open-bonded silicates. Animal and vegetable oils, fats and juices containing hydroxyl groups are freed from color by charcoal or weakly basic silicates.

An adsorption filter of the silicate or hydrous oxide (Fe, Al) type normally has terminal H and OH in place and in that condition will adsorb bases for which its attraction is stronger than for these groups. Heating to about 200° C. drives off most of the H and OH as water and leaves the filter capable of adsorbing even weak free bases.[1] Certain pure quartz oil sands are known (Tensleep, Oregon Basin, Wyoming) having a thick brown adsorbed coating which can not be washed off. Oxidation with chromic acid leaves a pure white quartz crystal. The coating is about 0.7 micron thick. It will readsorb on soaking the cleaned sand over night in the heavy crude from that field.

These Tensleep quartz grains must then have been chemically activated by natural processes. What these processes are is well worth knowing from either a geological or commercial standpoint. A laboratory study soon showed that the activation of even crystalline quartz is neither difficult nor complicated. A sea sand may be given the adsorbing properties of the Tensleep very readily.

The plan was to attack the surface of the quartz with a strong alkali, forming a layer of alkali silicate over the surface, replace the base by hydrogen by means of an acid treatment, then drive off the H and OH by heating, leaving open bonds. KOH solutions would doubtless serve for the first step but are too slow. A bath of fused sodium or potassium carbonate (at 850° C.) is too violent, but fused potassium hydroxide (at 350° C.) worked very well, and did not crack even crystals of considerable size. A minute or two was sufficient time. Boiling in HCl, followed by thorough washing and drying completed the activation. The test was to soak in heavy crude over night. Fine sand and clay was tested by percolation through two inches of sand in a tube.

Since the object of the chemical treatment is to open up the SiO_2 bonds over the surface, it should be possible to dispense with the initial alkali treatment. Quartz or sea sand given a brief bath of hydrofluoric acid were found to be activated just as well as when given the alkali and HCl treatment.

It is hoped that these simple experiments may throw additional light on the still obscure mechanism of surface reactions and selective adsorption. Activated surfaces of pure quartz are excellent filters per unit area and their filtering action is pure chemical.

P. G. NUTTING

U. S. GEOLOGICAL SURVEY

[1] P. G. Nutting, *Economic Geology*, May, 1926, and November, 1928.

A CELESTIAL SEARCHLIGHT

A NARROW beam of light, suggestive of a searchlight beam, stretched across the sky from west to east, approximately through the zenith, the evening of August 21, 1930. The point of observation was 3.5 miles north of the center of Littleton, New Hampshire, and the time, 9:50 to 10:15 P. M., E. S. T. For the first 15 minutes the beam appeared brightly over the western horizon, which was 20° above a horizontal, passed through the zenith and faded in cirro-stratus clouds about 20° above the eastern horizon. During the last ten minutes the beam was distinctly south of the zenith and during the last five faded rapidly and broadened till it was scarcely noticeable. Rough angular measurements showed that the beam was about 5° wide and that it was moving southward about 10° in 10 minutes. Vega was the center of the beam about 9:57 P. M.; at the northern margin at 10:00, and from more than 5° at 10:07 to 10° from it at 10:10 P. M. There was a general auroral glow in the northern sky during this beam phenomenon, and at 10 there was a temporary appearance of an auroral streamer in the N x E. The color of the lights was the usual auroral pale greenish yellow.

A beam of the same sort was observed by the writer two or three years ago at Silver Lake, New Hampshire. It seems that these beams may be narrow auroral arches that lose their arch-like appearance and become like straight beams when overhead.

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A SURFACE TENSION EFFECT

DURING the course of a microscopic investigation of certain oil products, great difficulty was experienced in deciding whether or not certain small spherical appearances were air bubbles. The optical behavior of these particles (diffraction rings, refractive shadows, etc.) closely resembled the appearance of air bubbles but were not quite identical. For use in direct comparison, air bubbles of about the same size were made by violent agitation of Nujol with air. A small portion of this Nujol containing bubbles ranging from $3\,\mu$ to about $5\,\mu$ was mounted under a standard cover-glass (.18 mm thick) and studied by different illuminations with a 6 mm objective and $20\times$ eyepiece.

While one of the smaller of these bubbles was being studied it disappeared between observations. After looking for it in some other portion of the field and not finding it, it was considered probable that its disappearance was the culmination of surface tension action. Another small bubble was picked out and carefully watched. At a diameter of about $5\,\mu$ its shrinkage became rapid enough to be measurable