International Journal of Engineering & Scientific Research (IJMRA Publication)
Vol. 6 Issue 10, October2018,
ISSN: 2347-6532 Impact Factor: 6.660
Journal Homepage: http://esrjournal.com, Email: esrjeditor@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A

Geological and Geochemical Prospecting Models of Gold Silver Polymetallic Deposits in China

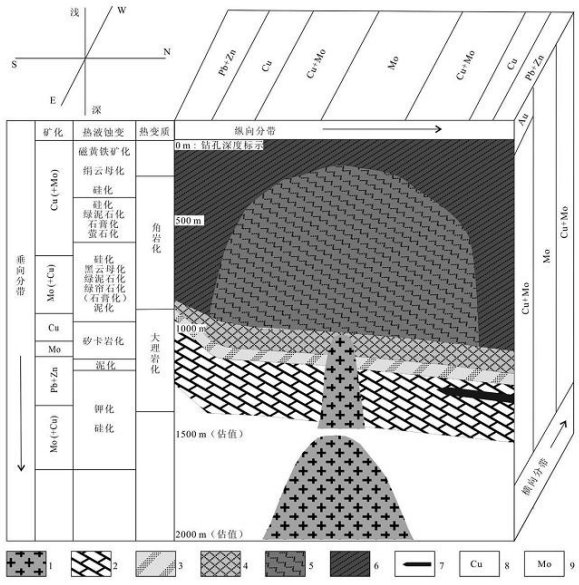
Jin-zhong Gong
Hebei Institute of Geophysical Exploration, Langfang 065000, China
Corresponding Author Email Id: gjz212@tom.com

Article Received: 10th September, 2018 Article Revised: 20th September, 2018 Article Accepted: 30th September, 2018

Abstract: Unique crustal evolution history has created the Chinese characteristics metallogenic geological event and important metallogenic belts. A large number of regional mineralization law research's and National Assessment of mineral resource potential, have established rich geological and geophysical geochemical prospecting models of typical deposits. Use metallogenic essential factors as an analysis unit, the paper has statisticsed the distribution and allocation data of stratigraphic age, mineral reserves, ore-bearing rock, wall rock alteration, mineralization age, genetic type, geochemical anomaly element combinations of 1310 gold, silver, copper, molybdenum, lead, zinc, tungsten, tin, antimony, mercury, rare earth, chromium, nickel, vanadium deposits in China. The results shows, limestone, dolomite, sandstone, gneiss, siltstone, amphibolite rock, slate, marble and tuff constitute the most important host rocks for gold silver and polymetallic mineralization; The element's excess aggregate stratigraphic horizons reflects major geological events and ore source beds; Granitoid intrusive activities has an important role in controlling to gold and silver polymetallic and rare earth mineralization; Basic-ultrabasic intrusive rocks has an important role in restricting to chromium, nickel, vanadium mineralization; Silicification, sericite, carbonatization, chlorite, pyrite, potassic alterations (gold and silver polymetals) and serpentinized (chromium, nickel and cobalt) is the most widely type of wall rock alteration; Genetic types with hydrothermal filling dyke type most important; Then by contact metasomatic skarn and porphyry types, magmatic liquation nickel and cobalt chromium occupied absolutely advantage. Sedimentary types are also important to vanadium, rare earth minerals. Mineralization era Yanshan most important, then by Variscan, and Indosinian Himalayan. Sb, As, Au, Ag, Zn, Pb, Cu geochemistry abnormalities has a high frequency distribution in different minerals species. This result has an important promoting role to regional metallogenic regularity, has practical significance to geological prospecting work.

