

so designed that this difference represents the amount of flocculation or precipitation in milligrams per cubic centimeter of fluid. There are several accessory mechanical features and minor details of the test, which it is not our purpose to discuss in the present communication.

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The effect of loss of sleep on the composition of the blood and urine.

By NORRIS W. RAKESTRAW and FLORENCE O. WHITTIER.

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The experiments were carried out on eight normal men, on a uniform diet, who remained awake over a period of 48 hours. Twenty-four hour urine samples were collected for two days of the wakeful period, as well as the normal day preceding. Blood samples were taken at the beginning, middle and end of the period. The whole experiment was repeated after an interval of three weeks, the men alternating as controls and subjects in the two periods.

Total nitrogen, urea, ammonia, chlorides, phosphates, uric acid and total acidity were determined in the urine by the customary methods; while in the blood, determinations were made of sugar, non-protein nitrogen, urea, phenols (both free and conjugated), uric acid, chlorides, and alkali reserve. In four cases total "acid soluble" phosphorus and lactic acid were also determined in the blood.

The results showed no really consistent alteration in any of the components studied with the exception of a possible increasing tendency of the total nitrogen and the phosphorus of the urine and an increase in the lactic acid and phosphorus of the blood. The data concerning these last two components are too fragmentary, however, to justify any positive conclusion as yet.

The experiment has shown that loss of sleep for as long as

forty-eight hours does not produce any considerable alteration in the composition of human blood or urine.

The investigation is being carried further.

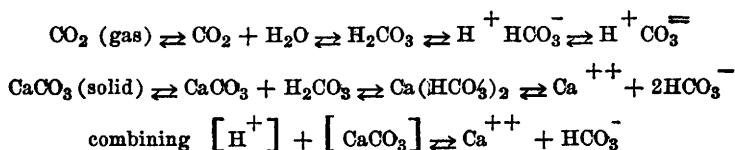
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Equilibria involving calcium, hydrogen, carbonate, bicarbonate, primary, secondary and tertiary phosphate ions.

By I. NEWTON KUGELMASS and A. T. SHOHL.

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The calcium salts of bicarbonate, carbonate, and primary, secondary and tertiary phosphates were studied to ascertain the conditions governing the equilibria at 38°C. Such a system may be evolved theoretically and experimentally by the addition to water of CO₂, CaCO₃, Na₂HPO₄. The resulting equilibria may be expressed by the equations



This resulting equilibria may be expressed according to the mass action law as

$$\begin{aligned} K_0 [\text{CO}_2] &= [\text{H}_2\text{CO}_3] \\ K_1 [\text{H}_2\text{CO}_3] &= [\text{H}^+] [\text{HCO}_3^-] \\ K_2 [\text{HCO}_3^-] &= [\text{H}^+] [\text{CO}_3^{=}] \\ K_3 &= [\text{Ca}^{++}] [\text{CO}_3^{=}] \\ K_4 &= \frac{K_1 K_3}{K_2} = \frac{[\text{Ca}^{++}] [\text{HCO}_3^-]^2}{[\text{H}_2\text{CO}_3]} \\ \text{and } K_5 &= \frac{K_4}{K_1} = \frac{K_3}{K_2} = \frac{[\text{Ca}^{++}] [\text{HCO}_3^-]}{[\text{H}^+]} \end{aligned}$$