

CONTENTS

PART I

ANALYSIS OF IRONS AND STEELS

<i>Method</i>	<i>Page</i>
I ALUMINIUM	
(a) HYDROXYQUINOLINE PRECIPITATION for samples of low chromium content	1
(b) HYDROXYQUINOLINE PRECIPITATION AFTER REMOVAL OF CHROMIUM for samples of high chromium content	3
(c) CUPFERRON PRECIPITATION AFTER MERCURY CATHODE SEPARATION for samples of low or high chromium content	5
2 ARSENIC	
(a) HYPOPHOSPHITE REDUCTION for samples of low alloy content	7
(b) HYPOPHOSPHITE REDUCTION for samples of high chromium and tungsten contents	9
3 BORON	
(a) QUINALIZARIN COLORIMETRIC METHOD for low alloy steels of boron content less than 0.02 per cent.	10
4 CARBON	
(a) GRAVIMETRIC COMBUSTION METHOD for irons, steels, and ferro-alloys	13
(b) GRAVIMETRIC COMBUSTION METHOD for graphitic carbon in irons and steels	18
(c) COLORIMETRIC METHOD for combined carbon in iron and steels	19
5 CHROMIUM	
(a) VIGNAL METHOD for samples containing more than 0.2 per cent. of chromium	22

<i>Method</i>	<i>Page</i>
(b) PERSULPHATE METHOD for samples containing more than 0·2 per cent. of chromium	24
(c) PERMANGANATE-SODIUM CHLORIDE METHOD for samples containing less than 3·0 per cent. of chromium	25
(d) DIPHENYLCARBAZIDE COLORIMETRIC METHOD for samples containing less than 0·25 per cent. of chromium	26
(e) ABSORPTIOMETRIC METHOD See Part II, Method 24, page 98.	27
6 COBALT	
(a) α -NITROSO- β -NAPHTHOL PRECIPITATION AFTER SEPARATION OF IRON	28
(b) ABSORPTIOMETRIC METHOD See Part II, Method 25, page 101.	29
7 COPPER	
(a) THIOSULPHATE PRECIPITATION for samples not containing tungsten	30
(b) THIOSULPHATE PRECIPITATION for samples containing tungsten	32
(c) POLAROGRAPHIC METHOD See Part II, Method 33, page 138.	32
8 IRON	
(a) STANNOUS CHLORIDE REDUCTION for samples of low copper, molybdenum, and vanadium contents	33
(b) HYDROGEN SULPHIDE REDUCTION for samples containing copper, molybdenum, or vanadium	34
9 LEAD	
(a) DIRECT SULPHATE SEPARATION for samples of low chromium content	37
(b) HYDROGEN SULPHIDE PRECIPITATION for samples of either low or high chromium content	38
(c) POLAROGRAPHIC METHOD See Part II, Method 33, page 138.	39

<i>Method</i>	<i>Page</i>
10 MANGANESE	
(a) BISMUTHATE METHOD for samples containing less than 0.5 per cent. of chromium with cobalt absent	40
(b) PERSULPHATE-ARSENITE METHOD for samples containing less than 0.5 per cent. of chromium with cobalt absent	41
(c) ZINC OXIDE METHOD for samples containing more than 0.5 per cent. of chromium with or without cobalt	42
(d) ABSORPTIOMETRIC METHODS See Part II, Methods 26(a), (b), pages 104 and 106.	43
11 MOLYBDENUM	
(a) SODIUM HYDROXIDE SEPARATION for samples not containing vanadium	44
(b) BENZOINOXIME PRECIPITATION	46
(c) COLORIMETRIC METHOD for samples containing less than 0.75 per cent. of molybdenum	48
(d) ABSORPTIOMETRIC METHODS See Part II, Methods 27(a), (b), pages 109 and 111	49
12 NICKEL	
(a) DIMETHYLGLYOXIME PRECIPITATION	50
(b) ABSORPTIOMETRIC METHOD See Part II, Method 28, page 113	52
13 NIOBIUM (COLUMBIUM) PLUS TANTALUM	
(a) CUPFERRON PRECIPITATION	53
14 NITROGEN	
(a) STEAM DISTILLATION METHOD for samples free from insoluble nitrides	55
(b) STEAM DISTILLATION METHOD for samples containing insoluble nitrides	58

<i>Method</i>	<i>Page</i>
15 PHOSPHORUS	
(a) DIRECT NITRIC ACID METHOD for samples of low chromium content	60
(b) ARSENIC REMOVAL METHOD	62
(c) PERCHLORIC ACID METHOD for high chromium samples	63
16 SELENIUM	
(a) SULPHUR DIOXIDE PRECIPITATION	66
17 SILICON	
(a) HYDROCHLORIC ACID METHOD for samples of low chromium content	68
(b) SULPHURIC ACID METHOD for samples of high chromium content	69
(c) PERCHLORIC ACID METHOD	69
(d) ABSORPTIOMETRIC METHOD See Part II, Method 30, page 118	70
18 SULPHUR	
(a) GRAVIMETRIC METHOD	71
(b) COMBUSTION METHOD	73
19 TIN	
(a) HYDROGEN SULPHIDE PRECIPITATION for highly alloyed steels	76
(b) DIRECT VOLUMETRIC METHOD for samples of low chromium content	78
20 TITANIUM	
(a) CUPFERRON PRECIPITATION	80
(b) DIRECT COLORIMETRIC METHOD for samples free from tungsten and vanadium and containing less than 3 per cent. of chromium	81
(c) ABSORPTIOMETRIC METHODS See Part II, Methods 31(a), (b), pages 122 and 124	82
21 TUNGSTEN	
(a) HYDROCHLORIC ACID METHOD for samples containing more than 3 per cent. of tungsten	83

<i>Method</i>	<i>Page</i>
(b) HYDROCHLORIC ACID METHOD for samples containing less than 3 per cent. of tungsten	84
(c) ABSORPTIOMETRIC METHOD See Part II, Method 32, page 127	85
22 VANADIUM	
(a) VOLUMETRIC METHOD	86
(b) MERCURY CATHODE SEPARATION for highly alloyed samples	87
(c) COLORIMETRIC METHOD for samples free from tungsten and containing less than 3 per cent. of chromium	88
23 ZIRCONIUM	
(a) CUPFERRON PRECIPITATION	90

PART II
SPECIAL ANALYTICAL METHODS
ABSORPTIOMETRIC METHODS

24 CHROMIUM	
(a) PERCHLORIC ACID METHOD for carbon and low alloyed steels containing less than 0.35 per cent. chromium	98
25 COBALT	
(a) NITROSO-R-SALT METHOD	101
26 MANGANESE	
(a) PERSULPHATE OXIDATION	104
(b) PERIODATE OXIDATION	106
27 MOLYBDENUM	
(a) DIFFERENCE METHOD FOR SAMPLES CONTAINING GREATER THAN 0.05 PER CENT. OF MOLYB- DENUM	109
(b) DIRECT METHOD FOR SAMPLES CONTAINING GREATER THAN 0.05 PER CENT. OF MOLYB- DENUM	111