Key words: prospecting model; geology geochemistry; metallogenic essential factors; distribution and allocation data; gold-silver polymetallic deposits; mainland China

The deposit model is a set of information assemblages that comprehensive describes or reflects the fundamental characteristics of regional metallogenic models. The prospecting model is the select optimum technique for narrowing the prospecting target area and even discovering new deposits. It is based on the empirical model and theoretical model, in order to prospecting for the purpose, to the actual information as the basic content, based on signs, features and data combinations, to form the standards and criterions, guide to the specific practice of prospecting [1]. China Mainland is an important part of the Eurasian continent, is the product of global tectonic evolution, it consists of a number of different sizes of ancient land core, after long-term great development, accretion and different types of junction, consume and the overlapping of various geological processes in the later period, and eventually to form [2].The regional metallogenic regularity study shows that, in the process of crustal evolution in China, it has formed eight important geological events. The spatial distribution of metallogenic geological events has formed 18 major metallogenic belts [3].Ye Tianzhu et al (2014) has divided ore deposit genetic type according to the metallogenic geological actions, the characteristics of the known typical deposits will be converted into mark symbols of prospecting, established ore - forming geological body model prospecting prediction theory and method system [4].



Copper polymetallic deposit model in Tibet JiaMa（Wang Wai ping etc. 2011）

Based on the national mineral resources potential evaluation results, the author has counted the distribution and allocation data of the stratigraphic age, resource reserves, ore-hosting rocks, wall rock alteration, metallogenic epoch, genetic type, geochemical anomaly combination, include 268 gold, 140 silver, 219 copper, 118 molybdenum, 257 lead and zinc, 87 tungsten, 87 tin, 41 antimony, 27 rare earth, 15 mercury, 12 chromium, 39 nickel and 7 vanadium deposits, in China mainland, established comprehensive geological and geochemical prospecting models.

1. Distribution and allocation characteristics of mineral factors

From the statistical results, we can sort out the frequency distribution of the main metallogenic essential factors.

Ore-hosting rock distribution frequency% Between the metallogenic geological bodies and the characteristics marks of mineralization, in the terms of time, space, material composition and its aggregation, dynamic effective range, there is a determinate relationship. Statistical results, limestone, dolomite and sandstone are the most important ore-hosting rocks for gold and silver polymetal mineralization, next by gneiss, siltstone, amphibolite, slate, marble and tuff.

Calculation results of connection degree of mineralization of gold-silver polymetallic deposit in Chinese rocks, fines and dense siliceous rock, siltstone, quartzite, plagioclase amphibolite, granulite, dolomite, gneiss, limestone, etc., especially the alternate distribution of coarse and fine, soft and hard.

Distribution of resources reserves in strata of different ages reflecting the main horizons and minerallogenic element excess aggregate may indicate the existence of mineral source beds. among them, Ar_3: Au20.28%; Pt_1: V88.74%,Ni60.17%,Cr17.15%,Au11.83%; Ch: REE98.53%,Mo:16.75%,W10.42%,PbZn10.32%; Jx: Mo10.35%; Nh: Mo15.76%; Z: V10.79%; €: Hg79.19%, Mo34.68%, W14.20%; D: Sb40.12%, PbZn28.87%, Ag25.44%, Sn21.56%,Cr14.91%; C: Cr38.46%,W29.74%,Cu14.56%,Sn10.73%; P: Sb 19.39%, PbZn17.21%,Sn17.43%;T: Sn27.29%,Sb14.26%,Cu13.01%,Cr11.92%; J: Cu28.31%,Ag15.40%,Cr11.92.

Strata gold - silver polymetallic mineralization density coefficient show cyclic and trending characteristics. The first cycle Ar-Qb: continental nucleus island arc geosynclinal type metamorphic rock formation, subside geosynclinal sedimentary covers, Fuping, Wutai, Luliang, Jinning tectonic movement, the ore - forming density peak at Pt_1; Second cycle: Nh-S, marine carbonate facies formation, Chengjiang, Caledonian tectonic movement, the mineralization peak at Z; The third cycle: D-Q, continental volcanic-sedimentary formations, Variscan, Indosinian, Yanshan movement, mineralization in D reaches the peak. The mineralization coefficient decreases gradually from Ar to Q, the number of enriched kinds and the mineralization coefficient increase or decrease at the same time. In the early stage of each cycle, give priority to Cr, Ni and V, late by acidity at low temperature elements. This feature is related to sedimentation formation and tectonic movement cycles.

