Petrology of Rocks in Contact of Mantle Peridotite and Gabbro Intrusions in the Central Iran Ophiolites (Jandaq, Anarak, Naein and Ashin)

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Abstract

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By intrusion of gabbros in mantle peridotites of the Central Iran ophiolites, a chemical potential gradient established and new metasomatic rocks are formed in contact zone. These rocks produced by this special type of contact metamorphism, are clinopyroxenite, olivine clinopyroxenite wehrlite, lherzolite plagioclase peridotite and troctolite,

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from mantle peridotite side to the gabbro side. The studied rocks are formed at the expense of peridotitic part of the contact zone. The occurrence of these types of reactions in ophiolitic associations are required a careful sampling and attention should be focused on the interpretation of gabbroic, peridotitic and pyroxenitic rocks data.

Keywords: Mantle peridotites, Gabbro intrusions, Contact zone, Central Iran ophiolites.



. (Tamura et al., 1999) al., 2001)



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KH = Khoy; KR = Kermanshah; NY = Neyriz; BZ = Band Ziarat; NA = Naein; BF = Baft; ES = Esphandagheh; FM = Fanuj-Maskutan; IR = Iranshahr; TK = Tchehel Kureh; MS = Mashhad; SB = Sabzevar; RS = Rasht; SM = Samail; ASH-ZA = Ashin-Zavar; AN = Anarak; JA = Jandaq.



(Droop, 1987) (Spear, 1995)

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Rock	Minerals	SIO_2	TiO ₂	Al ₂ O ₃	Cr_2O_3	FeO*	MnO	MgO	CaO	Na_2O	K_2O	NiO	Total
Gabbro	Plagioclase	46.74	00.0	33.93	0.04	0.20	0.00	0.01	17.25	1.72	0.02	0.00	99.91
[دور]	Clinopyroxene	55.76	0.04	0.29	0.04	6.17	0.23	15.64	21.67	0.20	0.03	0.00	100.09
Gabbro	Plagioclase	45.09	0.02	34.61	0.02	0.38	0.02	0.04	18.72	1.02	0.00	0.00	99.91
(نزدیک)	Clinopyroxene	52.93	0.43	2.90	0.33	4.12	0.08	16.47	22.83	0.30	0.02	0.00	100.41
Troctolite	Plagioclase	43.50	0.00	35.36	0.00	0.39	0.02	0.09	19.70	0.55	0.04	0.01	99.66
(منطقه همبری)	Olivine	40.11	0.02	0.00	0.01	12.57	0.21	46.96	0.02	0.03	0.01	0.24	100.17
	Plagioclase	44.52	0.00	35.29	0.00	0.31	0.02	0.03	19.32	0.73	0.03	0.01	100.24
Plagioclase	Clinopyroxene	52.93	0.20	2.32	0.71	4.11	0.11	17.78	21.97	0,14	0.01	0.04	100.32
Peridotite	Orthopyroxene	55.89	0.12	1.54	0.26	8.72	0.17	32.48	1.21	0.02	0.00	0.08	100.49
	Olivine	39.30	0.00	0.00	0.00	14.18	0.18	45.64	0.06	0.01	0.01	0.33	99.71
	Clinopyroxene	52.09	0.15	3.02	0.92	4.23	0.16	16.88	22.46	0.20	0.01	0.03	100.14
Wehrlite	Orthopyroxene	55.49	0.17	1.33	0.25	9.39	0.28	31.23	1.35	0.01	0.00	0.03	99.53
	Olivine	39.36	0.01	0.01	0.03	16.81	0.23	43.54	0.09	0.00	0.00	0.28	100.36
Clinopyroxenite	Clinopyroxene	51.70	0.18	3.62	0.41	4.56	0.17	16.85	22.80	0.18	0.02	0.01	100.50
Mantle Peridotite	Clinopyroxene	52.48	0.05	3.74	1.03	2.45	0.07	17.40	23.01	0.07	0.01	0.07	100.38
[دور]	Orthopyroxene	55.94	0.00	2.88	0.56	5.85	0.17	33.73	0.57	0.00	0.00	0.07	99.78
	Olivine	39.89	00.0	0.00	0.01	9.09	0.16	50.18	0.01	0.00	0.01	0.40	99.75

برگرفته از مطالعات نمونه های افیولیت عشین می باشد.

