

Table 14. Calculated compositions of liquid fractionates and crystalline residua derived from the high-alumina quartz tholeiite and basaltic andesite compositions at 18 kb

Composition	High-alumina quartz tholeiite			Basaltic andesite		
	1,330° C		1,300° C	1,280° C		1,250° C
Temperature						
Nature and estimated % of crystals	Initial liquid	15% cpx	50% cpx 10% plag 5% ga	Initial liquid	10% cpx	25% cpx 10% plag 1% ga
<i>Liquid fractionate</i>						
SiO ₂	52.9	53.8	58.1	56.4	57.1	58.8
TiO ₂	1.5	1.5	1.8	1.4	1.4	1.7
Al ₂ O ₃	16.9	17.7	17.8	16.6	17.1	15.9
Fe ₂ O ₃	0.3	0.4	0.9	3.0	3.3	4.7
FeO	7.9	8.1	9.0	5.7	5.3	4.5
MnO	0.2	0.2	0.5	0.1	0.1	0.2
MgO	7.0	5.9	2.1	4.3	3.4	2.6
CaO	10.0	9.0	4.0	8.5	7.8	6.4
Na ₂ O	2.7	2.9	3.7	3.0	3.2	3.2
K ₂ O	0.6	0.7	1.6	1.0	1.1	1.5
	100.0	100.2	99.5	100.0	99.8	99.5
<i>Mol. Prop.</i>						
	$\frac{100 \text{ MgO}}{\text{MgO} + \text{FeO}_{\text{Total}}}$					
	60.4	55.4	27.6	47.7	42.2	34.8
<i>CIPW norm</i>						
Qz	1.3	3.0	13.1	10.7	12.4	17.6
Or	3.5	4.2	9.4	5.9	6.5	8.8
Ab	22.8	24.6	30.7	25.4	27.1	27.1
An	32.2	33.2	19.9	28.9	29.0	24.6
Diop	14.2	9.4	2.7	10.8	14.7	5.6
Hyp	22.6	22.5	19.0	11.3	9.5	5.7
Ol	—	—	—	—	—	—
Mt	0.4	0.6	1.3	4.3	4.8	6.8
Ilm	2.8	2.8	3.4	2.7	2.7	3.2
<i>Crystal residuum</i>						
SiO ₂		50.1	48.0		50.5	52.1
TiO ₂		1.4	1.3		1.0	1.0
Al ₂ O ₃		16.4	12.3		11.7	17.8
FeO		7.3	6.9		9.7	7.8
MnO		tr	—		—	0.1
MgO		9.7	13.5		12.2	7.3
CaO		13.2	15.4		14.8	12.2
Na ₂ O		2.2	1.4		1.2	2.6
K ₂ O		0.1	—		—	0.1
		100.4	98.8		101.1	101.0
<i>Mol Prop.</i>						
	$\frac{100 \text{ MgO}}{\text{MgO} + \text{FeO}}$					
		70.3	77.7		69.2	62.5

Table 15. *Calculated approximate composition of liquid fractionate and crystalline residuum from the andesite composition at 18 kb*

Note: Suitable electron microprobe analyses of garnet and plagioclase could not be obtained at 18 kb. However as an approximation the composition of the garnet from a 22.5 kb run is taken. The composition of the plagioclase is estimated as $Or_5Ab_{85}An_{30}$ by comparison with plagioclase in the basaltic andesite at 18 kb and assuming that the albite enrichment trend with increasing pressure continues to 18 kb in the plagioclases crystallizing from the andesite (see p. 129).

Temperature		1,260° C		Temperature		1,260° C	
Nature and estimated % of crystals	Initial liquid	12% plag	3% ga	Nature and estimated % of crystals	Initial liquid	12% plag	3% ga
<i>Liquid fractionate</i>				<i>CIPW norm</i>			
SiO ₂	62.2	62.8		Qz	15.5	18.7	
TiO ₂	1.1	1.3		Or	13.6	15.4	
Al ₂ O ₃	17.3	16.4		Ab	27.9	22.0	
Fe ₂ O ₃	0.3	0.4		An	25.7	25.4	
FeO	5.9	6.3		Diop	0.2	0.7	
MnO	0.1	0.1		Hyp	14.8	14.8	
MgO	2.4	2.4		Ol	—	—	
CaO	5.2	5.3		Mt	0.4	0.6	
Na ₂ O	3.3	2.6		Ilm	2.1	2.5	
K ₂ O	2.3	2.6		<i>Crystal residuum</i>			
Mol. Prop.	100.1	100.2		SiO ₂		58.9	
100 MgO				TiO ₂		0.2	
$\frac{MgO + FeO_{Total}}{100 MgO}$	41.0	39.1		Al ₂ O ₃		22.5	
				FeO		3.5	
				MnO		0.1	
				MgO		2.2	
				CaO		4.4	
				Na ₂ O		7.1	
				K ₂ O		0.8	
				Mol Prop.		99.7	
				100 MgO			
				$\frac{MgO + FeO}{100 MgO}$		52.9	

and alumina and also in iron (except where crystallization is greater than 30%) but there is marked depletion in magnesia. Thus the fractionating liquids show a large drop in the $\frac{Mg}{Mg + Fe}$ ratio. In contrast to the trends at 18 kb, the liquid fractionation trends at 27—36 kb (Tables 16—20) show significant enrichment in silica and alkalis, alumina remains approximately constant, and iron and magnesium are both depleted. The $\frac{Mg}{Mg + Fe}$ ratio shows a slight decrease, so that there is some iron enrichment relative to magnesia. This effect is probably accentuated by the experimental conditions where there is some iron loss to the platinum capsule during a run. This factor will mean that the iron content of the mafic phases as analyzed will be slightly less than expected for similar crystals in equilibrium with a melt without iron loss.