Three metallogenic cycles main advantages of minerals: Ⅰ Ar_2: Fe-Mo, Ar_3: Fe-Au-Ni, Pt_1:V-Ni-Cr, Ch: REE-Mo, Jx: Mo-W, Qb: Sb-Cu; Ⅱ Nh: Mo, Z: P-V-Ag-Sb-Mo-Sn-Pb-Zn, €: Hg-P-Mo, O: W, S: Au; Ⅲ D: Sb-Pb-Zn-Ag-Fe-Sn, C: Cr-W, P: Sb-Sn-PbZn,T: Sn, J: Cu-Ag, K: Pb-Zn.

Table1. Relational form between stratum mineralization density coefficient and crustal development in China

Cycle	Major geological events	Strata	Ore deposit elements and mineralization density coefficient
Ⅲ	Massifs cracking junction, continental internal depression, Uplift of the Qinghai - Tibet Plateau	Q	salts, placer
		R	petroleum gas
		K	PbZn1.563
		J	Cu2.886,Ag1.570,Fe1.264,Cr1.215
		T	Sn2.137,Sb1.117,Cu1.019
		P	Sb5.049,Sn4.539,PbZn4.482,Ag2.424,Cu1.549,Cr1.115
		C	Cr8.566,W6.624,Cu3.243,Sn2.390,Au1.967,Ag1.679,PnZn1.650,Mo1.109
		D	Sb14.75,PbZn10.61,Ag9.353,Fe8.235,Sn7.926,W5.743,Cr5.482,Hg5.335,Au5.096,Cu3.276,Mo2.574,Ni1.132,P0.73

			5
II	Continental margin development consolidation accretion, formed of ancient Chinese mainland	S	Au2.826,PbZn1.333
		O	W2.319,PbZn2.191,Cu1.289,Ag1.227
		€	Hg28.90,P16.06,Mo12.66,W5.182,Sn3.533,PbZn2.529,Sb 2.131,Ni2.018
		Z	P108.1,V29.16,Ag22.95,Sb22.86,Mo20.22,Sn11.35,PbZn 10.86,W6.865,Au5.243,Ni1.892
		Nh	Mo19.22,W2.415,Ni2.183,Au2.171,Ag1.854
I	One after another formed of North China, Tarim, Yangtze, Huaxia land block, converged to form the original Chinese mainland	Qb	Sb13.84,Cu11.10,Ag6.920,PbZn4.800,Au2.30
		Jx	Mo17.84,W11.83,Au4.345,PbZn3.241,Sn2.759,Cu2.569,S b2.190
		Ch	REE45.41,Mo7.719,W4.802,PbZn4.756,Au1.885,Ni1.797 ,Sn1.078
		Pt_1	V52.51,Ni52.51,Cr10.15,Au7.00,P4.734,W4.580,Cu3.680 ,Ag2.302
		Ar_3	Fe48.87,Au32.71,Ni14.55,P9.677,V5.726,Cr5.468,Cu4.66 1,Ag3.097,PbZn1.145
		Ar_2	Fe49.17,Mo24.67,Au4.625

metallogenic density coefficient= Proportion of reserves distribution/ Proportion of strata exposed area

Intrusion type distribution frequency Granite intrusion activities have an important role in control to mineralization of gold and silver polymetals and rare earth elements, basic and ultrabasic intrusive rocks have important restricting effects to Cr, Ni and V mineralization.

Intrusive rocks gold-silver polymetallic deposit metallogenetic correlation degree make known, serpentine, peridotite, hornblendite, gabbro for Ni, V, Cr, diabase, lamprophyre and quartz porphyry, diorite, granodiorite for gold-silver polymetallic mineralization, indicating significant is obvious.

Wallrock alteration distribution frequency In all types of deposits in China, silicification, sericitization, carbonation, chloritization, pyrition and potashification for gold and silver polymetal deposits, serpentinization for chrome-nickel-cobalt deposits, it is the most important type of wallrock alteration. This shows that Si, Al, K, Na, CO_2, H_2O, S and other components has important role in the mineralization process.

Genetic type distribution frequency China's gold and silver polymetallic minerals is most important by hydrothermal filling veins-type, followed by contact-metasomatic skarn type and porphyry type, magma differentiation chromium nickel and cobalt minerals in the absolute dominant, sedimentary type vanadium, rare earth minerals are also important.

