At V_m a part of the input energy is radiated in space chiefly as high frequency oscillations; their frequencies and the corresponding current ^{i}-aerial increase with V. This applies also to the ordinary circuit conductivity i consisting of $^iHF + ^iLF + ^iS$ being due to the frequency of the A.C. supply and its harmonics, ^iS would appear to constitute a minor part of i. From the possible capacitance-change during a chemical reaction as in the *light-effect* Δi suggested above, the time-variation of the filtered ^{i}-aerial, ^iHF, ^iLF, etc., should be synchronous with the stage-wise progress of the corresponding composite change, especially when produced near V_m. Results of periodic reactions now being investigated in these Laboratories are in close accord with this deduction.

Department of Chemistry,
Benares Hindu University, S. S. JOSHI.
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ADSORPTION OF HYDROGEN AND CARBON MONOXIDE AND THEIR MIXTURES ON FISCHER-TROPSCH CATALYSTS : PART I

THE adsorption of hydrogen and carbon monoxide has been studied, both from pure gases and their mixtures on a kieselguhr supported catalyst containing 34·2 per cent. cobalt, 4·084 per cent. copper, 2·33 per cent. ThO_2 and 0·2369 per cent. Ce_2O_3 (tried in Fischer-Tropsch synthesis) at temperatures considerably below those where velocity of reaction becomes perceptible It was found that in the adsorption from mixtures, the presence of one gas promoted the adsorption of the other. The increase of adsorption was conspicuous even at 25° C. in the case of hydrogen and became noticeable only at 97° C. in the case of carbon monoxide. Besides, activation was found to set in at a much lower temperature in the case of mixture adsorption than in the case of pure gas adsorption. The relative amounts of the individual gases adsorbed from mixtures increased with rise of temperature even at temperatures above 25° for hydrogen and above 51° for carbon monoxide; in the case of pure gases, this activation effect became appreciable only at much higher temperatures, *viz.*, above 97° C. for hydrogen and 134° C. for carbon monoxide.

The adsorption was measured by a volumetric method. The analyses were carried in a modified micro Bone and Wheeler apparatus. No trace of hydrocarbons was found in the adsorption system at temperatures below 110° C. even after a period of 24 hours which was considered necessary for attainment of adsorption equilibrium.

The enhancement of adsorption of one gas by another cannot be explained on the basis of Langmuir theory, extended to cover mixed adsorption by Markham and Benton.[1] The theory, on the other hand, leads to the conclusion that the adsorption of one gas should decrease the adsorption of the other as was found by Hurst and Rideal[2] in the adsorption

TABLE I.—*Hydrogen*

p	25° C.			51° C.			76° C.			97° C.			107° C.		155° C.
	P.G.	M_1	M_2	P.G.	M_1	M_2	P.G.	M_1	M_2	P.G.	M_1	M_2	M_1	M_2	P.G.
15	—	3·45	—	2·11	3·87	5·18	—	4·79	6·12	2·31	6·69	10·88	9·72	16·25	2·86
25	3·08	4·07	7·00	2·40	4·59	6·90	—	5·68	8·29	2·57	7·27	13·07	11·55	19·80	3·20
35	3·20	3·76	6·94	2·62	5·30	7·16	—	6·66	8·59	2·72	9·19	14·30	15·00	22·71	3·47
60	3·00	—	—	3·09	-	—	—	—	—	3·21	—	—	—	—	4·08

TABLE II.—*Carbon Monoxide*

p	25° C.			51° C.			76° C.			97° C.			107°C.		134°C.	155°C.	178°C.
	P.G.	M_1	M_2	P.G.	M_1	M_2	P.G.	M_1	M	P.G.	M_1	M_2	M_1	M_2	P.G.	P.G.	P.G.
15	9·58	6·50	3·36	7·36	6·43	3·43	7·10	6·95	4·21	7·10	8·34	6·49	10·30	10·39	7·36	9·60	14·78
25	10·93	7·35	3·97	8·44	6·75	—	8·06	7·40	—	8·00	9·00	—	11·86	—	8·18	10·92	17·69
35	11·98	9·85	—	9·44	7·79	—	9·19	8·13	—	8·91	10·75	—	15·10	—	9·25	12·25	20·50
60	14·20	—	—	11·10	—	—	—	—	—	11·15	—	—	—	—	11·91	16·12	26·40

p = partial pressure in cms. of mercury, P. G. = volume in c c. N.T P. adsorbed by 9·41 gms. of catalyst from pure gas, M_1 = volume adsorbed from C 1 : 1) CO : H_2 mixture and M_2 = volume adsorbed from (1 : 2) CO : H_2 mixture.