various screening constants are self-consistent. Excellent agreement with experiment is found also for the normal alkaline-earth oxides, sulfides selenides and tellurides with the sodium chloride structure, and for the normal alkaline-earth halides, alkali oxides and sulfides and quadrivalent oxides with the fluorite and rutile structures.

In lithium chloride, bromide and iodide, magnesium sulfide and selenide and strontium chloride the inter-atomic distances depend on the anion radius alone, for the anions are in mutual contact; the observed anion-anion distances agree satisfactorily with the calculated radii. In lithium fluoride, sodium chloride, bromide and iodide and magnesium oxide the observed anion-cation distances are larger than those calculated because of double repulsion; the anions are approaching mutual contact, and the repulsive forces between them as well as those between anion and cation are operative.

In crystals containing eighteen-shell cations and not easily deformable anions (F^-), the agreement between the calculated and observed radii is good; for deformable anions ($O^=$, Cl^-, Br^-, I^-), the observed inter-atomic distances are shorter than those calculated.

The theoretical result is derived that ionic compounds MX_2 will crystallize with the fluorite structure if the radius ratio R_M/R_X is greater than 0.65, and with the rutile (or anatase) structure if it is less. This result is experimentally substantiated.

It is also shown that theoretically a binary compound should have the sphalerite or wurzite structure instead of the sodium chloride structure if the radius ratio is less than 0.33. The oxide, sulfide, selenide and telluride of beryllium conform to this requirement, and are to be considered as ionic crystals. It is found, however, that such "tetrahedral" crystals are particularly apt to show deformation, and it is suggested that this is a tendency of the anion to share an electron pair with each cation.

A brief discussion of crystals containing complex ions is given.

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NOTES

Colloidal Phenomena in Dye Solutions.—A remarkable instance of colloidal behavior was observed during a recent investigation of concentration effects. If an aqueous solution of rosaniline hydrochloride is treated with phenol an addition product, $C_{20}H_{20}N_3Cl.2C_6H_5OH$, is formed which does not differ very greatly from the dye itself in general properties and behavior. If rosaniline base is fused with phenol, however, rosaniline phenolate, $C_{20}H_{20}N_3.C_6H_5O$, is obtained. This phenolate is only slightly soluble in water and its aqueous solutions are extremely colloidal. If a dilute, aqueous solution is diluted with an equal volume of water the resulting solution would be expected to show only half the original color. In point of fact such dilution actually increases the color in a material degree owing to the dissociation of solute molecules which accompanies the dilution. The effect of similar dilution with alcohol is even more marked. The color differences of such solutions become greatly accentuated on standing. The color of the undiluted aqueous solution decreases at a relatively rapid rate, owing to further progressive association of solute molecules. The corresponding alteration in the dilute aqueous solution is much less and the dilute alcoholic solution gives but little indication of physical instability. The phenomenon appears suitable for classroom demonstration.

Table I gives the spectrophotometric measurements obtained in such tests. The values recorded are the extinction coefficients measured at the absorption maxima of the respective solutions in a 1cm. layer. In the aqueous solutions the maximum absorption was found at 542 mμ and in the aqueous alcoholic solution at 548 mμ. The original aqueous solution was prepared by saturating distilled water with phenolate at room temperature.

TABLE I

EXTINCTION COEFFICIENTS AT ABSORPTION MAXIMA

	Original aqueous soln.	Original soln. diluted with an equal volume of water	Original soln. diluted with an equal volume of alcohol
Immediate absorption	0.54	0.69	0.88
After 1 day	.34	.63	.875
After 6 days	.16	.41	.85

CONTRIBUTION FROM THE
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Determination of Excess of Alkali in Hypochlorite Solutions.—The procedure is based upon the removal of the hypochlorite by means of a reducing agent, giving removable and non-interfering compounds. The hypochlorites are removed as indicated in the equation $2Ni(OH)_2 + NaOCl + H_2O = NaCl + 2Ni(OH)_3$. The change in condition from nickelous to nickelic is indicated by the change in color from light green to black. Inasmuch as both nickel hydroxides are insoluble in water, they can be completely removed before titrating.

Ferrous, manganous and cobaltous hydroxides react in like manner. Nickelous hydroxide, however, was found to be best for the purpose, due to its stability and insolubility.

The presence of ammonium salts vitiates this method.

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