—40 km depth under alternatively by the ic lower crust at siminditions. In both ill consist dominantly clinopyroxene and cic plagioclase and of fractional crystalli-

PH2O conditions may t 30-40 km depth in s and island arcs. It imate source of the that it was introduced b of a convection cell , as in the hypothesis is, in turn, might exline rocks with a The basalt magma melting of the mantle ise a high-alumina or it may have been sequently rose to a g contaminated with crystallization under the parent basalt may li basalt type [19]). alc-alkaline suite retallization will vary e parent basaltic comich the process takes

be comparatively alkali-poor olivine T conditions subseation, the residuum over a long period of 10]. The work of onstrated that such clogite more readily rmation takes place ently sink into the T ( $\sim 3.6 \text{ g/cm}^3$ ). In ses regarding the cryshe derivation of the tional crystallization

ged that the calc-

Table 5

Calculated compositions of liquid fractionates and crystalline residua derived from the high-alumina quartz tholeiite at 9-10 kb under wet conditions \*.

Pressure		9 kb	10 kb	10 kb
Temperature		1040°C	960°C	920°C
Nature and estimated % of crystals extracted	Initial liquid	18% cpx 5% amph 2% opx 1% ilm	18% cpx 25% amph 2% opx 1% ilm	18% cpx 32% amph 3% plag 2% opx 1% ilm
Liquid fractionate				
SiO <sub>2</sub>	52.9	55.9	59.7	64.5
TiO <sub>2</sub>	1.5	0.8	0.4	0.1
Al <sub>2</sub> O <sub>3</sub>	16.9	19.4	20.2	19.9
Fe <sub>2</sub> O <sub>3</sub>	0.3	0.4	0.5	0.7
FeO	7.9	7.2	5.8	3.7
MnO	0.2	0.3	0.3	0.4
MgO	7.0	4.4	2.1	2.0
CaO	10.0	. 7.8	6.7	3.9
Na <sub>2</sub> O	2.7	3.3	3.4	3.6
K <sub>2</sub> O	0.6	0.8	0.9	1.0
	100.0	100.3	100.0	99.8
Mol. Prop.				
100 MgO	60.4	50.9	37.5	45.3
MgO + FeOtot	00.4	30.9	37.3	43.5
CIPW norm				
Qz		5.5	14.4	25.3
Or	1 A K A	4.8	5.4	5.9
Ab		27.9	28.8	30.5
An		35.7	33.2	19.3
Cor		_	1.4	5.8
Diop		2.4	_	_
Нур		21.9	15.3	12.1
Mt		0.6	0.7	1.0
Ilm		1.5	0.8	0.2
Crystal residuum				12.21
SiO <sub>2</sub>	24,	44.8	43.0	42.7
TiO <sub>2</sub>		2.5	2.7	2.7
Al <sub>2</sub> O <sub>3</sub>		9.7	12.3	14.2
FeO		9.1	10.1	11.2
MgO		14.6	12.9	11.0
CaO		16.6	13.8	14.8
Na <sub>2</sub> O		1.0	1.8	1.9
K <sub>2</sub> O		0.04	0.2	0.2
		98.34	96.8	98.7
Mol. Prop.				
100 MgO		74.2	69.5	63.7
MgO + FeO				

<sup>\*</sup> The orthopyroxene analysis obtained at 1040°C, 9 kb has been used in calculations for other experimental runs since it could not be analyzed in these runs. Since only 2% of orthopyroxene is extracted, any variations in its composition will not seriously affect the compositions of the liquid fractionates or crystalline residua. Also 1% of ilmenite is extracted as part of the crystalline residua. This is because an accessory iron-titanium rich opaque mineral phase occurred in the experimental runs in graphite capsules where no iron loss took place. This phase could not be analyzed quantitatively and as a first approximation for these calculations was taken as ilmenite.