



REE and trace element geochemistry of vein type Pb-Zn Deposits: Dadağlı (Kahramanmaraş)

Yusuf Barbaros Akben¹, Cihan Yalçın^{*2}, Yusuf Uras¹

¹Kahramanmaraş Sütçü İmam University, Department of Geological Engineering, Türkiye, bakben@gmail.com

²Ministry of Industry and Technology, World Bank Project Implementation Unit, Ankara, Türkiye cihan.yalcin@sanayi.gov.tr

Cite this study: Akben, Y. B., Yalçın, C., & Uras, Y. (2022). REE and trace element geochemistry of vein type Pb-Zn Deposits: Dadağlı (Kahramanmaraş). 5th Advanced Engineering Days, 175-177

Keywords

Pb-Zn
Epigenetic
Trace element
REE
Dadağlı

Abstract

Prior to Neotethys' closure, it may be observed in the Kahramanmaraş region in conjunction with the Taurus Orogenic Belt and Arabian Plate units. One of these bands, the marginal fold belt of the Arabian plate, is where the Dadağlı Pb-Zn mineralization is also observed. The oldest lithology in this area is made up of units from the Seydişehir formation. This unit is overlain in an angular unconformity of Mesozoic carbonates. In the fractures and fissures of carbonate rocks to the north of Dadağlı, there are vein type and epigenetic Pb-Zn mineralizations. Galenite, sphalerite, barite, goethite, pyrite, cerussite, smithsonite, quartz, and calcite are formed as gangues throughout paragenesis. Zn ranges from 77.19 to 1200.10% and Ag ranges from 6.20 to 59.17% in the ore zone samples that were used for the trace element analyses. Some of the samples that were compiled include a significant amount of Sc. The ore zone has low concentrations of these elements, according to REE analyses. When compared to heavy rare earth elements (HREE), it may be claimed that light rare earth elements (LREE) are richer. The Dadağlı Pb-Zn mineralization's characteristics are revealed by the obtained geochemical concentrations.

Introduction

Arabian plate lithologies and units from the Taurus Orogenic Belt came together in the Kahramanmaraş region with the closure of the Neotethys Ocean [1]. Due to the presence of rocks with various tectonic characteristics, Rigo De Righi and Cortesini [2] and Gül [3] divided the tectonostratigraphic units in this region into orogenic belts. According to Hanilçi et al. [4], the Pb deposits found in carbonate rocks in Turkey are a product of the Alpine-Himalayan Orogenic Systems. This orogenic belt has the effect of bringing several tectonic belt lithologies together in Turkey. Dadağlı Pb-Zn mineralization is found in the Arabian Platform's marginal fold belt, which is south of the Taurus Orogenic Belt (Figure 1).

Cansu and Öztürk [5] revealed that barite mineralization occurs in Paleozoic-aged sedimentary rocks in this area, and ore paragenesis also contains galenite and sphalerite. According to the study done by Akben et al. [6], this area has Pb-Zn mineralization linked to barite and quartz veins.

The alteration geochemistry of the Pb-Zn mineralization in this area was disclosed by Uras and Yalçın [7]. Yalçın [8-9] reported that galenite and smithsonite are found as gangue minerals in vein type barite mineralizations in the zones in the same region. According to Uras and Yalçın [7], the lead mineralization found to the north of Dadağlı was associated with carbonate rocks, and the PbO content reached a high of 60%. The common alteration types, according to the alteration geochemical diagrams and microscopy analyses, include carbonation and sericitization [7].

This paper reveals the trace and REE concentrations of this region's mineralization zone.

Material and Method

At the Geochemistry Research Laboratory of Istanbul Technical University, 10 samples were evaluated using the ICP-MS method on a BRUKER S8 TIGER model instrument for trace and REE analysis in the ore zone (Table 1-2).

