

Madras
21.8.29

From

A. Jayaraman
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Nungambakkam
Madras.

U. S. R.
23/8

Dear Sir,

I introduce myself as A. Jayaraman B.Sc. Son
in Law of Mr. S. Ramayya Deputy Finance Secretary
Govt of India. You might remember you gave a
letter to Prof. Saigona Rao of the Indian Institute
of Science in connection with my admission there.
Unfortunately I could not get in there as I ^{did} ~~could~~
not satisfy their regulations for admission in to the
institute. I wish to express my grateful thanks
for the kind efforts that you had taken in this
connection.

My F. in Law would have told you all about myself.
It is my ambition to do some good work in the
border of Chemistry and Physics under a really
great ~~Rao~~ and reputed Professor. I have already
had considerable research and analytical
experience but unfortunately I happened to
work under a man of ill fame by sheer
accident. Well if my labours have not had
a success materially, my training has never
been a waste and it has given me more
of confidence and more of courage to think originally.

My pet problem is the study of the influence of electron concentration in metals and alloys with reference to their catalytic activity and activation energy. I had the good fortune to study some of the original papers and books of Dr Hume-Rothery on pure metallurgy and alloying and this showed me the way to apply some of the modern theory of metals and alloys to the field of catalysis by metals and alloys.

My investigations in this field should comprise of study of equilibrium diagrams for those series of alloys for which the ^{thermodynamic study} ~~above work~~ has not been done. This should be my start. I would like to investigate first in Pt-Au series, Ni-Cu ~~to~~, Pd-Ag, ~~Pt-Ag~~ and some other active catalysts in the transition metal other series. Since in those series of alloys ~~to~~ the parent metals have holes in the d band addition of electron contributing metals like Cu, Au, Zn, Ag etc should bring about causes the paramagnetism to fall down slowly with the atomic percent of the material added finally resulting finally in the complete disappearance of paramagnetism. Here also the Brillouin zone overlap occurs. ^{on} Catalysis the ~~nature~~ ^{mode} of decomposition is influenced by the structure of the catalyst. The molecules are adsorbed on the lattice points and a unimolecular film results from which they decompose and evaporate off. The source of activation energy ~~may be~~ is supposed to be the thermal vibrations of the lattice and also ~~the~~ in

Collision^{of molecules with the surface}. Another source which may be responsible for the activation may be the collision of free electrons with the adsorbed molecules. This does not seem to be impossible since the energy of free electrons are of the order of a few electron volts.

So by carrying out the above quoted alloying and conducting catalytic experiments ^{with the material} should give a clear insight into the mechanism. I wrote to Sir C. N. Hinshelwood on this problem and he approves of it and has written to me to take up the work and collect as much data as possible. Prof. N. F. Kent from Bristol says that the problem is quite a good one. ~~surely~~ he Prof Schwab has done some work along these lines but in his cases there were structural changes. This alloying should be carried out within the solid solubility as this does not involve a change in the structure but only a dissolution forming in most cases a ~~continuous~~ series of solid solutions.

Susceptibility measurements at each ^{stage} ^{study of} should be made. Side by side with this, the emission of these alloys should give some interesting clues. At the Brillouin zone overlap the work function should change enormously.

All these works cannot be done without the cooperation of a physicist of repute. Certainly it would have been very good had I managed

to get in to the institute.

I shall be grateful to you if you could put me under in some place where facilities are ~~are~~ and feel guidance are available. & I should really be intimate if I can work under your personal direction. It is only the great minds that enthuse their students and it has ^{been} proved beyond doubt in the case of the illustrious man Faraday and a host of other Scientists. I have seen and I have ^{personally} experienced that an immense enthusiasm and curiosity is aroused by associating with big people. It is with tenacity I hold on to science and thanks to Dr. Einstein, Ramanujing annas and Curie whose photos I keep in my study.

Well Sir I should be much grateful to you for any kind of suggestions and advices that you can offer.

Hope this will find you quite healthy.

With respects

Yours sincerely

A. Jayaraman

P.S. I may also come to Delhi in 15 days time.