PETROGRAPHICAL AND GEOCHEMICAL FEATURES OF THE BOZDAĞ FORMATION METACARBONATE IN NORTHWEST OF KONYA, TURKEY

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INTRODUCTION

The study area is located between Yükselen-Osmancık and Kadınhanı town, about 40 km northwest of Konya (Figure 1). The area is included in the Afyon-Bolkardağı Zone (Okay, 1985), or in the Kütahya-Bolkardağ belt (Özcan et al., 1988). Bozdağ formation was first named by Doğan (1975) and its general field descriptions were reported by Eren (1993) and Kurt (1994). Bozdağ formation, which can be observed various shaped and isolated masses, include different degree metamorphosed limestone, dolomitic limestone and dolomite. The limestone is light gray, white in colour and generally massive to medium bedded (thickness,10-50 cm). The dolomite and dolomitic limestone are medium to thick bedded, black and dark gray in colour, which caused by very high contents of bitumunous, and insoluble residue. They show very fine lamination and comprise widespread biostromes of Amphipora. When broken, all the dolomite and dolomitic limestone regardless of color, give off a strong, petroliferous odor. The rocks of this formation, which metachert beds and chert lenses generally occurs in metacarbonate, are interfingering with each other laterally and vertically.

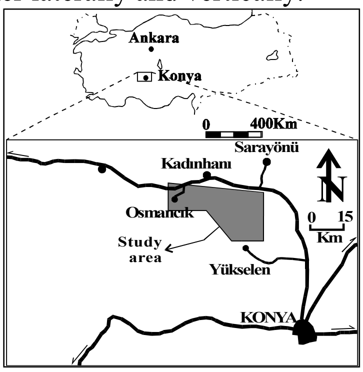

Figure 1:Location map of the study area

The metacarbonate rocks contain corals, which are Thamnopora, Syringopora and Canina, stromatoporoid which is Amphipora, crinoids, fusulinide and algs. These fossils indicate a middle Devonian and early Carboniferous age in the formation. Otherwise the formation contains an abundant microfauna which is difficult to identify, due to metamorphism and recrystallization. These metacarbonates are cut by intrusive dykes and active volcanism and metasedimentary rocks also recorded in the surrounding area (Eren 1993, Kurt 1994).

The aim of this research is to investigate the petrography and geochemistry of the metacarbonate rocks studied.

METHODS

Mineral identifications were made optically an by X-ray difraction methods. An analysis of major and trace elements was made by the X-ray fluorescence machine.

PETROGRAPHY

The light coloured metacarbonate is composed of micrite cement, calcite, dolomite, biomicrite, coral and Fe-oxide. The calcite grain boundaries are sutured and are fragmented and set in a secondary calcite cement. Some coarse calcite crystals show deformation twinning, kinking and inclusion trails. The grain size distribution is unimodal. An abundance of such twinned lenses characterizes as the twinning regime. Very small calcite grains are found mainly in the groundmass, but sometimes fill fossil cavities. Noncarbonate minerals accumulated along stylolites as insoluble residues, these residues also form the boundaries of veins, and this relationship indicates that some veins formed by void filling after formation of stylolite. İnsoluble residues contain iron oxides, organic materials and sericite. The rocks show laminated zones and mosaic textures.

Dark coloured, bitumunous and partly dolomitized limestone consist of of finely to medium crystalline sucrosic dolomite, biomicrites, pelmicrites, corals, with well developed crystalline microvuggy porosity. Dolomite has almost obliterated the original structure of the fossils. Very small calcite grains fill fossil cavities. The fine grained (0,1-1 mm) dolomite crystals are brownish and clearer rims. The texture is dominated largely elongation and characteristically have irregular and interlocking boundaries. Stylolitization occurs typically as a haphazard replacement of matriks and sparry calcite by irregular.

Lithification after burial is partly supported by the preferred orientation of microfossil test and other grains (long axes are parallel with bedding) which is result of compaction and deformation.

