77. Composition and Classification of Coal.—Classification, changes in composition, weathering, spontaneous combustion, formation of mine gases. Lectures; assigned reading. *II;* (1) [3Q; 1 quarter hour]. Professor PARR

Prerequisite: Chemistry 65.

78. Metallography.—Constitution and microstructure of metals and alloys and the relations between their properties, chemical and mechanical treatment, and structure. Lectures; reading; laboratory. *II;* (2) [2Q; 3 quarter hours].

Associate Professor MCFARLAND

Prerequisite: Chemistry 7.

[**80. The Elements of Glass Blowing.**—Construction and repair of glass apparatus. *II;* (1). Not given, 1918-19.

Prerequisite: Two years' work in chemistry.]

[**86. The Chemistry of the Higher Order Compounds.**—Complex compounds from the standpoint of the Valence Theory as developed by Werner. *II;* (2). Not given, 1918-19. Assistant Professor SMITH

Prerequisite: Chemistry 9a, 9b, 14a-14b.]

90-91. Chemical Inspection Trips.—Required for juniors and seniors in the courses in chemistry and chemical engineering. For the year 1918-19 the trips took place on April 16 to 19, 1919. The expense involved will approximate fifteen to twenty-five dollars for each student. *II; (no credit)* [3Q; *no credit*].

Associate Professor MCFARLAND in charge

92a-92b. Chemical Literature and Reference Work.—Periods, leaders, journals. Required of juniors in chemistry and chemical engineering; required also of juniors who are majoring in chemistry. *I, II;* (1) [W92a, 1Q, or 2Q; 92b, 2Q; 92c, 3Q; 1 quarter hour]. Miss SPARKS

93a-93b. Journal Meeting.—Required of seniors and all graduate students in chemistry. All members of the staff of the department of chemistry are expected to attend. *I, II;* (1) [2Q, 3Q; 1 quarter hour]. Dr. BRALEY

95. History of Chemistry.—Lectures and assigned reading. *I*; (2) [3Q; 3 quarter hours]. Assistant Professor SMITH

Courses for Graduates

Graduate students whose major subject is in some department other than chemistry, before taking graduate work for credit in this department, must have had the equivalent of 15 university credits in chemistry, and the ground covered should include satisfactory work in general chemistry, and in qualitative and quantitative analysis. Such students are advised to make selections from the following courses: Chemistry 31, 33 (or 102, 102a), 14a, 14b, 9a, 9b, 15, and 25. Courses of a more special nature will not, as a rule, be accepted for graduate work unless preceded by one of the above courses.

For students in agriculture, Chemistry 5a and 13a will not be accepted for graduate credit.

Graduate students who are candidates for an advanced degree in chemistry must have had the equivalent of 25 university credits in chemistry, properly distributed.

For students in chemistry, 5a, 13a, 9, and 9c will not be accepted for graduate credit and 9a, 9b, 14a-14b, 31, and 33 will be accepted only from students entering the Graduate School with the equivalent of 30 university credits in chemistry.

101. Theories of Chemistry.—Seminar. Origin and development of the principal theories of science. *Once a week. II;* (*¼ unit*) [3Q; *¼ unit*]. Professor NOYES

102. Advanced Physical Chemistry.—This course, with 102a, covers a period of two years. In the first year especial attention will be paid to: thermodynamic methods