Ore deposit quantity distribution frequency of ore - forming period In all Chinese minerals, Yanshan period ore deposit quantity occupy an absolute advantage, the distribution frequency of each mineral is 10% -80%, it is called the "big explosion of mineralization.", next by Variscan, Indosinian and Himalayan periods.

Distribution characteristics of geochemical anomalies The anomalous frequency of each element anomalies in different minerals, shows that, Sb, As, Au, Ag, Zn, Pb, Cu and so elements have a high frequency distribution in different minerals, reflecting the significant enrichment results of trace element content in the low-temperature mineralization process.

1: 200000 stream sediment geochemical anomalies general characteristics: abnormal large area, high

concentration, with obvious concentrate center and a density zonality; the ore-forming elements (occurrence frequency 80% -100%) and associated elements (occurrence frequency 20% -80%) are distributed along the metallogenic tectonic belt. The anomaly outside zone of ore - forming elements corresponding to the range of alteration mineralization zone, middle belt shows the ore field range, the inner zone is related to the ore-hosting position and the ore-bearing structure; Indirect ore-forming elements and mineral elements anomalies space fit well, located in the near ore parts (trailing edge); The combination of indicator elements of ore-forming environment (occurrence frequency 20% -1%) is closely related to ore-hosting rock and intrusive rock body[5].

2. Prospecting indicator of gold and silver nonferrous rare earth mineral deposit in China

According to statistic results**,** we can sort out the form of gold and silver polymetallic prospecting marks of rare earth deposits in China.

Table2. Prospecting indicator form of gold silver polymeta and rare earth mineral deposit in China

Deposit	Stratum	country rock	Epoch	Intrusive rocks	Wallrock alteration	Genetic types	Geochemical anomalies
Hg	€, D	limestone, dolomite, mudstone	Yanshan, Indosinian	γ, ηγ, η, βμ, χ	silicification,carbonatization,baritization,pyritization	Sedimentary reform, Hydrothermal filling	Hg,As,Sb,Zn, Au,Pb
Sb	D,P, T	limestone, sandstone, mudstone	Yanshan Indosinian	γ, βμ, γδ	silicification, carbonatization, pyritization,sericitization,chloritization	Hydrothermal filling, Sedimentary reform	Sb,Hg,Au,Pb,W
Pb-Zn	D, P, Ch, K	limestone, dolomite, sandstone, tuff, andesite	Yanshan Indosinian, Variscan	γ, γδ, δ	carbonatization, Silicification, pyritization,sericitization, chloritization	Sedimentary reform, Contact metasomatic, Volcano Eruption flow	Zn,Pb,Ag,Cu,As, Sb,Cd
Ag	D,J, T	limestone, tuff, sandstone,siltstone	Yanshan, Variscan	γ, γδ, δ, ηγ	silicification, carbonatization, sericitization,chloritization, pyritization,skarn	Hydrothermal filling, Volcano Eruption flow	Ag,Pb,Zn,Cu,Au, As,Sb,Bi,Cd
Au	Ar_3, D,Pt_1,T	tuff, sadstone, limestone,slate, siltstone, andesite,schist	Yanshan, Variscan, Indosinian	γ, γδ, δ	silicification,sericitization, pyritization, carbonatization, chloritization,arsenopyritization	Hydrothermal filling, Altered rock, Fine grained disseminated	Au,Hg,Ag,As,Sb, Pb,Zn,Mo,W,Bi
Cu	J,C, T	sandstone, limestone, tuff, andesite	Yanshan, Variscan, Himalayan	γ, γδ, δ	silicification,sericitization, chloritization, arbonatization, pyritization,potash-feldspathization,epidotization,kaolinization,	Porphyry, Hydrothermal filling, Contact metasomatic, Volcano	Cu,Ag,Zn,Pb,Mo, Au,As,Sb,Bi,W, Cd

