Table 9:Comparison between the average chemical composition of the studied Arc granitoids and some of Egyptian and world rocks

Major oxides	I	II	III	IV	V	VI	VII	VIII
SiO_2	64.33	68.78	68.01	64.94	68.60	66.09	62.88	70.30
TiO_2	0.59	0.69	0.34	0.31	0.49	0.54	0.61	0.58
Al_2O_3	15.69	13.27	15.11	15.79	15.20	15.73	16.34	13.92
Fe_2O_3	3.30	3.42	1.68	3.15	2.42*	1.38	1.52	1.75
FeO	2.60	1.62	1.11	2.21	n.r.	2.73	2.86	0.95
MnO	0.16	0.09	0.08	n.r.	n.r.	n.r.	0.08	0.03
MgO	2.37	2.66	1.24	2.29	1.20	1.74	3.44	0.41
CaO	5.07	4.09	2.50	3.95	2.92	3.83	4.94	3.95
Na_2O	3.40	2.53	4.21	3.57	4.50	3.75	3.92	3.84
K_2O	2.34	1.51	3.15	2.01	2.77	2.73	1.59	3.44
P_2O_5	0.13	0.07	0.18	0.13	0.13	0.18	0.18	-

*= Total iron calculated as Fe_2O_3, n. r.= not recorded

I = Average chemical composition of the studied Arc-granitoids of Wadi Beida.

II = Average chemical composition of the studied arc granitoids of El Hobal pluton, South Eastern Desert (Abu El Laban, 2002).

III = Average chemical composition of arc granitoids of G. El Shalul area, Egypt (after Assran, 2000).

IV = Average chemical composition of older granitoids of El Bakria area, Egypt (Mohamed, 1999).

V = Average chemical composition of the older granitoids (Greenberg. 1981).

VI = Average chemical composition of granodiorites (Le Maitre, 1976b).

VII = Average chemical composition of tonalite of G. Muqsim area (Sadek, 1994).

VIII = Average chemical composition of tonalite, Wadi Abu Gurdi, Hamata area, Ali et al., 1983).

