

+953.8 cal/equiv. and +798.9 cal/equiv. respectively, whereas those on the black and *karl* soils the ΔG values are -53.7 cal/equiv. and -59.6 cal/equiv. respectively. These indicate the preference of Ca^{2+} on red and laterite soils and paraquat²⁺ on black and *karl* soils. Hence, deactivation of the weedicide is higher in black and *karl* soils than in red and laterite soils.

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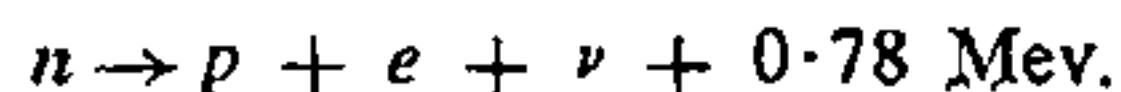
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PRIMORDIAL NUCLEAR MATTER AND NUCLEOSYNTHESIS

MANY theories have been proposed to explain the observed relative abundance of elements in the universe particularly in the solar system where experimental data are easily available. None of these theories is in a position to explain all the features of the abundance curve¹. The latest approach made by Burbidge *et al.*² introduces eight different processes to create elements to cover the entire mass region (1 to 260). The fundamental question about the starting material however remains to be settled. The failure of α, β, γ^3 theory which assumes neutrons as the primordial matter lead Burbidge *et al.* to assume that hydrogen was the starting material. In this note it is shown that neutron is a better choice and elements can be synthesized from neutron matter. More detailed results will appear elsewhere.

The well-known fact that our observable universe is made up of neutrons, protons and electrons leaves us with only two choices: neutron and hydrogen. A convincing proof about the neutron being the primordial matter comes from beta decay. In beta decay a neutron decays to proton an electron and a neutrino. It has been experimentally proved that the properties of beta particles emitted from a nucleus and those of the extranuclear electrons are same (same charge, mass, spin, etc.). This strongly suggests that they have the same origin. In other words electrons are merely the decay products of neutrons. If this is true, then neutrons must have existed in the prestellar conditions and must be taken as the primordial matter.

The decay of neutrons can be represented as



the decay energy of neutrons will raise the temperature of the mixture ($n + p + e + \nu$) to a billion degree or more. When the proton density becomes high the reverse reaction $n \leftarrow p + e + \nu$ will stop the neutrons from being destroyed. At this temperature fusion reactions will start to build up the heavy nuclei. Neutron capture will be another competing reaction which will contribute to element formation.

The hydrogen will be the product of a later stage when under suitable conditions protons and electrons combine to form a bound system.

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A REINVESTIGATION OF IRON-RESACETOPHENONEOXIME COMPLEX : AN IMPROVED PROCEDURE FOR THE SPECTROPHOTOMETRIC DETERMINATION OF IRON (III)

IN our attempts to determine the stability constant of the iron-resacetophenoneoxime complex, we observed that iron (III) and resacetophenoneoxime give rise to a mixture of complexes in addition to the single species of 1:1 complex (pH 4.5 to 7.0) reported by Raja Reddy *et al.*¹. They made use of the Hilger Spekker Absorptiometer with Ilford colour filters in their investigations. We have now made a detailed study using UVISPEK Photoelectric Spectrophotometer (Hilger and Watts Ltd., manual type).

The reagent has negligible absorbance in the spectral region studied, 400 to 650 nm. The absorption curves were drawn at different pH values; the measurements were made against the reagent blank in 10% v/v aqueous ethanol. The metal to reagent ratio was maintained at 1:50 because it was found that at lower concentrations such as 1:6 turbidity developed thereby causing difficulties for accurate measurements.

An isobestic point in the pH range 6.0 to 8.3 at 580 nm clearly indicated the presence of mixture of complexes. But in the pH range 2.5 to 5.0, the absorption curves do not pass through the isobestic point indicating the presence of a single species which is in confirmation with the results reported by Raja Reddy *et al.* at pH 4.5. At pH

values between 2.0 to 5.0 the colour of the complex is violet and fades away with time, while at higher pH values the colour is reddish-violet and stable for 24 hrs.