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Rock	Minerals	Oxygen	si	Ti	Ρ	ċ	Fe^{+2}	Fe^{+3}	Mn	Mg	Ca	Na	K	iz	Total
Gabbro	Plagioclase (Bytownite)	80	2.15	0.00	1.84	0.0	0.01	0.0	0.0	0.0	0.85	0.15	0.00	0.0	5.00
[دور]	CPX (Augite)	9	2.06	0.00	0.01	0.00	0.19	0.00	0.01	0.86	0.86	0.01	0.00	0.00	4.00
Gabbro	Plagioclase (Anorthite)	8	2.08	0.00	1.88	0.0	0.02	0.0	0.00	0.00	0.93	0.09	0.00	0.00	5.00
(نزدیک)	CPX (Diopside)	9	1.92	0.01	0.12	0.01	0.11	0.02	0.00	0.89	0.89	0.02	0.00	0.00	4.00
Troctolite	Plagioclase (Anorthite)	80	2.02	0.00	1.93	0.0	0.02	0.0	0.00	0.01	0.98	0.05	0.00	0.0	5.00
(منطقه همبری)	Olivine (Chrysolite)	4	1.00	0.00	0.00	0.00	0.26	0.00	0.00	1.74	00.0	0.00	00.00	0.01	3.00
	Plagioclase (Anorthite)	8	2.05	00.0	1.92	0.00	0.01	0.00	0.00	0.00	0.95	0.06	0.00	0.00	5.00
Plagioclase	CPX (Augite)	6	1.92	0.01	0.10	0.02	0.08	0.04	0.00	0.96	0.85	0.01	0.00	0.00	4.00
Peridotite	OPX (Enstatite)	6	1.94	00.0	0.06	0.01	0.21	0.05	0.01	1.68	0.04	0.00	0.00	0.00	4.00
	Olivine (Chrysolite)	4	0.99	0.00	0.00	0.00	0.30	0.00	0.00	1.71	0.00	0.00	0.00	0.01	3.00
	CPX (Diopside)	6	1.90	0.00	0.13	0.03	0.07	0.06	0.01	0.92	0.88	0.01	0.00	0.00	4.00
Wehrlite	OPX (Enstatite)	9	1.96	0.01	0.06	0.01	0.26	0.02	0.01	1.64	0.05	0.00	0.00	0.00	4.00
	Olivine (Chrysolite)	4	1.00	0.00	0.00	0.00	0.36	0.00	0.01	1.64	0.00	0.00	0.00	0.01	3.00
Clinopyroxenite	CPX (Diopside)	6	1.88	0.01	0.15	0.01	0.05	0.09	0.01	0.91	0.89	0.01	0.00	0.00	4.00
Mantle															
Peridotite	CPX (Diopside)	9	1.90	00.0	0.16	0.03	0.06	0.02	0.00	0.94	0.89	0.0	0.0	00.0	4,00
[دور]	OPX (Enstatite)	6	1.93	00.0	0.12	0.02	0.17	0.00	0.01	1.74	0.02	0.00	00.00	0.00	4.00
	Olivine (Forsterite)	4	0.98	0.00	00.0	0.00	0.19	0.00	0.00	1.84	0.00	000	0.00	0.01	3.00







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Gabbro (Far)	Gabbro (Near)	Troctolite (Contact Zone)	Plagioclase Peridotite	Wehrlite	Clinopyroxenite	Serpentinized Mantle Peridotite
Plagioclase An 84.62 Ab 15.27 Or 0.12	Plagioclase An 91.02 Ab 8.98 Or 0.00	Plagioclase An 94.97 Ab 4.80 Or 0.23	Plagioclase An 93.44 Ab 6.39 Or 0.17			
Clinopyroxene Wo 44.75 En 44.93 Fs 10.32 Mg# 0.82	Clinopyroxene Wo 46.57 En 46.74 Fs 6.69 Mg# 0.88		Clinopyroxene Wo 43.47 En 49.47 Fs 6.59 Mg# 0.89	Clinopyroxene Wo 45.49 En 47.57 Fs 6.94 Mg# 0.88	Clinopyroxene Wo 45.66 En 46.95 Fs 7.40 Mg# 0.87	Clinopyroxene Wo 46.78 En 49.22 Fs 4.00 Mg# 0.93
		Olivine Fo 86.75 Fa 13.02 Tp 0.22	Orthopyroxene Wo 2.27 En 84.72 Fs 13.01 Mg# 0.87 Olivine Fo 85.00 Fa 14.81 Tp 0.19	Orthopyroxene Wo 2.58 En 83.00 Fs 14.42 Mg# 0.86 Olivine Fo 82.00 Fa 17.76 Tp 0.25		Orthopyroxene Wo 1.09 En 89.90 Fs 9.00 Mg# 0.91 Olivine Fo 90.63 Fa 9.21 Tp 0.16

Mg# .

