

MINERALOGY OF CLAY IN SANDSTONES

1. INTRODUCTION

The samples of fairly coarse grey sandstone, partly friable in nature, were received from Esso Australia Ltd.

It was requested that the mineralogy of the clays present should be determined using X-ray diffraction methods.

2. PROCEDURE

It was evident that the samples were essentially clay-poor sandstones and not friable enough to disperse in water using a standard high-speed mixer. Therefore they were crushed mechanically to approximately -60# B.S.S., and a weighed amount of the resulting powder was in each case dispersed in water with the aid of deflocculants, and allowed to sediment for separation of a representative -2 μ m fraction. This fraction in suspension was examined on the plummet balance to determine its solids content. Because of the very low proportion of -2 μ m material found, and the resulting shortage of clay material, the sedimentations were repeated and a larger volume of -4 μ m material extracted and concentrated by centrifugation.

The -4 μ m material was used for X-ray powder photographs, and was also laid down on ceramic plates as oriented clay samples. These oriented preparations, two for each sample, were treated (i) with Mg⁺⁺ ions and (ii) with Mg⁺⁺ ions and glycerol, dried in air, and examined in the X-ray diffractometer.

3. RESULTS

The proportion of material dispersing into the "clay" (-2 μ m) fraction was approximately as follows:

P1-C6	:	2%	PELICAN-1	CORE 6	8551 FEET
P1-C8	:	4%	PELICAN-1	CORE 8	9427 FEET
P2-C2	:	4%	PELICAN-2	CORE 2	9794 FEET

The rest of the results refer to the -4 μ m fraction (q.v.) but this is not anticipated to be significantly different from the -2 μ m fraction, except that it will have a higher quartz content.

All three -4 μ m fractions were found to be essentially similar mineralogically. Kaolin is the dominant clay mineral in every case, and moderate amounts of illite, of randomly interstratified mixed-layer illite-montmorillonite, and a trace of chlorite are present. In addition, a slight trace of montmorillonite was just detected in P1-C6, but not in the other two samples.

As has been stated, all three samples were very similar mineralogically, but when quantitative considerations are included, P1-C2 stands apart significantly from the other two samples, with an illite/kaolin ratio of approximately 1:5, while the other samples have a ratio of approximately 1:2. It is difficult to judge reliably the proportion of mixed-layer illite-montmorillonite, but it