GEOCHEMISTRY

Two samples from dolomitized limestone were analysed for mineral compositions by XRD. Dolomitized limestone consist mainly dolomite (Figure 2). 5 samples from limestone and 3 samples from dolomitized limestones were analyzed for major and trace element composition by XRF machine (Table 1).

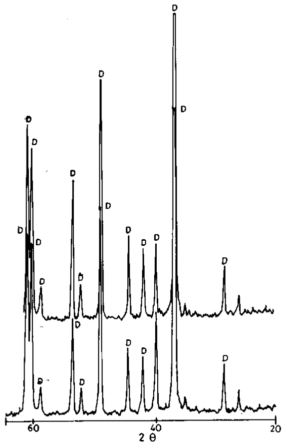

Figure 2:X-ray diffraction diagram of the dolomitic limestone. D:dolomite

Table 1:Major oxides and trace element concentrations of rocks

Sa.No	1	2	3	4	5	6	7	8
SiO_2	4.20	4.29	2.52	0.10	1.96	1.07	1.1	0.0
TiO_2	0.05	0.06	0.07	0.04	0.04	0.04	0.02	002
Al_2O_3	1.61	1.71	0.32	009	00	014	017	015
Fe_2O_3	0.13	o.11	0.26	0.02	0.05	0.01	0.00	0.00
MgO	0.71	0.62	0.54	0.52	0.84	22.08	24.38	20.54
Na_2O	0.30	0.30	0.41	0.23	0.75	0.06	0.03	0.00
CaO	54.6	53.64	54.92	54.84	53.74	28.91	33.09	29.33
LOI	39.19	39.70	40.63	42.25	42.83	46.64	42.34	47.67
Total	100.8	100.5	99.7	99.5	100.2	99.00	100.2	97.7
Rb	5	6	5	9	0	5	4	6
Sr	188	246	221	487	339	52	90	73
Zr	26	23	19	bdl	12	16	18	11
Ba	6	bdl	bdl	15	11	28	22	2
Pb	4	3	2	6	4	9	14	0

Al_2O_3 shows a positive correlation with Fe_2O_3 and TiO_2 all of which are likely to be contained in clay minerals in different proportions. Where Al_2O_3 is zero or extremely low (eg. sp.5) clearly the SiO_2 cannot have been introduced into the original sediment in clay mineral and was probably therefore either in traces of detrital quartz or in siliceous organisms.

Iron, Mg and Sr remain the same in their respective average concentrations in both limestone and dolomitized limestone of formation. Iron is 0.02-0.26% Mg 052-084% and Sr is 221-487 ppm for limestone and iron 001%,Mg 22-24.4% and Sr 52-90 ppm for dolomitized limestone. There isa good indication that the Zr was mostly introduced in clay minerals because of the marked correlation of Zr and Al. Pb is 0-14 ppm in all the carbonate rocks. Wedepohl et al (1974) stated that calcite and dolomite cannot incorporate appreciable concentrations of Pb, because sea and interstitial waters usually contain very little Pb. Strontium (Sr) is one of the most important minor elements in carbonate rocks especially in dolomites as discussed by Veizer and others (1978) who regarded Sr as an indicator of the derivation of the dolomite. Early diagenetic fine crystalline dolomites have higher Sr contents than later diagenetic dolomites The range of Sr in late diagenetic limestones is typically 90-300 ppm. The chemical composition of chert lenses in formation have been deposited in a relatively shallow-water environment similar to recent continental shelf slope environments (Kurt,1994).

CONCLUSIONS

The studied formation include corals, Amphipora fossils, crinoids, fusulinides, algs, shallow water environment chert lenses and blackish lamination dolomitized rocks.

The lithological, petrographical and geochemical features of the Bozdag formation shows that depositional processes governed sedimentation in a reef environment or shallow water environment.

Chemical evidence is also presented to suggest that strontium may be very low in the dolomitized limestone and possibly of late diagenetic origin

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