

Substance	Formula Weight	Solubility in 100 pts. of Water at 20°	Per Cent. Metal	Quantity of Salt to be Dissolved in 1 Liter to Give Strength 1 c.c. = 100 mgs. of Metal
NaCl	58	35 g.	40	250
KNO ₃	101	25	39	257
NH ₄ NO ₃	80.1	200	22.5	445
BaCl ₂ ·2H ₂ O	244	41	56	180
Ca(NO ₃) ₂ ·4H ₂ O	236.2	extremely soluble	17	590

these standard solutions to students as "unknown" bottles; these consist of homœopathic vials of 50 c.c. capacity. For the analysis the student takes 25 c.c. of his solution, the other half being reserved in case of accident.

The amounts of standard solutions pipetted out should be such as to yield a suitable concentration when the volume is diluted to 50 c.c., *i. e.*, when the bottle is filled.

Example: Pipetted out into "unknown" bottle: 1 c.c. NaCl sol, 2 c.c. Ca(NO₃)₂, 1 c.c. NH₄NO₃, and then fill the bottle with distilled water.

Since the student uses only 25 c.c. of this solution the latter will contain: 50 mgs. Na, 100 mgs. Ca, 50 mgs. NH₄.

The following papers were reported by title:

Conditions under which Secondary School Teachers Conduct their Work: ALBERT L. SMITH.

Conditions and Equipment in Secondary Schools: CHARLES R. ALLEN.

Elementary Chemistry Teaching as a Means of Developing the Power of Independent Scientific Reasoning: ARTHUR A. BLANCHARD.

The First Course in Chemistry for Secondary Schools: M. D. SOHON.

D. L. RANDALL,
Press Secretary

SOCIETIES AND ACADEMIES

THE GEOLOGICAL SOCIETY OF WASHINGTON

At the 225th meeting of the society, held on Wednesday, January 12, Mr. Fred. E. Wright exhibited specimens of obsidian from Hrafninnuhryggur, Iceland, with peculiarly pitted surfaces, resembling the markings of the Austrian moldavites; also a unique type of crystallization of radial spherulites in cavities of that obsidian.

Mr. David White exhibited a photograph of an unusually large and complete *Stigmara* stump, taken in an anthracite mine near Scranton, Pa.

It afforded an excellent illustration of a "kettle bottom" or "pot," a common source of danger in coal mines, and clearly showed the hole in the roof above the fallen stump.

Mr. Chas. Butts described a Carboniferous coal bed overlain by Lower Cambrian limestone, near Aldrich, Ala., the limestone being thrust over the coal at the fault bounding on the east the Carboniferous rocks of the Cahaba trough. The coal is completely overturned, lies flat at the exposure, and is unchanged except for being crushed and mixed with shale.

Regular Program

Influence of the Earth's Rotation on the Lateral Erosion of Streams: H. M. EAKIN.

Observations on Alaska rivers indicate a higher efficiency of the deflective force of the earth's rotation in determining lateral erosion of streams than has been ascribed to it. The Yukon River and its tributaries, the Tanana, Koyukuk and Innoko, and the Kuskokwim, all large Alaska streams, show a marked predominance of erosion on the right bank. The strength of the deflective force as computed and compared at different latitudes shows it to be much stronger in the higher latitudes. For instance, for latitudes 5°, 25°, 45° and 65°, the ratios are approximately 1 to 4.8 to 8.0 to 10.3. The effectiveness of the deflective force may be compared with that of the centrifugal force of various curves of rivers, that of the deflective force at latitude 65° being approximately equivalent to that of the centrifugal force developed on a curve having a radius of 6.2 miles, computations being based on an assumed velocity of 2 meters per second. The lateral stresses due to either centrifugal force or deflective force tend to establish cross gradients which would oppose them. The lateral stresses being weaker in the lower part of the stream, the stronger lateral gradient supported by the upper part of the stream sets up an undertow in a direction opposite to that of the lateral stresses. The results of the boring currents thus produced are expressed in selective cut and fill. The deflective force being to the right in the northern hemisphere combines with the centrifugal force on right curves and opposes it on left curves. On straight reaches the deflective force acts alone. In a meandering stream the lateral gradients are reversed on successive bends and the lateral stresses are not fully expressed in lateral currents, since they are under conditions of acceleration much of the time. On straight reaches, there

being no reversal of lateral gradient, the deflective force becomes relatively much more efficient in inducing lateral currents.