In view of these facts it is not possible to determine the stability constants by the Job's method of continuous variation. These studies, however, have revealed that there is no need at all for maintaining rigorous control of pH for the determination of Fe(III) when the measurements of the optical densities are made at 580 nm. We, therefore, recommend the following modified procedure for the determination of iron(III) with resacetophenoneoxime in 10% v/v ethanol-water medium.

An aliquot of iron(III) solution is treated with resacetophenoneoxime in ethanol in fiftyfold excess and the pH adjusted to 6.0 to 8.3 with dilute sodium hydroxide (0.01 M) and the absorbance measured at 580 nm. Beer's law is obeyed in the range 1-14 ppm. Na⁺, K⁺, NH₄⁺, Hg⁺⁺, Cd⁺⁺, Ca⁺⁺, Mg⁺⁺, Zn⁺⁺, Cl⁻, Br⁻, I⁻, NO₃⁻, SO₄⁻⁻ have no effect even when present in excess. CH₃COO⁻, F⁻, and Al⁺⁺⁺ are tolerable upto 50 ppm. Oxalate, citrate, borate and Mn⁺⁺ interfere when the concentration exceeds 10 ppm. The tolerance of a given ion is a maximum amount that can produce an absorption difference of 3% from that of the iron complex (Fe:5 ppm). Phosphate, carbonate and Co⁺⁺ interfere seriously. Copper², nickel³ and palladium⁴ interfere as they produce precipitates with the reagent.

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INFRA-RED CARBONYL FREQUENCIES OF HYDROXY CHALKONES AND CHROMONES

In some of our earlier papers¹⁻³ on the effect of conjugation and hydrogen bonding on the infra-red carbonyl frequency, certain abnormal features were observed. There were special cases in which the introduction of a hydroxyl group, in a position that can cause chelation, raises unexpectedly the infra-red carbonyl frequency rather than lower it. This was attributed to the presence of a conjugated

$$\begin{array}{c} | \quad | \quad | \\ -O-C=C-C=O \end{array}$$
 system in which the ethylenic double bond was not a part of a benzenoid ring. Such an abnormal feature was first noticed by

comparing the infra-red spectra of 5-hydroxy-flavones and isoflavones on the one hand and the corresponding flavanone and isoflavanone derivatives on the other⁴⁻⁵. The former group of compounds shows this special effect whereas the latter group does not, obviously due to the absence of an ethylenic double bond in the oxygen ring. That the benzenoid double bond is not capable of bringing about such an effect, was established by the recent study of the I.R. spectra of suitably substituted hydroxy xanthenes, benzophenones and anthraquinones⁶.

In a further study discussed in this paper, we have examined compounds which have an ethylenic double bond but without oxygen linked to it, i.e., chalcones (I). In them, the chelation of the ortho hydroxyl with the chalcone carbonyl brings about the normal lowering of the C=O frequency. When the chelation is removed by acetylation or methylation, the C=O frequency is increased. Thus 2'-hydroxy-4',6',4-trimethoxy chalcone absorbs at 1613 cm⁻¹, while 2',4',6',4-tetramethoxy chalcone absorbs at 1648 cm⁻¹ and 2'-acetoxy-4',6',4-trimethoxy chalcone absorbs at 1652 cm⁻¹. The same is the case with other chalcones (Table I). Thus chalcones behave similar to flavanones and isoflavanones as against flavones and isoflavones obviously due to the absence of ether oxygen as the electron source.