					skarn,biotitization	Eruption flow	
Mo	€,Ch, Nh, Jx	sandstone, limestone, dolomite,schist, slate	Himalayan, Yanshan, Variscan	γ, ηγ, γδ, δ	silicification,sericitization, potash-feldspathization, pyritization,chloritization, carbonatization, kaolinization, biotitization	Porphyry, Hydrothermal filling, ontact metasomatic	Mo,Ag,Zn,Cu,Pb, W,Bi,Au, As,Sb, Sn
Sn	T,D, P,C	sandstone, limestone, siltstone, mudstone	Yanshan, Himalayan	γ, ηγ,qπ	silicification,sericitization, chloritization,pyritization, carbonatization,fluoritization,tourmalinization	Hydrothermal filling, Contact metasomatic	Sn,W,Bi, Pb,Zn,Mo,Cu,As, Sb
W	C,D, €	sandstone, limestone, slate, mudstone	Yanshan, Himalayan	γ, ηγ, γδ	silicification,sericitization, pyritization,chloritization, skarn,carbonatization, potash-feldspathization, fluoritization	Hydrothermal filling, Contact metasomatic	W,Bi,Mo,Cu,Ag,Sn,Zn,Pb, As,Sb,Au,Cd
REE	Ch, J	sandstone, tuff, shale, siltstone, leptite	Himalayan, Yanshan, Variscan	γ, ηγ, κγ, ρ	apatite,potash-feldspathi zation, quartzn,silicification, monazite,carbonatization, biotitization, fluoritization	Weathered sedimentary, Magma differeniation	La,Y, Nb ,Be, Zr

3. The Geological theoretical significance of empirical model

Currently, most mineralologists generally accepted the argument point of mineral multi-source, multi-genesis, multi-stage mineralization, it is believed that the deposit is formed under the multi-stage and multi-type metallogenic process, material sources have multiple source superposition and mixing features. The eruption and intrusion of magma are the most common thermal phenomena in crustal development history, also the most important heat source [4].

Element enrichment coefficient (mean value of rock element content/ abundance of crustal elements in eastern China[6]) of the main ore - bearing rock types in China and distribution of surrounding rocks in different ore, relationship studies have shown: (1) distribution of surrounding rocks of basic-ultrabasic magmatic differentiation type Cr, Ni, V deposits, with the rock element enrichment coefficient sequence, there is a good correspondence, indicating that the ore-forming materials are mainly from the magmatic rocks themselves; (2)Sedimentary rocks, metamorphic rocks, volcanic rocks, intermediate-acid intrusive rocks, between element enrichment coefficient series and the distribution of the mineral deposit surrounding rock, there is no close correspondence. Most of the surrounding rock is not enriched ore-forming elements of the corresponding deposits, while the enrichment of hydrothermal elemental composition H_2O, CO_2, S, Cl, Hg, F, As, Sb, Se and heat source element K, Na, U, Th, more closely with the gold and silver polymetallic mineralization. The wall rock alteration

is just the product of these hydrothermal activities. This is another metallogenic factor outside the exposed area; (3)Many researchers has calculated the geochemical data of the rock in the mining area, it is concluded that some of the surrounding rock mineralization and associated elements content significantly increased, so they are identified as the "source beds" that original enrichment of ore-forming material. This understanding is questionable. In fact, most cases, they may be caused by superposition of late hydrothermal activity.

In short, the results of this study and widely exist of $H_2O+CO_2+SO_2+NaCl+CH_4$fluids around the mineral deposit, indicating that the mineralization is essentially the process of hydrothermal fluid generation, migration, precipitation, the ore-forming material is extraordinary enriched as a minor component in the favorable space blocks. Those geophysical and geochemical environments that favorable for this process, is just important metallogenic prediction target areas.

References

1. Shi Jun-Fa, Tang Jin-Rong, Zhou Ping, etc., World prospecting model and mineral exploration [M], Beijing: Geological Publishing House, 2010, p3-39

2. Cheng Yu-qi Editor in Chief, Introduction to Regional Geology in China [M], Beijing: Geological Publishing House, 1994, p12

3. Zhao Yiming, Wu Liangshi, etc., Metallogenic regularity of major metal deposits in China [M], Beijing: Geological Publishing House, 2004, p10-12, p373-395

4. Ye Tianzhu, Lv Zhicheng, Pang Zhenshan etc., Theory and method of prospecting prediction in exploration area [M], Beijing: Geological Publishing House, 2014, p2-96