The Missouri River, studied for comparison with the rivers in higher latitudes, shows evidence of unbalanced lateral erosion in the distribution of its flood plain with respect to its course.

Winds, crustal warping and asymmetry of drainage basins are other causes which may unbalance lateral erosion, but conditions do not point to their operation in the cases mentioned. The unbalanced erosion in the Alaska rivers, therefore, seems undoubtedly due to the deflective force of the earth's rotation.

Geologic Thermometry: FRED. E. WRIGHT.

In ordinary thermometry, temperature, or the degree of hotness of a body, is defined by the expansion of a perfect gas and is expressed in terms of fixed units, determined by the freezing and boiling points of water under standard conditions. Temperatures are ascertained practically by means of thermometers which, although they vary greatly in type, are all based on some property which varies in a definite way with the temperature. In geology, temperatures are of fundamental importance, particularly the temperatures to which rocks were heated in past geologic ages and under inaccessible conditions. Points on the geologic thermometer scale must therefore be historic points, or temperatures at which permanent changes occur in the rock or mineral, traces of which persist at lower temperatures. Such definite points serve to establish limits within which observed reactions must have been effected. The factors which may serve to furnish points of this nature are, especially: melting temperatures of stable minerals and of eutectics; inversion temperatures of minerals; temperature limits beyond which monotropic forms can not exist under different conditions of pressure; stable ranges of enantiotropic forms and of minerals which dissociate or decompose at higher temperatures; temperatures beyond which any physical property acquires a permanent set and by virtue of internal friction or other cause does not return to its original value on cooling; also the occurrence of zonal growth in isomorphous mixtures like the feldspars or pyroxenes. These factors can be and are being determined by modern laboratory methods and are in turn directly applicable to the study of rocks. In applying such data geologically, however, it should be remembered that the data are obtained under certain definite conditions while in nature the rocks may have been and

often were formed under totally different conditions of equilibrium. Two factors particularly may be operative in this direction, pressure and solution, or the presence of other components, as water, which tend to modify very materially the equilibrium criteria and behavior of the physical chemical system in question. The data now available on the geologic thermometer scale indicate that the establishment of such a scale is feasible and can be accomplished by a sufficient number of proper laboratory determinations; also that in many cases the application of such data to natural phenomena is warranted.

The Origin of the Pegmatites of Maine: EDSON S. BASTIN.

The pegmatites of Maine all belong to the type commonly known as granite pegmatites. The fact that their chief minerals are also the dominant minerals of the granites, the presence of granite in all districts where pegmatites occur, and numerous observed transitions from granite to pegmatite, indicate that the pegmatites are closely related to the granites in origin.

The peculiar textures exhibited by the pegmatites as compared with the granites are *not* believed to be due mainly to differences in the proportions of the principal mineral constituents or of the rare elements such as fluorine, lithium and phosphorus, but probably to greater abundance of gaseous constituents in the pegmatite magma as compared with the granite magma. The principal gaseous constituent was probably water. There are field indications that the pegmatite magmas locally exhibited a considerable degree of viscosity, sufficient for example to float fragments of the schist wall rock. This and other facts suggest that the vaporous content of the pegmatites was not so greatly in excess of that of the granites as has commonly been supposed. Experiments by F. E. Wright and E. S. Larsen on specimens collected by the writer from the pegmatites of Maine show that the quartz from the finer-grained pegmatites and from the graphic granite of the coarser pegmatites crystallized above 575° C., whereas that of the large areas of pure quartz, the quartz crystals, developed in miarolitic cavities and the quartz associated with tourmaline, lepidolite, spodumene, etc., near the pockets in the gem-bearing pegmatites, was formed below 575° C. This fixes the temperature of crystallization of many of these pegmatites at about 550° and 600° C.

FRANÇOIS E. MATHES,
Secretary