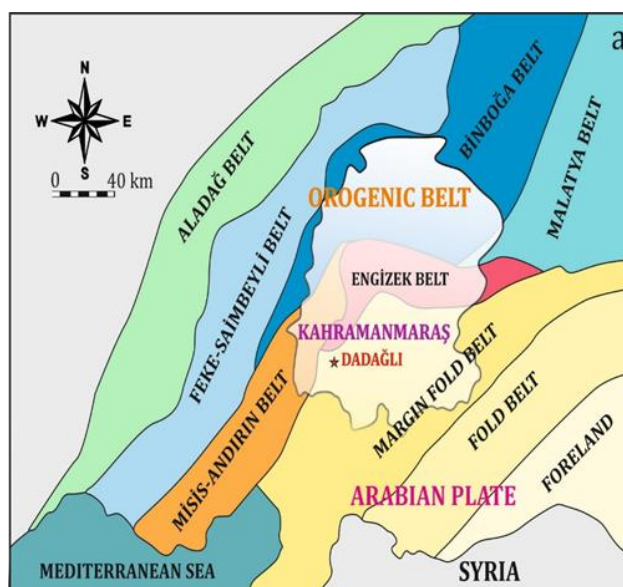


Figure 1. Tectonic location of the study area [3]

Mineralization and Geochemistry

In the dolomitic limestones to the north of Dadağlı vein-type Pb-Zn mineralizations can be observed (Figure 2a, b). Galena, sphalerite, pyrite, and quartz are still present in the mineralization with epigenetic formation, along with calcite, smithsonite, and quartz, respectively.

In the ore zone, Zn ranges from 77.19 to 1200.10% and Ag ranges from 6.20 to 59.17%, as shown in the Table 1. Some of the samples that were collected include a great deal of Sc. Hg ranges from 20.67 to 415.78%, whereas Sr ranges from 169.33 to 677.39% (average: 4.15%).

Table 1. Trace element concentrations of the samples

TRACE ELEMENT (PPM)	DK-1	DK-2	DK-3	DK-4	DK-5	DK-6	DK-7	DK-8	DK-9	DK-10
Sc	ND	ND	40.44	9.51	ND	26.00	26.20	12.00	14.20	3.56
V	855.70	554.98	975.78	241.80	1307.08	90.76	130.20	145.60	230.48	268.20
Co	106.38	90.64	302.48	632.18	39.21	394.56	320.20	39.21	68.20	80.20
Ni	51.86	54.38	460.32	3691.15	38.05	485.68	32.20	50.30	200.30	180.30
Cu	9.95	105.60	89.55	363.92	113.80	666.73	220.40	128.30	340.30	120.60
Zn	77.19	127.31	768.70	93.70	86.26	1018.28	120.30	150.30	1200.10	980.50
Rb	59.55	97.22	79.67	125.45	29.26	72.71	34.60	58.20	68.20	76.15
Sr	266.35	677.39	672.18	776.16	328.47	169.33	268.90	320.20	468.48	530.78
Zr	315.06	308.49	618.38	536.12	98.55	769.74	120.45	150.80	96.00	98.00
Mo	6.25	6.05	16.78	11.58	1.31	20.48	5.20	6.20	4.58	15.20
Ag	20.46	20.39	59.17	37.69	6.20	55.20	32.40	17.40	20.10	40.30
Cd	1.31	31.47	44.71	26.01	7.86	6.62	16.80	7.45	3.23	4.30
Sn	5.58	49.00	82.83	53.35	7.60	6.42	18.70	25.30	4.30	5.20
Sb	20.20	33.02	74.96	48.31	9.99	39.14	23.25	26.40	35.40	38.90
Nd	64.99	ND	ND	39.76	ND	404.16	ND	32.30	ND	56.30
W	176.17	85.79	ND	ND	198.22	ND	ND	ND	ND	ND
Hg	29.32	241.90	178.29	415.78	20.67	395.15	250.30	310.20	178.20	86.78

Conclusion

The results of the study suggest that REE's Pb-Zn mineralization is poor (Table 2). Moreover, it implies that Heavy Rare Earth elements are rarer than Light Rare Earth elements (LREE) (HREE).