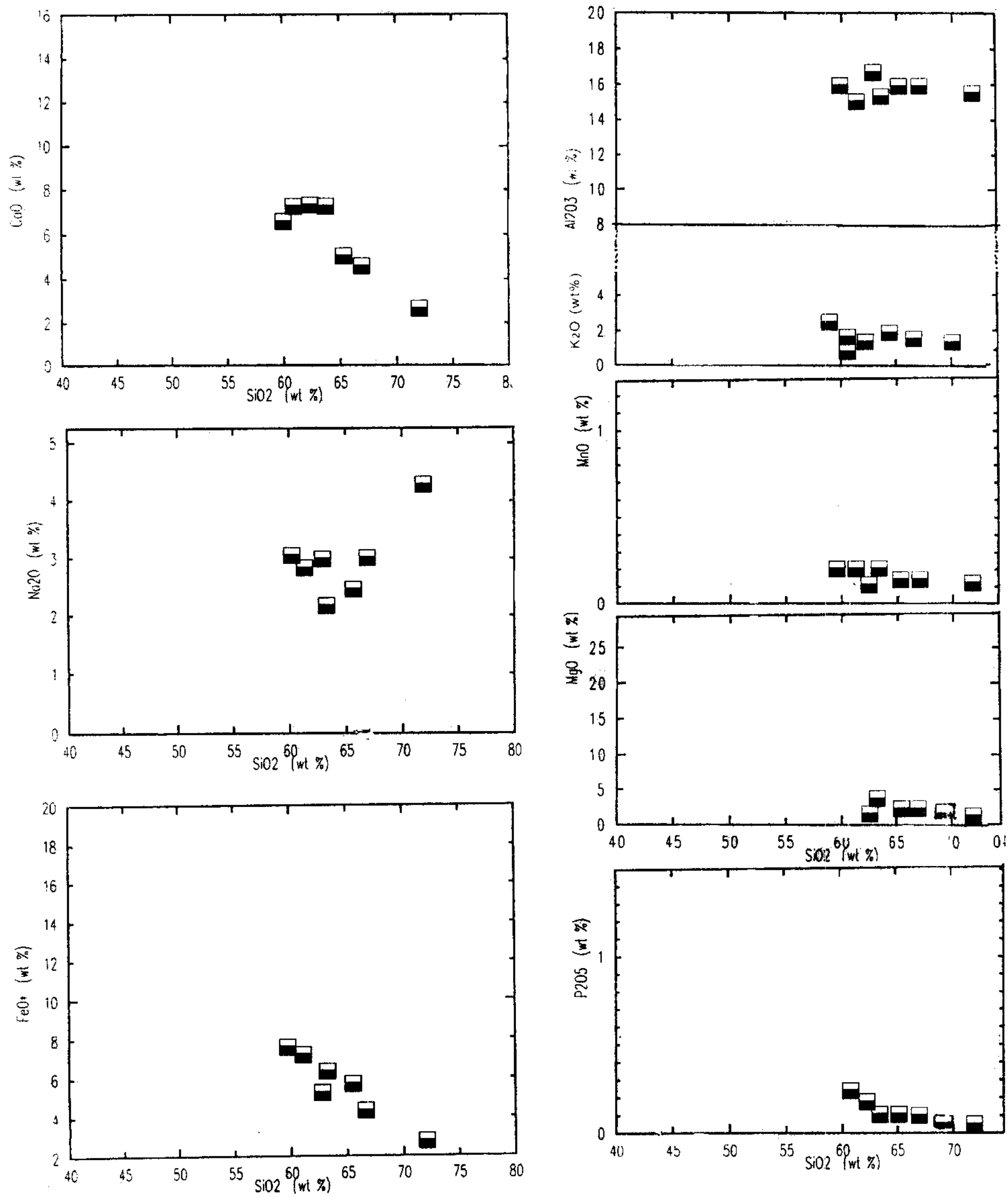

Fig. (4.30) : SiO_2 vs. major oxides for studied Arc granitoid rocks.

