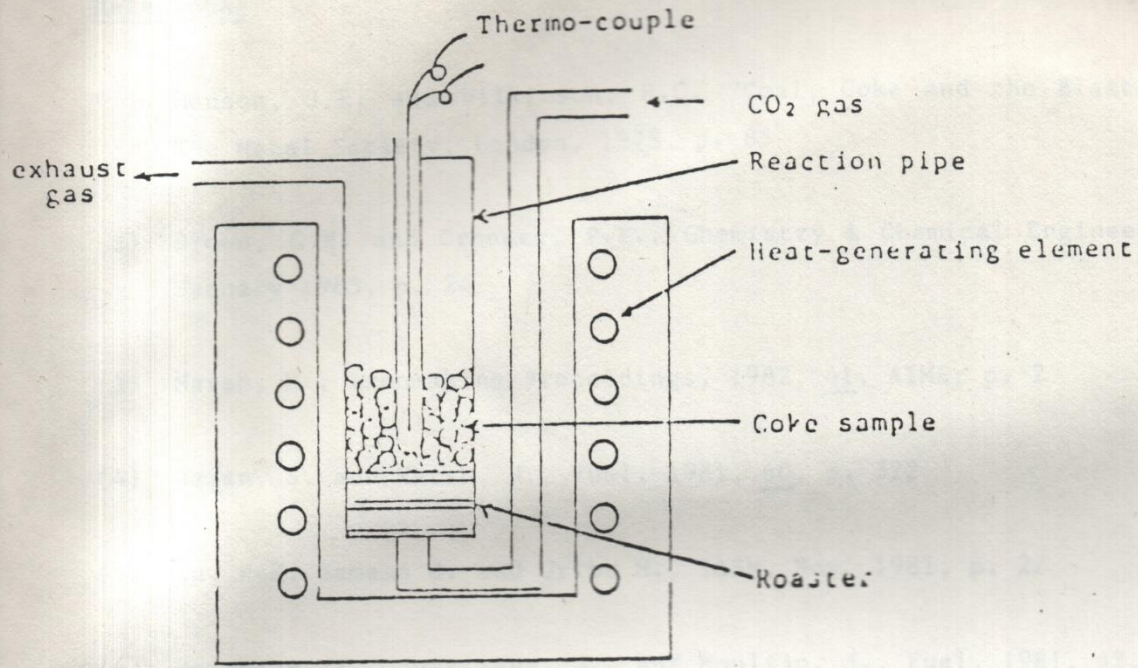


Fig. 1. Testing apparatus for coke reactivity

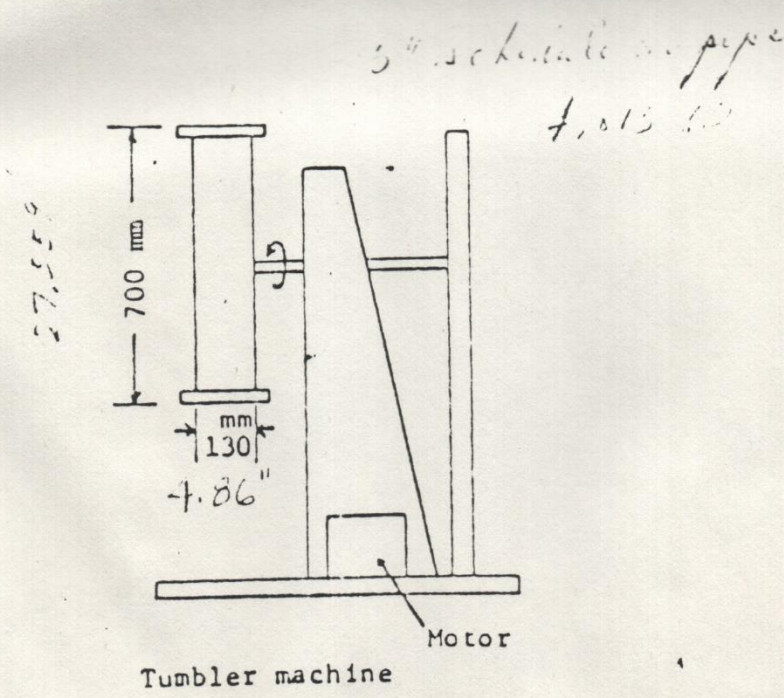




Reaction apparatus

Reaction pipe;

height - 650 mm  
 outer diameter - 76.3 mm  
 material - stainless-steel



Tumbler machine

Fig. 1. Testing apparatus for coke reactivity and strength after reaction