Table 2. REE concentrations of the samples

REE (PPM)	DK-1	DK-2	DK-3	DK-4	DK-5	DK-6	DK-7	DK-8	DK-9	DK-10
Ce	10.41	12.10	10.06	9.62	5.52	31.37	26.80	17.40	18.80	23.30
Cs	0.85	3.41	0.92	4.08	0.93	0.35	2.10	3.23	0.90	0.46
Dy	0.48	0.99	0.73	0.68	0.86	0.81	0.30	0.29	0.68	0.82
Er	0.37	0.49	0.44	0.28	0.46	0.48	0.30	0.38	0.40	0.46
Eu	0.61	7.88	2.16	5.81	1.02	0.64	2.30	3.20	1.80	1.90
Ga	3.83	5.37	3.79	6.56	2.94	2.47	4.20	3.60	2.20	2.10
Gd	0.73	1.01	1.13	0.74	1.15	1.47	1.24	1.14	1.46	1.19
Ho	0.07	0.12	0.13	0.11	0.15	0.15	0.12	0.15	0.10	0.11
In	ND	ND	0.06	ND	0.01	0.01	ND	ND	0.01	ND
La	7.84	8.41	9.14	7.18	4.34	22.11	16.29	15.82	6.20	11.20
Lu	0.02	0.06	0.11	0.07	0.04	0.04	0.04	0.06	0.10	0.05
Nd	4.62	6.42	8.22	5.51	4.53	12.55	11.20	8.97	4.20	6.20
Pr	1.21	1.73	2.10	1.35	1.13	3.61	2.80	2.40	1.60	1.80
Rb	16.55	43.33	15.89	53.92	16.27	13.68	12.67	11.65	22.30	12.50
Sm	1.29	12.80	3.70	9.46	2.11	1.99	1.89	1.68	2.30	7.20
Tb	0.04	0.15	0.17	0.14	0.17	0.18	0.18	0.17	0.16	0.16
Tl	5.16	5.01	13.59	10.72	0.93	15.62	13.24	11.40	4.80	8.90
Tm	0.01	0.05	0.07	0.07	0.09	0.04	0.07	0.06	0.08	0.09
Y	2.83	4.70	3.22	3.83	6.34	4.94	2.90	3.68	4.80	5.20
Yb	0.14	0.35	0.52	0.33	0.40	0.29	0.36	0.38	0.36	0.34

References

- Şengör, A. C., & Yılmaz, Y. (1981). Tethyan evolution of Turkey: a plate tectonic approach. *Tectonophysics*, 75(3-4), 181-241.
- De Righi, M. R., & Cortesini, A. (1964). Gravity tectonics in foothills structure belt of southeast Turkey. *AAPG Bulletin*, 48(12), 1911-1937.
- Gül, M. A. (2000). Kahramanmaraş Yöresinin Jeolojisi. Hacettepe Üniversitesi, Doktora Tezi, 304 s.
- Hanilçi, N., Öztürk, H., & Kasapçı, C. (2019). Carbonate-Hosted Pb-Zn Deposits of Turkey. In *Mineral Resources of Turkey* (pp. 497-533). Springer, Cham. <https://doi.org/10.1007/978-3-030-02950-0>.
- Cansu, Z., & Öztürk, H. (2020). Formation and genesis of Paleozoic sediment-hosted barite deposits in Turkey. *Ore Geology Reviews*, 125, 103700.
- Akben, Y.B., Yalçın, C., & Uras, Y. (2022, December). Geology and geochemistry of the Pb-Zn mineralization observed in the carbonates in the north of Dadağlı (Kahramanmaraş). In 2022 VI. International Scientific and Vocational Studies Congress – Engineering (BILMES EN 2021), Abstract Proceedings Book, pp. 28-29, TURKEY, ISBN: 978-605-74786-6-5.
- Uras, Y., & Yalçın, C. (2022). Dadağlı (Kahramanmaraş) bölgesinde karbonatlı kayaçlar ile ilişkili epijenetik Pb cevherleşmesinin alterasyon jeokimyası. *Kahramanmaraş Sütçü İmam Üniversitesi Mühendislik Bilimleri Dergisi*, 25(4), 724-732.
- Yalçın, C. (2022). Preliminary Datas of Carbonate-rock hosted barite Mineralization in Dadağlı (Kahramanmaraş) area, Turkey. *Advanced Engineering Days (AED)*, 2, 33-35.
- Yalçın, C. (2022). Geochemical and geological approach to the carbonate-hosted barite deposits in Dadağlı (Kahramanmaraş), Turkey. *Engineering Applications*, 1(1), 55-62.
- Öztürk, S., Yalçın, C., & Kumral, M. Microthermometric characteristics of vein type U-Th enrichment observed in the Fault Zones in Northwest of Arıklı (Çanakkale-Turkey). *Gümüşhane Üniversitesi Fen Bilimleri Dergisi*, 11(3), 729-743.
- Yalçın, C., Öztürk, S., & Kumral, M. (2022). Evaluation of U-Th enrichments in QGIS platform; Example of Arıklı (Çanakkale, Turkey) district. *Intercontinental Geoinformation Days*, 4, 225-228.