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[Mg/(Mg+Fe2+)]

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(Technoexport, 1979)

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(Plyusnina, 1982)

(EPMA)

oC (Gottschalk et al. 2001) (Uchara and Shirozu, 1985) (Mellini et al., 1987) (Wunder, 2001) (Santos (Girardeau and Gil (Becker, 1996) barguchi, 1991) (Santos et al., 1996) (barguchi, 1991)

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(Niida et al., 2002) (IODP, 2005)

(Wang, 2004).





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	ی و نام آنها.	فرمول ساختار	نتايج محاسبه أ	افيوليت جندق به همراه	ر نمونه های	مای موجود د	بى پيروكسن م	5 أناليز شيمياي	دول ۲- نتايخ	٨.
SiO_2	53.87	51.92	52.92	SiO ₂	56.60	57.31	56.15	57.46	57.00	56.61
TiO_2	0.23	0.20	0.27	TiO ₂	0.02	0.04	0.00	0.01	0.00	0.00
Al_2O_3	4.62	6.49	5.06	Al ₂ O ₃	1.39	0.94	1.17	0.50	1.30	1.87
Cr_2O_3	1.01	1.16	0.84	Cr_2O_3	0.14	0.05	0.22	0.11	0.10	0.30
FeO*	2.27	2.41	2.16	FeO*	6.25	5.95	6.44	6.09	6.31	6.16
MnO	0.11	0.09	0.08	MnO	0.08	0.15	0.14	0.10	0.11	0.12
MgO	17.46	15.24	15.83	MgO	36.01	35.91	35.97	35.95	36.19	35.59
CaO	19.68	21.60	21.68	CaO	0.10	0.09	0.16	0.12	0.08	0.07
Na_2O	0.57	0.71	0.82	Na_2O	0.03	0.00	0.04	0.03	0.00	0.03
K_2O	0.01	0.01	0.03	K_2O	0.01	0.00	0.00	0.02	0.02	0.00
P2O5	0.27	0.33	0.30	NiO	0.05	0.04	0.06	0.02	0.12	0.10
NiO	0.04	0.04	0.05	Total%	100.68	100.48	100.33	100.42	101.24	100.86
Total%	100.15	100.20	100.05	Oxygen	6	6	6	6	6	6
Oxygen	6	6	6	Si	1.94	1.96	1.92	1.96	1.95	1.93
Si	1.95	1.89	1.92	Ti	0.00	0.00	0.00	0.00	0.00	0.00
Ti	0.01	0.01	0.01	AI	0.06	0.04	0.05	0.02	0.05	0.08
Al	0.20	0.28	0.22	Ċ	0.00	0.00	0.01	0.00	0.00	0.01
r L	0.03	0.03	0.02	Fe(iii)	0.06	0.05	0.11	0.06	0.05	0.07
Fe(iii)	0.00	0.00	0.00	Fe(ii)	0.12	0.12	0.07	0.12	0.12	0.11
Fe(ii)	0.07	0.07	0.07	Mn	0.00	0.00	0.00	0.00	0.00	0.00
Mn	0.00	0.00	0.00	Mg	1.81	1.83	1.83	1.83	1.81	1.81
Mg	0.94	0.83	0.86	Ca	0.00	0.00	0.01	0.00	0.00	0.00
Ca	0.76	0.84	0.84	Na	0.00	0.00	0.00	0.00	0.00	0.00
Na	0.04	0.05	0.06	К	0.00	0.00	0.00	0.00	0.00	0.00
K	0.00	0.00	0.00	Ni	0.00	0.00	0.00	0.00	0.00	0.00
Р	0.00	0.00	0.00	Sum	4.00	4.00	4.00	4.00	4.00	4.00
Ni	0.00	0.00	0.00	Mg#	0.94	0.94	0.96	0.94	0.94	0.94
Sum	4.00	4.00	4.00	Name	Enstatite	Enstatite	Enstatite	Enstatite	Enstatite	Enstatite
MO	42.95	48.25	47.69							
EN	53.00	47.37	48.46							
FS	4.05	4.37	3.86							
Mg#	0.93	0.92	0.93							
Name	Augite	Dionside	Dionside							



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