5. Chen Hong-qi, Qu Xiao-ming, Fan Shu-fang, Geological Characteristics and Mineralization Prospecting Model of Porphyry Copper-Gold Deposits in the Duolong Ore Deposit, Gaize County, Tibet [J]. Geology of Mineral Deposits, April 2015, Volume 34, Number 2, p321-332

6. Chi Qing-hua, Yan Ming-cai, Element abundance data handbook of applied geochemistry [M], Beijing: geological publishing house, 2007, p2-105

Reserves horizon distribution (%) form of gold silver and polymetallic deposits in China

Age	Dis.	Hg	Sb	PbZn	Ag	Au	Cu	Mo	Sn	W	REE	Ni	V	Cr
Q	38.90					0.26						0.45		
EN	7.74			4.76	0.73	0.17	2.17	0.04						
K	6.00			9.71	2.76	0.72	4.18	1.63	0.01		0.09			1.80
J	9.81	4.06	0.63	4.42	13.88	7.28	26.82	2.47	3.30	0.46	0.53	0.33		11.92
T	12.77		14.26	2.74	9.27	10.23	12.59	0.03	28.09	2.55	0.10	0.07		11.92
P	3.84	1.88	19.39	4.57	9.96	3.86	3.92	3.24	17.64	5.04		1.12		4.28
C	4.49	0.35	0.14	6.68	7.75	8.62	15.71	5.14	10.96	11.59		11.03		38.46
D	2.72	14.51	40.12	29.27	22.19	14.37	10.99	5.21	20.87	19.72	0.35	3.08		14.91
S	2.07			2.77	0.06	6.18	1.17	0.04	0.00	0.52	0.19	0.08		
O	1.94		0.58	0.78	2.27	1.54	2.44	1.19	0.94	5.74	0.04	1.47		
€	2.74	79.19	5.84	10.19	5.57	2.02	2.09	25.06	9.58	23.65	0.01	5.53	0.43	
Z	0.37		8.46	5.39	9.45	1.93	0.24	17.95	3.83	0.61	0.05	0.70	10.79	
Nh	0.82		0.29	2.09	2.01	1.14	0.03	0	0.44	3.01		1.79		
Qb	0.50		6.92	2.60	5.36	2.09	5.26	1.47	0.34	0.77		0.02		
Jx	0.58		1.27	1.86	1.06	1.98	0.71	5.76	1.62	9.30	0.01			
Ch	2.17		1.10	9.97	1.49	4.92	3.42	21.72	2.37	5.46	98.53	3.90		0.01
Pt_1	1.69		1.19	1.14	3.53	8.17	5.42	1.08	0.00	11.35	0.05	60.17	88.74	17.15
Ar_3	0.62	0.01		1.02	2.54	23.42	2.78	1.71	0.00	0.11	0.05	9.02	3.55	3.39
Ar_2	0.24			0.01	0.10	1.08	0.06	6.23	0.01	0.10	0.01	0.04		0.01

Total reserves: Hg123277t, Sb8585455t, PbZn348690961t, Ag246506t, Au16387t, Cu190060797t, Mo35403428t, Sn9474688t, W7692055t, REE102918979t, Ni14267480t, V7290963t, Cr 11693962t

Period distribution (%) form of gold silver and polymetallic deposits in China

Period	Hg	Sb	PbZn	Ag	Au	Cu	Mo	Sn	W	REE	Ni	V	Cr
Himalayan		7.32	5.84	5.80	6.12	8.68	62.96	4.60	22.99	62.96			
Yanshan	73.33	75.61	57.98	73.19	57.14	49.32	37.04	65.52	81.61	37.04	10.26		25.00
Indosinian	20.00	14.63	14.79	6.52	14.63	7.31		3.45	4.60				25.00
Variscan		7.32	14.79	10.14	15.99	19.63	18.52	3.45	6.90	18.52	41.03		25.00
Caledonian	6.67		5.45	5.07	2.72	3.65		2.30	4.60		12.82	57.14	8.33
Jinningian			0.78	1.45	1.70	4.11	3.70	3.45	1.15	3.70	10.26	14.29	8.33
Luliang			0.78		1.70	2.28	11.11		1.15	11.11	12.82	28.57	16.67
Wutai						1.37					5.13		
Fuping			0.39			0.91				3.70			16.67