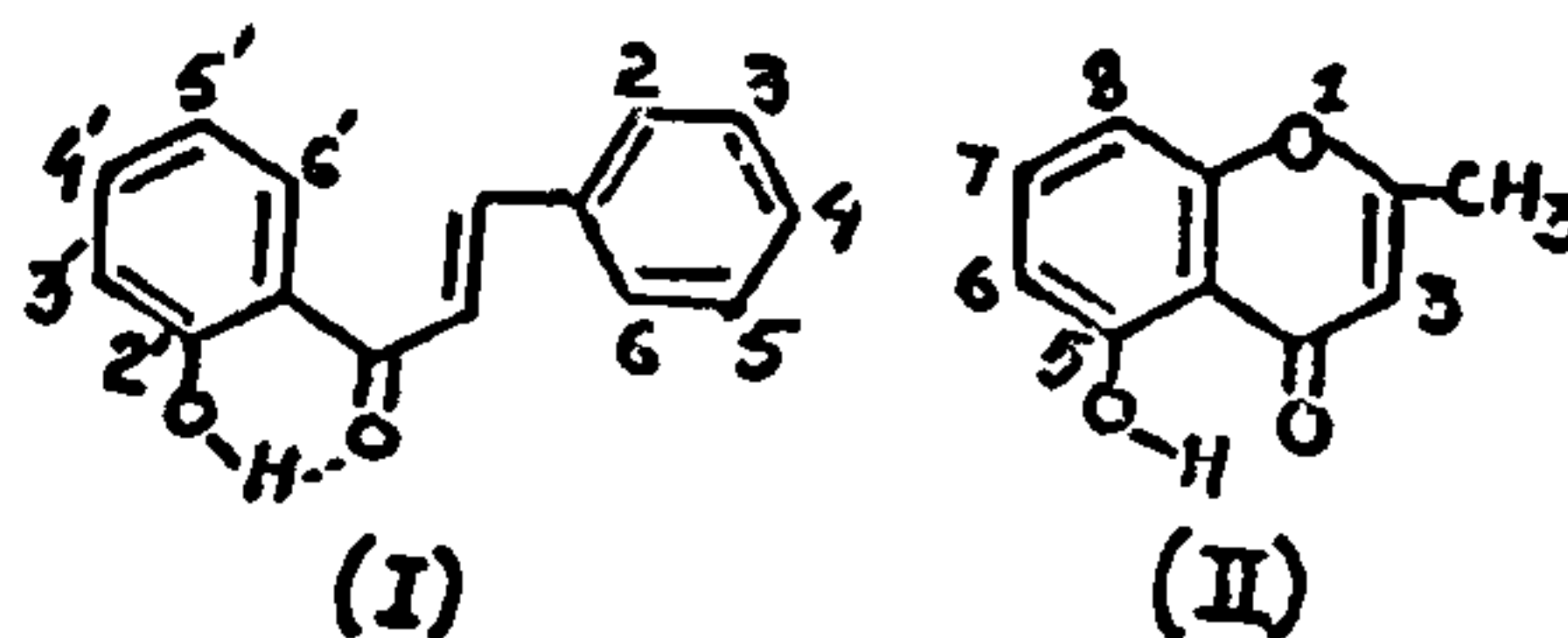


TABLE I
Infra-red carbonyl frequencies of chalcones (I)

Compound	ν_{\max}^{KBr} C=O (cm ⁻¹)
1. Chalcone ⁷	1659
2. 2'-hydroxychalcone ⁷	1637
3. 2'-methoxy ⁷ -	1650
4. 4'-hydroxy ⁷ -	1653
5. 4'-methoxy ⁷ -	1656
6. 2'-hydroxy-4'-methoxy ⁸ -	1625
7. 2', 4'-dimethoxy ⁸ -	1650
8. 2', 3, 4'-trihydroxy-	1621
9. 2', 3, 4'-triacetoxy-	1661
10. 2'-hydroxy-4', 4-dimethoxy ⁸ -	1620
11. 2'-acetoxy-4', 4-dimethoxy ⁸ -	1652
12. 2'-hydroxy-4', 6', 4-trimethoxy-	1613
13. 2'-acetoxy-4', 6', 4-trimethoxy-	1652
14. 2', 4', 6', 4-tetramethoxy-	1648
15. 2', 3', 4', 3, 4-pentahydroxy-	1619
16. 2', 3', 4', 3, 4-benzoyloxy-	1656