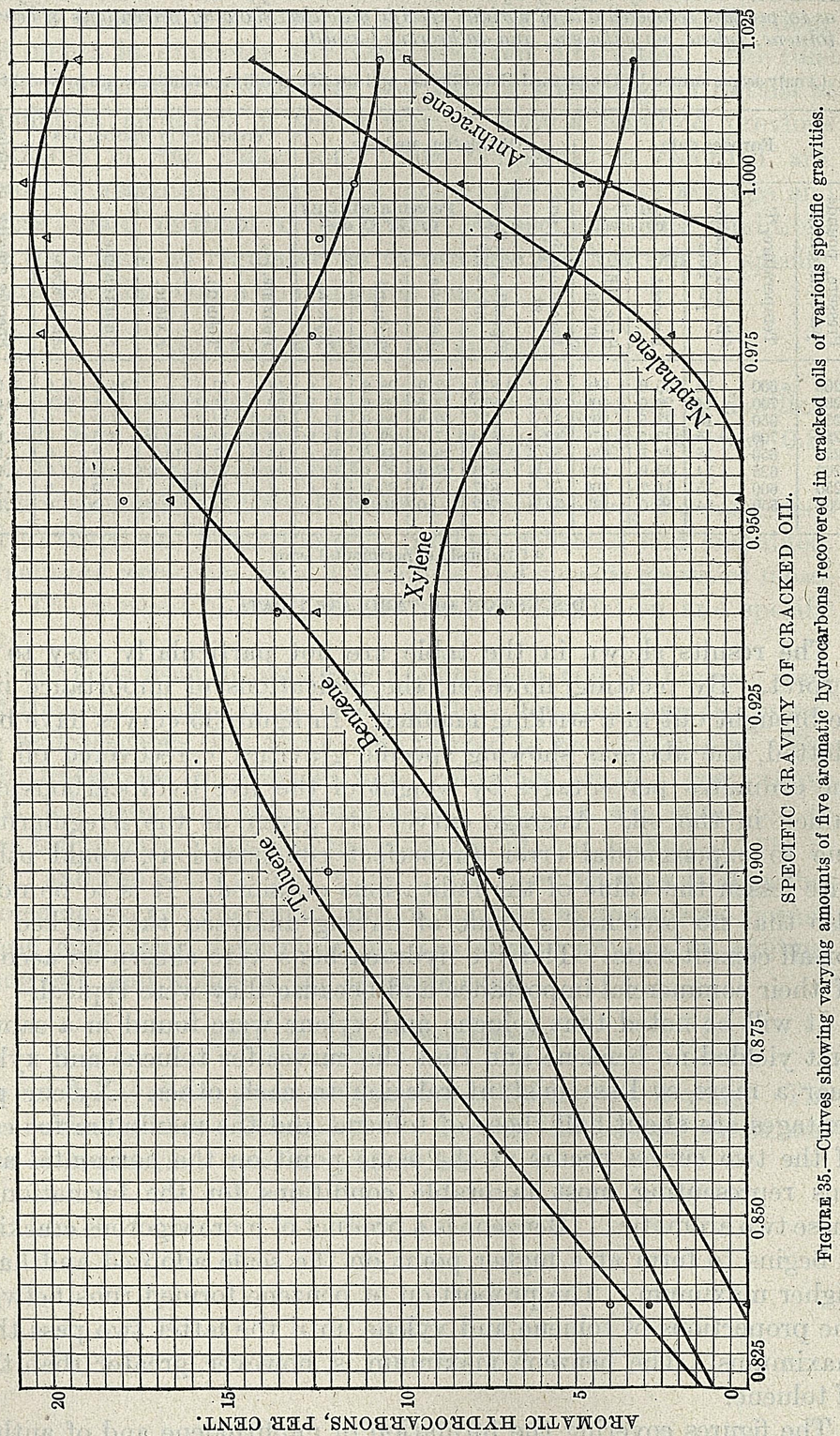

FIGURE 35.—Curves showing varying amounts of five aromatic hydrocarbons recovered in cracked oils of various specific gravities.

and toluene commences to fall off. The naphthalene curve ascends rapidly at the upper limit of the range of temperatures used in the experiments, and there is no indication that it has begun to approach its maximum. Cracking conditions to produce anthracene must be even more strenuous than those to produce naphthalene.

GENERAL SUMMARY.

The results of the experiments described show that from cymene it is possible to produce by "cracking" all the other hydrocarbons of the series, such as xylene, toluene, benzene, naphthalene, and anthracene. From xylene results toluene, benzene, naphthalene, and anthracene, but no cymene. Toluene yields benzene, naphthalene, and anthracene, but no cymene and no xylene. Benzene goes to naphthalene and anthracene, but not to any of its higher homologues. From naphthalene anthracene is readily obtainable, but none of the monocyclic hydrocarbons, benzene, toluene, xylene, and cymene, is produced. Anthracene yields no naphthalene, but goes to tarry matter, carbon, and gas.

Likewise it appears that the formation of higher benzene homologues is favored by less strenuous conditions of cracking than constitute an optimum for benzene. Polycyclic hydrocarbons are shown to be decomposition products of monocyclic hydrocarbons, as production of the latter falls off under cracking conditions that favor the formation of such typical compounds as naphthalene and anthracene.

On the basis of the evidence at hand it seems justifiable to state that the course of the cracking reaction in the aromatic series may be indicated as follows and that practically no reverse action occurs.

Higher benzene homologues $\rightleftarrows$ lower benzene homologues $\rightleftarrows$ benzene $\rightleftarrows$ (diphenyl) $\rightleftarrows$ naphthalene $\rightleftarrows$ anthracene $\rightleftarrows$ carbon and gas.

APPLICATION TO OTHER FIELDS OF PRINCIPLES ESTABLISHED BY HYDROCARBON REACTIONS.

The technical and industrial importance of the different reactions reported herein is much greater than their application to the treatment of petroleum alone would indicate. The principles involved are equally applicable to the treatment of coal, lignite, peat, bitumen, or any other substance capable of yielding liquid hydrocarbons. In fact, the field for application of these principles is even greater as regards these other substances because of their greater extent and production. The output of petroleum in the United States, although 65 per cent of that of the whole world, is decidedly secondary, on the basis of volume and tonnage, to that of solid fuels, indicating at once the tremendous possibilities in the production of tar and other hydrocarbons from coal and the other materials enumerated.