A Texas refiner reported the following technique:

"The complaint is investigated immediately by qualified investigators who are on call day or night. He has at his disposal hourly records of wind direction and velocity. Also a continuous record of the oxidizable sulfur compounds (principally H_2S and SO_2) is obtained by monitoring with a Titrilog. This unit is portable and can be used to check concentrations in nearby residential areas.

"Paint panels with lead-base and fume-resistant paint sections also are located on the perimeter of the refinery to detect the presence of hydrogen sulfide."

Methods used by two Los Angeles plants were: "Wind-recorder charts, fall-out monitoring plates, daily reports of hourly checks on smoke and odors by strategically located personnel."

The second reported: "This refinery maintains records of wind direction and velocity, atmospheric concentration of SO_2 at ground level, observations of a daily odor control, process data, maintenance work done, and smoke and dust-detection devices."

Role of Research

Much has been learned about the fundamentals of air pollution in the past 10 years. But insofar as the chemistry and mechanics are concerned—not to mention the effects of air pollution on human health — much more needs to be learned if community problems are to be solved on an intelligent basis.

That air pollution is a growing urban problem is readily reflected in the tone and quality of articles carried in newspapers and national consumer magazines. Here are just a few examples:

"Filth in the Air," Redbook, April 1960.

"The Polluted Air We Breathe," Consumer's Union, August 1960.

"How Much Poison Are You Breathing?" Harpers Magazine, October 1960.

"The Filthy Air We Breathe," Changing Times, September 1960.

"The Noisome Problem of Car Fumes," Fortune Magazine, January 1960.

The Consumer's Union article received wide newspaper publicity due to a listing of the 12 worst-polluted areas in the United States. Based on a poll of APC experts the areas were: New York, Chicago, Los Angeles, Philadelphia, Cincinnati, Detroit, St. Louis, Birmingham, the Ohio River Valley, Pennsylvania's Allegheny County, the Kanawha Valley of West Virginia, and the area around Niagara Falls, N. Y.

With half our population now living in 174 metropolitan areas, practically every major city now has air-pollution problems. Many are making surveys and taking steps to correct the situation.

Regardless of the extent to which

No article on air pollution would be complete without some reference to the role played by the automobile in producing Los Angeles-type smog, and the process being made toward a cure.

Los Angeles, which probably has the most stagnant air of any major U. S. city, was the first place where smog became a problem. But as their car populations increase, other cities are experiencing similar attacks. San Francisco, New York, and Chicago all have eye-burning smog during periods of static weather.

In Washington, D. C., last fall, smog reduced visibility to 1.5 miles, as compared to 10 miles on a clear day. At the peak an ozone concentration of 0.25 p.p.m. was measured, only half that at which the first alert is called in Los Angeles.

There no longer appears to be any question that the auto is the main cause. Researchers can create "synthetic" smog by irradiating exhaust gases in the laboratory, producing formaldehyde, acrolein, and peroxyacetyl nitrate—three compounds which have been found to have eye-burning, crop-damaging properties.

Effect of fuel composition. With the cause of smog now apparently determined, the best means of cleaning up the exhaust gases is now the goal. Most researchers believe that either catalytic converters or direct-flame afterburners will be the answer. Some, however, believe a partial solution is to limit the olefin content of motor fuels.

Though the relationship between fuel composition and an auto's exhaust is far from settled, research conducted by the Bureau of Mines at its Bartlesville, Okla., laboratories indicates little can be accomplished by this route.

The bureau has found that only during decelerating periods does the olefin concentration of the exhaust follow the olefin content of the fuel. During accelerating and cruising, the olefin content of the exhaust was independent of the fuel's olefin content.

Even more important, the majority of its experimental data shows a slight trend toward decreased olefin emissions with higher olefinic content of the fuel.

Research by the Los Angeles Air Pollution Control District points to the opposite conclusion. Fuels with different proportions of olefinic, paraffinic, and aromatic fractions were tested under average Los Angeles traffic conditions. Analysis of the exhaust gases showed their hydrocarbon composition reflected the composition of the parent fuel.

Meanwhile, the APCD's Rule 63, which became effective last July 1, prohibits the sale of gasolines having more than 15% olefins. The limit may be further reduced to 10% in mid-1962. At least two Los Angeles refiners have found it necessary to install light hydrogen-treating units in order to comply with the existing limit.