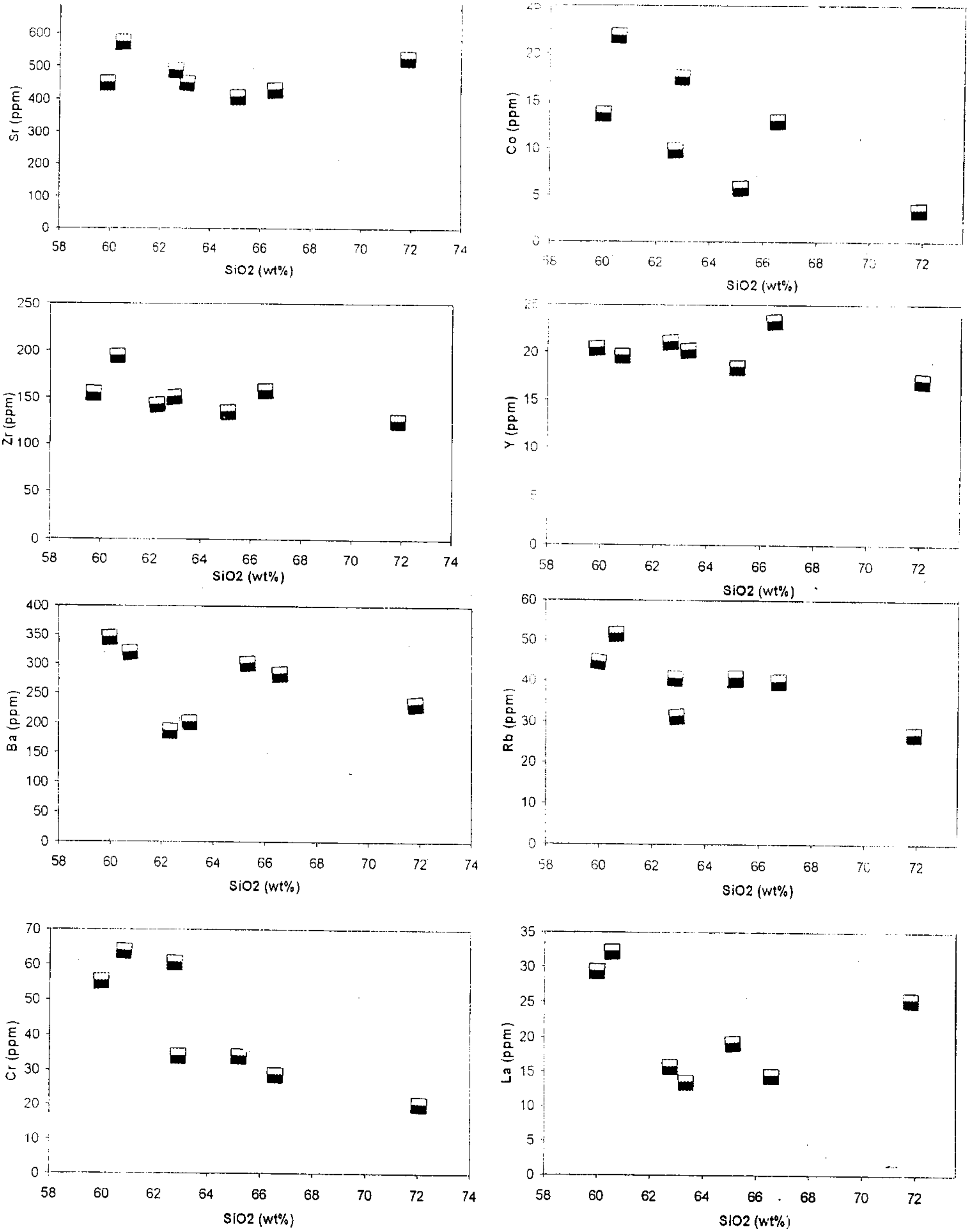

Fig. (4.31) : SiO_2 vs. trace oxides for studied Arc granitoid rocks.

2 - The present normative hyperthene is higher than diopside and wollastonite in the analyzed samples.

3 - Normative corundum is recorded in two samples.

4 - Normative magnetite is relatively high in all samples.

The normative values are consistent with the petrographic investigation of these rocks.

(A) Petrochemical classifications

On the (Na_2O + K_2O) vs SiO_2 diagram of Cox et al., (1979), they plot in diorite to granodiorite fields (Fig. 4.32). These are confirming the petrographic description.

(B) Magma type

Several discrimination diagrams are used to suggest the magma type of the Arc-granitoids of the studied area.

On AFM diagram of Irvine and Baragar (1971), the studied granitoids follow the typical calc–alkaline trend (Fig. 4.33), being relatively rich in total alkalis. Petro et al., (1979) used the AFM diagram to differentiate between compressional and extensional environments i.e. granites formed under environments of compression (e.g. subduction–related granites) and those formed under tensional condition (e. g. intra-plate rifting environments). The trend of extensional suite trends to be closer to and roughly parallel to the AF–side line at a composition approaching the alkali apex.

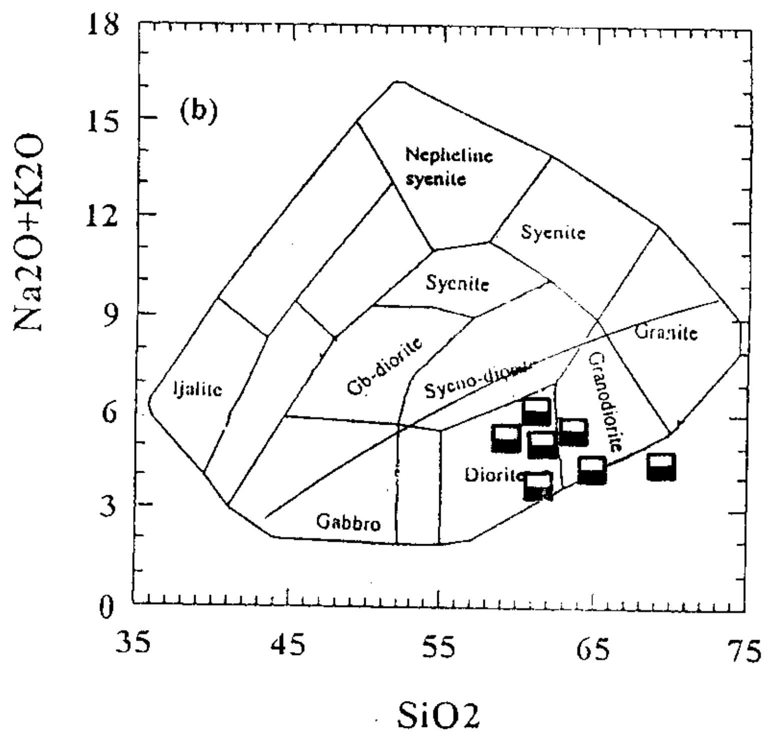

Fig. (4.32) : (Na_2O + K_2O) versus SiO_2 for the studied Arc granitoids of (Cox et al., 1979).