Wall rocks distribution (%) form of gold silver and polymetallic deposits in China

Wall rocks	Hg	Sb	PbZn	Ag	Au	Cu	Mo	Sn	W	REE	Ni	V	Cr
tuff	6.67	14.63	22.18	29.71	27.99	25.57	22.03	10.34	6.90	22.22	10.26		25.00
rhyolite		7.32	10.89	13.77	8.58	10.96	10.17	2.30	3.45	14.81			
trachyte			3.11	14.35	1.12	3.20	1.69	1.15	3.45	3.70			
andesite	6.67	7.32	18.29	19.56	16.42	20.55	13.56	5.75	3.45	11.11	5.13		16.67
basalt		4.88	8.95	6.52	7.09	9.59	4.24	2.30	1.15		12.82	14.29	16.67
spilitic keratophyre			1.56	5.79	2.63	2.29	3.39				7.69		8.33
komatite						0.91					5.13		
picrite											2.56		
apatitolite												14.29	
limestone	53.33	43.90	41.63	35.51	20.89	29.68	24.58	24.14	35.63	11.11	2.56	14.29	16.67
dolomite	53.33	14.63	31.91	18.12	5.97	15.53	22.88	12.64	10.34	11.11	5.13	28.57	
siliceous rock	6.67	14.63	10.89	13.04	5.97	10.05	12.71	3.45	6.90		7.69	28.57	16.67
shale	13.33	9.76	7.00	4.35	2.98	3.65	5.08	13.79	6.90	22.22	7.69	57.14	8.33
mudstone	33.33	24.39	15.56	10.87	5.60	5.02	13.56	16.09	21.84	11.11	5.13		8.33
clay rock	6.67	2.44	0.78		1.87	0.46							
siltstone		17.07	17.90	24.64	17.91	16.89	9.32	24.14	11.49	22.22	2.56	42.86	8.33
fine sandstone			1.95	4.35	3.36	4.57	4.24	4.60	5.75			14.29	
sandstone	20.00	31.71	23.74	27.54	22.76	31.96	33.05	48.28	43.53	29.63	17.95		33.33
coarse sandstone			0.78	0.72	0.37	1.83		1.15					
hornstone			5.45			1.37	3.39	3.45	5.75	7.41	2.56		
quartzite		4.48	5.45	1.45	3.73	3.65	6.78	1.15	13.79		17.95		8.33
conglomerate	13.33	4.88	6.23	12.32	7.46	10.05	1.69	1.15	5.75	11.11			8.33
ferruginous quartzite			0.39		1.49	0.91	0.85		1.15		2.56		
marble		4.88	15.18	10.14	9.70	13.24	10.17	10.34	11.49	7.41	12.82		25.00
phyllite		2.44	8.95	8.69	10.45	6.85	6.78	6.90	9.20	3.70	5.13		16.67
slate		17.07	13.23	12.32	18.28	16.44	15.25	9.19	29.89	11.11	10.26		16.67
schist		7.32	9.73	12.32	15.67	18.72	16.95	10.34	12.64	18.52	30.77		8.33
leptite			2.33		2.24	1.83	1.69	1.15	3.45	7.41	2.56		8.33
gneiss	6.67	4.88	5.45	6.52	13.81	6.39	12.71	1.15	11.49	18.52	28.21	42.86	33.33
leptynite			4.28	7.25	11.57	3.65	5.93	4.60	6.90	22.22	5.13	14.29	8.33
granulite					1.87				1.15		2.56		8.33
amphibolite		2.44	1.95	4.35	8.96	4.57	4.24		9.19		33.33	28.57	

Intrusive rock types distribution (%) form of gold silver and polymetallic deposits in China

