next portions of hydrogen, however, cause an enhancement of carbon monoxide adsorption to a value higher than that obtained on the cleared catalyst surface. This difference in behaviour indicates that the latter amounts of hydrogen are adsorbed on sites dissimilar to those on which the first 0·20 ml. was adsorbed.

At 76°, the first portions of hydrogen upto 0·50 ml. cause a suppression of carbon monoxide adsorption and it is only when 1·0 or 1·50 ml. hydrogen is presorbed that the carbon monoxide adsorption comes up to the value obtained on the bare surface. At 97°, all doses of presorbed hydrogen upto 1·50 ml. cause a suppression of carbon monoxide adsorption. The first portions of hydrogen added have a relatively greater suppression effect than subsequent portions.

These results are strongly suggestive of being composed of two opposing effects occurring concurrently on different types of adsorptive sites on the surface. The presence of hydrogen on one causes a suppression of carbon monoxide adsorption; while carbon monoxide adsorption is enhanced with hydrogen present on the second type of sites. The relative extents to which hydrogen is adsorbed on the two types of sites at different temperatures, determine the overall effect on carbon monoxide adsorption.

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1. Ghosh, Sastri and Kini, *Ind. Eng. Chem.*, 1952, **44**, 2463.
2. Griffin, *J. Am. Chem. Soc.*, 1927, **49**, 2136.
3. —, *Ibid.*, 1937, **59**, 2431.

EXPONENTS OF THE ABSORPTION LAW FOR THE POLAR AND EQUATORIAL REGIONS

JOHNSON[1] suggested that the difference δ $(=\Delta n)$ of the exponents of the absorption law $I = A/h^n$ for the polar and equatorial regions can be determined from an analysis, either of the latitude effect or of the east-west asymmetry. He also pointed out that a higher accuracy can be realised from the latter method. The change in exponent arises from the inclusion in high latitude measurements of low energy rays in the range $\Delta r_c = 0\cdot5 - 0\cdot35 = 0\cdot15$. The absorption of the asymmetric radiation can be determined from the variation of the asymmetry with the zenith angle. With an increase of zenith angle, the atmospheric path increases but there is also an increase in the energy range within which the asymmetric component lies. To correct for the latter effect, the asymmetry A is divided by the range Δr_c of the threshold energies for the two directions involved and multiplied by 0·15, a value selected as a standard range because it represents approximately the range within which the latitude sensitive radiation is included. In Table I are given the asymmetry and other data. The symbol $A' = 1 + 0\cdot15\, A/\Delta r_c$ and $h = 9\cdot685 \sec \theta$.

TABLE I

Zenith angle θ	Asymmetry A	Δr_c	A′	h	log h	log A′
10°	·038	·044	1·128	9·833	·993	·0522
15°	·059	·066	1·134	10·02	1·001	·0546
20°	·073	·089	1·123	10·30	1·013	·0503
25°	·087	·112	1·115	10·69	1·029	·0476
30°	·091	·136	1·100	11·19	1·049	·0414
35°	·114	·161	1·106	11·82	1·073	·0437
40°	·122	·187	1·098	12·64	1·102	·0407
45°	·121	·214	1·085	13·70	1·137	·0355
50°	·114	·241	1·071	15·07	1·178	·0298
55°	·102	·271	1·056	16·89	1·228	·0237
60°	·086	·301	1·043	19·36	1·287	·0182

The threshold energies at Hyderabad (geomagnetic latitude 7° 39″) are calculated for the zenith angles concerned using the necessary formulæ.[2] The minimum energy allowable at the vertical in India at the geomagnetic equator is 17·0 Bev. after corrections for tilt of the earth's magnetic field and eccentricity of the dipole are taken into account (Neher,[6] Milli-

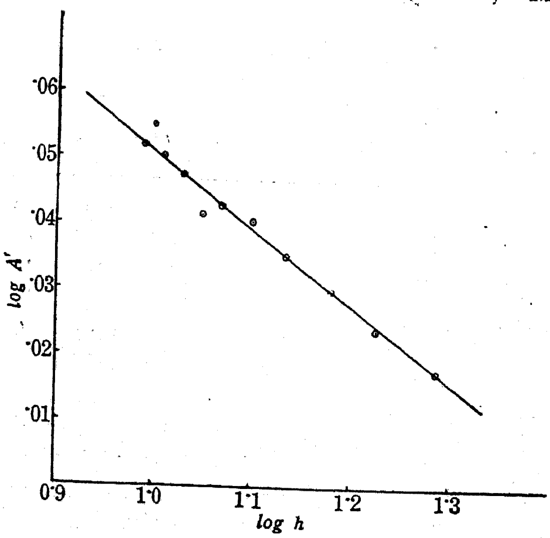

FIG. 1