The search for a converter. With a California state law already setting standards for motor-vehicle exhaust emissions, the job is to develop devices which will effectively (and economically) reduce their hydrocarbon and carbon monoxide content.

"Learning more about our atmosphere has been expensive"

refining operations may be contributing to air pollution in any of these cities, the petroleum industry—at least in the public's viewpoint—is indirectly involved since it supplies the motor fuel for autos.

Hydrocarbons, carbon monoxide, and lead exhausted from cars are becoming of increased concern to health authorities. Eye-burning smog is generally associated with Los Angeles; but New York, Chicago, San Francisco, Washington, and other large cities also are experiencing such attacks (see box).

Oil industry research. The oil industry has been one of the most active leaders in air-pollution research, both in the sponsorship of group research as well as that carried on privately. The American Petroleum Institute, Western Oil & Gas Association, Coordinating Research Council, and Air Pollution Foundation all have contributed valuable findings.

A 3-year study of Los Angeles refineries, completed in 1958, resulted in valuable data on refinery emissions and better sampling and analytical methods. Though it was a joint federal-state-county project, oil-industry personnel contributed much to its success.

Learning more about our atmosphere, and the extent to which refinery operations and products contribute to community air-pollution problems has been expensive. Complete figures are not available, but the following is a partial listing of oil-industry expenditures for research:

... API sponsored projects have cost more than $1,500,000. These approximated $250,000 annually during some years, and for the current year will be about $165,000.

... Western Oil & Gas has spent about $250,000 on surveys and in sponsoring research. Its member companies contributed another $1,275,000 to the Air Pollution Foundation during the period 1954-1960. Except for last year, when $75,000 was given, the annual contribution was $200,000. With its mission accomplished, the foundation is being dissolved this year.

... Oil-company research amounts to more than $500,000 annually, according to figures supplied the Journal in this survey. Even though many companies did not supply this information, the 16 which did reported a total of $526,000 annually during 1958-60. This year they planned to spend $503,000.

Based on the reported figures alone, it thus is evident that the oil industry's total research bill is ap-

... AND THE AUTO

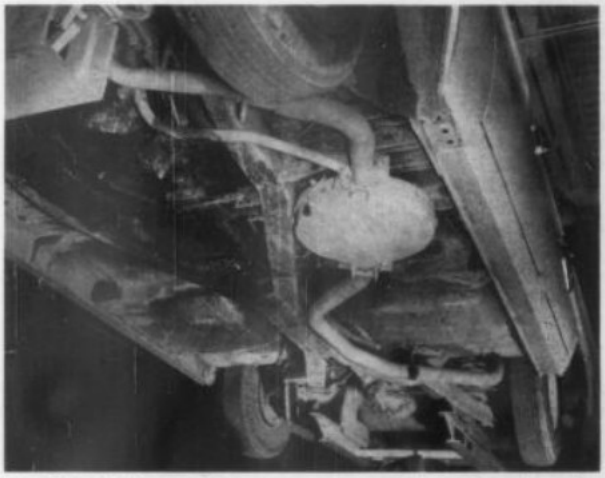
Facilities for testing such devices are now being set up in Los Angeles by the Motor Vehicle Pollution Control Board. When these are available, it is expected that several immediately will be offered.

Both Universal Oil Products Co. and Oxy-Catalyst, Inc., have catalytic converters which they claim will meet California requirements (i.e., capable of an 80% reduction in hydrocarbons and a 60% reduction in CO emissions, and that its initial cost be not more than about $50 above the cost of the existing muffler it would replace).

In the direct-flame afterburner field, Holley Carburetor Co. and Thompson Ramo Wooldridge, Inc., claim satisfactory devices. These are only 4 of the more than 30 companies which have been working on the problem.

Just when the first exhaust-control devices will be available is questionable. After the test facilities are set up, two or more devices have to be certified. A year after that any new car sold in California must have a converter before it can be registered. Thus it would appear that it will be about 2 years before any devices could appear on cars.

When completely satisfactory devices become available, it's not unlikely they will become standard equipment on all autos. The need for cleaner air will require their installation, pollution experts claim.



EXHAUST-CONTROL DEVICES are now in the mill which would reduce hydrocarbon and CO emissions considerably. Pictured is the catalytic converter developed jointly by Universal Oil Products Co. and Oxy-Catalyst, Inc.