bubbles per second, the temperature kept constant during the time. A first test was made sufficiently high to find where reduction actually took place with rapidity, then successive tests at intervals of 5°, until no turbidity was shown by the barium hydroxide solution. In reductions by carbon monoxide, a tendency clearly exists for the carbon dioxide formed to unite with unchanged oxide to form carbonate to some extent, but, with an excess of carbon monoxide passing, this, it is believed, could have but little effect upon the result.

The following shows reduction temperatures for carbon monoxide. (Time of test, six hours.) Silver oxide, 0°C.; auric oxide, 0°; mercurous oxide, 0°; yellow mercuric oxide, 0°; red mercuric oxide, 95°.

CONCLUSIONS.

(1) The minimum temperature of reduction of both silver and gold oxide by hydrogen is much below zero, and that for carbon monoxide lower than that for hydrogen.

(2) Carbon monoxide is a more rapid and efficient reducing agent than hydrogen.

(3) The differences in the temperatures of reduction of the yellow and red oxides of mercury make them exhibit properties of two different substances, and confirm the differences previously found in their behavior to chlorine,[1] oxalic acid,[2] iodic acid,[3] and ammonia.[4] Further work is being done with the oxides of lead and copper.

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NOTES.

Analysis of Water from Hinton, West Virginia.—This water is characterized by a large content of manganese, nickel and cobalt salts. In many mineral waters, manganese salts are reported as present in traces or in comparatively small quantities, but in this water the amount of manganese salts is so large that during evaporation a very marked brown precipitate of a

[1] Pelouze: *Compt. rend.*, **16**, 50.
[2] Millon: *Ann. Chem.* (Liebig), **18**, 349.
[3] Rammelsberg: Pogg. *Ann.*, **44**, 570.
[4] Hirzel: *Ann. Chem.* (Liebig), **84**, 258; Weil: Pogg. *Ann.*, **123**, 358.

manganese compound is formed, part of which floats on the surface of the evaporating water. This precipitate dissolves on the addition of hydrochloric acid with the evolution of chlorine in such quantity that the evaporation of the acidified water to dryness cannot be made in a platinum dish.

The relative quantity of manganese salts in this water is greater than that in any of those given in Peale's[1] Mineral Springs of the United States, while the quantity of the nickel and cobalt salts is only exceeded by the amounts in the waters of the Jordan[2] Alum and Rockbridge Alum Springs, Virginia.

Still larger contents of manganese, nickel and cobalt salts are found in the water of Roncegno,[3] South Tyrol.

The specific gravity of the Hinton water at 15°-16° was 1.007.

The weight of solids dried at 180° was 1.2836 grams per liter, or 74.9750 grains per U. S. gallon.

The results of the analysis were:

	Parts to 1,000,000.
Potassium (K)	4.6
Sodium (Na)	306.7
Calcium (Ca)	89.6
Magnesium (Mg)	42.4
Aluminum (Al)	1.3
Iron (Fe)	10.5
Manganese (Mn)	40.7
Nickel and cobalt (Ni, Co)	3.6
Silicate ion (SiO_3)	16.0
Carbonate ion (calculated) (CO_3)	109.1
Chlorine (Cl)	627.2
	1251.7

This corresponds to:

	Grams per liter.	Grains per U. S. gallon.
Potassium chloride	0.0087	0.5082
Sodium chloride	0.7785	45.4722
Calcium chloride	0.1776	10.3736
Magnesium chloride	0.0847	4.9473
Magnesium carbonate	0.0710	4.1471
Alumina	0.0024	0.1402
Silica	0.0128	0.7476
Ferrous carbonate	0.0215	1.2558
Manganese carbonate	0.0848	4.9532
Cobalt and nickel carbonates	0.0073	0.4264
	1.2493	72.9716

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[1] Bulletin of the United States Geological Survey, No. 32.

[2] *Loc. cit.*, pp. 62 and 65.

[3] Gläser und Kalmann: *Ber. d. chem. Ges.*, **21**, 1637 and 2879; abstract in *J. Chem. Soc.* (London), **54**, 796 and **56**, 28.