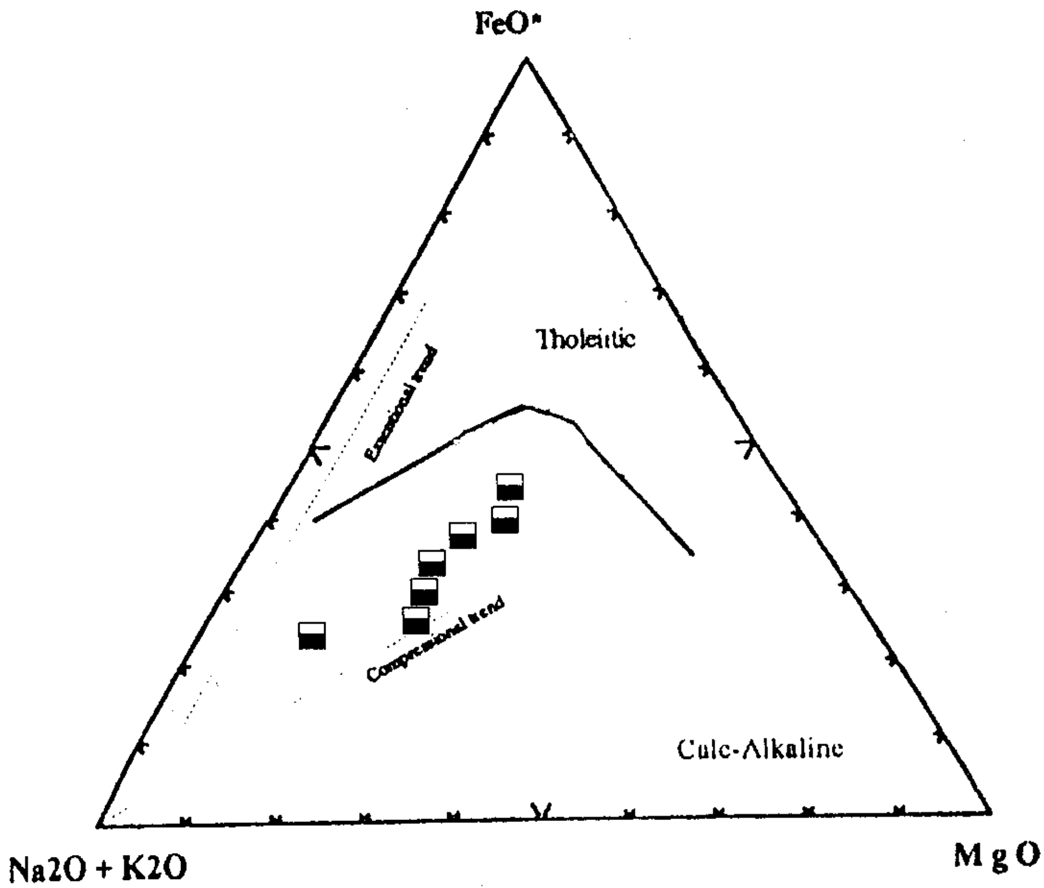

Fig. (4.33) : AFM diagram for the studied Arc granitiodes rocks 1.2 are the extensional and compressional trends (Petro et al., 1979). Tholeiltic – calc – alkaline boundary after (Irvine and Bargar, 1971).

On the other hand, trends of compressional suite tend to be more or less perpendicular to the FM–side line for the entire trend. It is observed that the trend of the studied granitoids showing tendency to compressional environment (Fig. 4.33).

(c) Tectonic setting and petrogenesis

Mainar and Piccoli (1989) used the major elements to discriminate the tectonic environments of granitoids. The chemical data for the studied granites are plotted on the respective discrimination diagrams. Accordingly, the analyzed samples of Arc granitoids may represent IAG, CAG, and CCG fields due to its lower content of iron on the binary diagram between SiO_2 and FeO^t / FeO^t + MgO (Fig. 4.34), SiO_2 versus K_2O (Fig 4.35), FeO^t versus MgO (Fig. 4.36) and FeO^t + MgO versus CaO(Fig. 4.37).

Pearce et al., (1984) used the trace elements to discriminate the tectonic environments of granitic rocks. They (obcit) concluded that the granites can be classified according to their tectonic settings into four main groups; ocean ridge granites (ORG), volcanic arc granites (VAG), within plate granites (WPG) and collision granites (COLLG). By using Y versus silica, the examined granitoids plot in VAG (Fig. 4.38). Also, by using Rb versus silica, the studied granitoids plot in volcanic arc-granites (Fig. 4.39).

Application of the discrimination diagrams involving the (Rb + Nb + Y) system of Pearce et al., (1984) shows that the data points of Arc-granitoids lie within VAG field on both binary diagrams (Figs. 40 & 41).