

REPORT ON SOME GLASS SANDS

The investigation of the glass sands of Tasmania has not yet been undertaken, but in the course of geological surveys the presence in many places of sands suitable for glass making has been noted. The information at our disposal is meagre, but if the inquiry for this material is likely to lead to the establishment of the glass industry a careful survey will be instituted. Before proceeding with the report some notes on glass sands will be given.

The Requisite Qualities of Sand for Glass Making

The importance of having a proper grade of sand for use in this industry is evident since it forms such a large proportion of the new materials entering into the composition of glass. The greater part of the material used is obtained from natural sand deposits or by crushing loosely bonded sandstone. Such sands vary considerably in chemical composition and physical properties. From long experience glass manufacturers have recognised certain properties which a sand should have to permit of its being classed as suitable for the manufacture of glass. Again, the requisite properties vary according to the quality of glass desired.

Chemical Composition

The better the sand the higher is the proportion of silica. Objectionable impurities are compounds of iron, alumina, magnesia, lime, and alkalis. Iron oxide imparts to glass a green, yellow or red colour, the intensity varying with the amount of the impurity. Alumina tends to decrease the transparency of glass and increases the fusion point. Magnesia raises the fusion point of the charge, but lime in limited amount is not very injurious. Organic matter colours the glass a dark amber. Titanium oxide and alkalis are generally in such small proportion as not to be harmful. The following analyses are of typical glass sands:-

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Silica	99.12	99.58	99.25
iron oxide	0.07	0.02	0.04
alumina	0.43	0.12	0.59
lime	0.34	0.13	0.11
magnesia	0.11	trace	0.02
alkalis	-	0.17	0.25

While considerable latitude is allowable in the size of grains in good glass sand, uniformity is desirable. Grains larger than 14-mesh are harder to melt than the rest of the batch on charge and combining too slowly with the fluxing ingredients cause stringing of the glass. On the other hand material much finer than 100 mesh is liable to result in considerable loss in charging. A general specification for the texture of a glass sand may be given as material that will pass a 14 mesh screen. 90% retained on 100 mesh, and 65% between 20 mesh and 65 mesh.

Summarising a sand for glass manufacture should be one of uniform grain and of medium fineness, as high in silica as possible, and should be almost free of iron and other impurities. A few deposits of sand will now be described.

Sisters Hills Sandstone

This is a very extensive deposit of sandstone of Pre-Cambrian age lying westward of Wynyard. It crops out most prominently at Sisters Hills and is well exposed in some of the railway cuttings and again in road cuttings west of Table Cape. The beds of sandstone, which are steeply inclined, are intercalated with quartzites and narrow bands of grey shale. The sandstones vary greatly both in texture and composition. In some beds the sandstone is stained and impregnated with ferruginous material while in other beds it is pure white. Some beds are of very friable rock easily crushed in the hand, but all degrees of hardness may be found including sandstone so hard as to be almost a quartzite. The cementing material is generally siliceous in the white rock but is slightly calcareous and argillaceous in places. The texture varies greatly from fine to coarse, but medium grain size is the more general. Only one sample of the better class material has been analysed. This was composed of silica 99.10 per cent, organic matter, lime and magnesia, and traces of iron oxide - a true glass sand. If that may be accepted as an indication of the average quality then here are most extensive deposits of high-grade glass sands.

Wynyard Formation

In the Wynyard Tertiary formation is a member consisting of even-grained glass sand of extreme fineness. The thickness of this bed has not been determined but it has been penetrated to a depth of five feet. The sand grains pass through a 65 mesh screen and the greater part through 100 mesh.

Analyses show the following composition:-

silica	99.5	per cent
alumina	0.12	" "
lime	0.06	" "
magnesia	0.03	" "
iron oxide	0.05	" "
organic matter	0.32	" "

Further investigation is desirable.

Blythe Sands

Silica deposits of recent origin have been found in several localities in northern Tasmania, the best known being the Blythe beach sands. These beds, 6 to 8 feet deep, are traversed by the North-Western Railway. Their extent has not been determined by the Mines Department.

The sands consist of sub-angular quartz grains, rounded grains of chert, rounded hardened clay, with also a little organic matter. The chemical composition of the sand is;

silica	96.52	per cent
ferric oxide	1.42	" "
alumina	1.37	" "
lime	0.52	" "
magnesia	0.29	" "
organic matter	0.16	" "

The colour in caustic soda solution is a very pale yellow. The sample contained about 2.5 per cent of clayey material which with the iron oxide acted as a binder in the compacted sands underneath.

Classified by the use of wire-woven sieves it was found that 44% was retained on 20 mesh sieve, 32% was retained on 30 mesh sieve, and 24% passed through the 30 mesh sieve.

The proportions of iron oxide and alumina are high for clear glass. These and other impurities could be greatly reduced by washing and the colour effect of the iron compound could be neutralised by some decolouriser such as manganese or selenium. However, a pellucid glass containing manganese after long exposure to the rays of the sun becomes of a light purple colour due to oxidation of that element. Therefore, such glasses are used for bottles only.

Summarising - it seems to the writer that the best glass sands are likely to be found in the Upper Pre-Cambrian measures.

A. McIntosh Reid.
DIRECTOR OF MINES.

Hobart.
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