THERMAL STUDIES ON SOFT AND BRITTLE ASBESTOS

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ABSTRACT

Differential thermal and thermogravimetric analyses of the soft and brittle asbestos are carried out. The results have revealed that the brittle asbestos has a higher dehydration temperature and greater loss of weight than the soft, and this helps to identify the mixtures of chrysotile and antigorite, the latter forming a high percentage in the brittle asbestos.

INTRODUCTION

ALTHOUGH there are a number of publications on the thermal studies of serpentine and asbestos, a comparative study of the soft and the brittle asbestos has not been carried out. In the present study, soft and brittle asbestos (collected from the asbestos mineralised zone near Pulivendala 14° 25′ : 78° 14′, Cuddapah District) are studied for their thermal properties. Asbestos occurs in this area in serpentines, serpentinized dolomitic limestones and in the marginal portions of the trap at its contact with the dolomitic limestones. Most of the fibres generally confined to the contact are brittle.

EXPERIMENTAL

Sample Preparation :

Samples of soft and brittle asbestos, more than 1″ in length are selected and the ends are cut off aod powdered by the standard procedure[1,2] and used fnr DTA and TGA.

DTA curves were recorded with a heating rate of 10°/min employing platinum crucibles. Alumina was used as the reference material. A Stanton thermobalance, with an accuracy of 1 mg was used for recording TGA curves at a heating rate of 6°/min.

RESULTS AND DISCUSSION

The results of DTA and TGA curves of the soft and brittle asbestos are shown in Table I. From the results, it is clear that the brittle asbestos has a higher temperature of dehydration and greater loss of weight than the soft.

TABLE I

DTA and TGA data of soft and brittle asbestos

A. DTA

Sample No.	Endothermic peak °C	Exothermic peak °C	Maximum temp. upto which the test was carried out
G_2 (soft)	692	..	979
G_4 (soft)	694	809	916
D_3 (brittle)	712	809	993
A_3 (brittle)	715	810	1004

B. TGA

Sample No.	Weight of the substance (g)	Weight loss (g)	% Loss of Weight
G_2 (soft)	0·1112	0·0177	15·92
G_4 (soft)	0·1076	0·0176	16·35
D_3 (brittle)	0·1829	0·0332	18·15
A_3 (brittle)	0·1112	0·0203	18·24

The endothermic peak for the soft asbestos occurs at 694° C and for the brittle at 715° C. An exothermic peak is observed at about 810° C in all the samples except in G_2. These peaks are well correlated with those, characteristic of serpentine minerals[8]. The presence of an endotherm in serpentine minerals is due to dehydration and the formation of "largely disordered" intermediate phase. The exotherm is for the completion of this reaction with the formation of final product, Forsterite[3].

The high temperature of endothermic peak in the brittle asbestos can be explained by assuming no variation in the particle size and morphology between them, since these two factors control the nature of the endotherm[4]. Trace element study of soft and brittle fibres by spectroscopic methods reveals that the latter is high in Ni, Mn, Ti and B as compared with the former. Since Ti and Mn have no control over the dehydration temperature and Ni is directly proportional to it[5], the presence of Ni in the brittle asbestos along with the other elements is responsible for the high temperature of dehydration. When Ni is substituted for Mg in the brucite layer, the Ni–O covalent bond has greater interlayer bond strength than the Mg–O bond[5]. Similar observations are made by Roy and Roy[6] in their studies on the stability of serpentine minerals.

Since heat of dehydration or heat of reaction (ΔH) can be obtained from the area under DTA[7], the smaller area for the brittle indicates the low heat of dehydration and hence high activation energy. Contrary to this, the soft asbestos has high heat of dehydration and hence low activation energy. As these values are limited by several other factors, they are not calculated in the present study.

There is no variation in the exothermic peak between the soft and brittle asbestos, indicating that the formation of Forsterite is completed at about 810° C. The absence of exothermic peak in one of the soft asbestos (G_2) indicates that the Forsterite is formed even before the dehydration[8].

The shoulders of the soft and brittle fibres start at about 620° C, slightly higher than the temperature reported for serpentine minerals by Faust and Fahey[9]. The temperature at which the structural water starts to come off is approximately the same for these two varieties. However, the brittle variety has greater loss of weight than the soft (Table I). The greater loss of weight is not entirely dependent on the water content of the sample, since the brittle asbestos contains lower percentage of water. It may be due to other volatile substances in the brittle asbestos[10].

The higher dehydration temperature and lower heat of dehydration and greater loss of weight in the brittle asbestos, as compared to the soft, indicate that the former may be of antigorite[5] or a mixture of chrysotile and antigorite. A relatively high percentage of antigorite is confirmed by X-ray diffraction data.

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EFFECTS OF A NON-STEROID, CLOMIPHENE CITRATE* ON THE BIOCHEMICAL COMPOSITION OF THE TESTIS AND ACCESSORY SEX ORGANS OF ADULT ALBINO RATS**

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ABSTRACT

The treatment of adult male albino rats with clomiphene citrate (CC) for 7, 14, 21 and 28 days affected the structure as well as functions of the testis and accessory sex organs as reflected by the decrease in the activity of acid phosphatases and succinic dehydrogenase and increase in alkaline phosphatases of the testis as well as significant fall in sialic acids, fructose and citric acid content of caput and cauda epididymis, prostate and seminal vesicles respectively. The results confirm the weak estrogenic nature of CC and the effects may be due to its antiandrogenic nature.

INTRODUCTION

CLOMIPHENE CITRATE (CC), a non-steroidal triphenyl derivative of the estrogenic chlorotrianesene 1-(β-diethylaminoethoxyphenyl)-1,2-diphenyl-2-chloroethylene; clomid; MER-41) is known to inhibit endogenous gonadotropic activity and testicular functions thus resulting in reduced fertility in male rats and rabbits[1-6]. Kalra and Prasad[6] studied the effects of clomiphene on immature intact male rats and suggested that the inhibitory effects on the testis and accessory sex glands following long term administration are due to the estrogenicity of the compound. No work has so far been carried out to elucidate the

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