Intrusion	Hg	Sb	PbZn	Ag	Au	Cu	Mo	Sn	W	REE	Ni	V	Cr
pegmatite			1.17	0.72	1.89	1.37		4.60	1.15	14.81			
felsite		2.44	1.95	6.52	2.27	1.83	2.54			3.70			
aplite			1.56	2.90	7.20	1.83	0.85	2.30	1.15				
lamprophyre	20	9.76	4.28	8.69	12.12	6.85	5.93	4.60	4.60	3.70	7.69		
rhyolite porphyry		2.44	3.89	4.35	1.89	2.28	4.24		1.15				
quartz porphyry		17.07	10.12	18.84	6.06	8.22	10.17	16.09	10.34		2.56		
syenite-porphyry			6.61	8.70	8.33	4.11	5.08	4.60	3.45	14.81			
monzonite	20	2.44	3.89	2.17	4.55	4.57	3.39		2.30	3.70			
albitite			1.95	2.17	3.79	2.74	0.85			7.41			
alkali-feldspar granite			5.06	3.62	3.41	1.83	7.63	4.60	2.30	18.52			
granite	20	58.54	49.03	47.83	37.50	36.99	48.31	58.62	62.07	37.04	2.56		
admellite	20	17.07	15.95	20.29	17.05	13.24	35.59	19.54	27.59	37.04	2.56		
plagiogranite			3.11	12.32	6.44	3.65	5.93	1.15	1.15	3.70			
granodiorite		19.51	28.02	31.16	31.06	36.53	35.59	8.05	25.29	7.41	5.13		
trachy porphyry			0.78	0.72	0.38	0.46							
diorite	6.67	14.63	23.35	23.19	25.00	20.55	14.41	3.45	11.49		7.69		
andesitic-porphyrite		2.44	3.50	4.35	3.41	6.39	2.54	2.30	3.45	3.70	2.56		
basalt porphyry		4.88	0.78		0.76	0.46		1.15					
plagioclasite				1.45	0.76	0.91			1.15	3.70	2.56	14.29	
diabase	20	24.39	16.73	18.12	15.91	14.61	6.78	9.19	11.49	3.70	17.95		
gabbro			1.57	7.25	3.03	8.22	3.39			7.41	43.59	14.29	16.67
hornblendite			0.78	0.72	0.38	1.83	1.69				12.82	28.57	
pyroxenite			1.57	2.17	0.38	8.22	1.69	1.15	1.15	3.70	38.46	28.57	25.00
serpentinite			0.39	0.72	0.76		1.69				30.77		25.00
peridotite			0.78	1.45	0.38		1.69	1.15			58.97	28.57	91.67

Genetic types distribution (%) form of gold silver and polymetallic deposits in China

Genetic types	Hg	Sb	PbZn	Ag	Au	Cu	Mo	Sn	W	REE	Ni	V	Cr
weathered sedimentary	6.67				1.49	3.65	4.24	2.30		59.26	15.38	71.43	
sedimentary metamorphic reform	53.33	24.39	34.88	1.45		5.48	0.85	3.45	1.15	11.11			
fine grained disseminated			0.78	1.43	17.54	0.46							
hydrothermal filling dikes	53.33	80.49	31.78	55.80	60.07	22.37	34.75	51.72	65.52		23.08		
altered rock		7.32	3.49	9.42	37.31	3.65		8.05	9.19				
contact metasomatic skarn		4.88	34.88	13.77	5.60	21.00	22.03	27.59	27.59	3.70	2.56		
porphyry			5.81	6.52	4.48	28.77	55.93	6.90	16.09	3.70			
magma liquation differentiation						6.85				25.93	76.92	28.57	100
volcano eruption flow			17.51	18.12	7.09	20.09	5.08			3.70			

Wall rock alterations distribution (%) form of gold silver and polymetallic deposits in China

Altertion	Hg	Sb	PbZn	Ag	Au	Cu	Mo	Sn	W	REE	Ni	V	Cr
carbonized	26.67	2.44	0.78			0.91	0.85						
clavization	6.67	2.44	6.27	6.57	4.56	5.48	4.24	1.15					
gypsification	6.67	2.44	2.35	4.38	0.76	3.20	1.69						
zeolitization			1.18	2.19	0.38	2.28	2.54	1.15	1.19				
jarosite-zation		2.44	1.57	2.19	1.52	1.83							
cinnabar-zation	13.33				1.14								
realgar-orpiment		4.88	0.78	1.46	2.28		1.69						
hornfelsed		7.32	5.49	5.84	1.14	7.31	10.17	6.90	17.86				
chloritization	13.33	26.83	47.45	59.12	54.37	58.45	44.92	49.43	39.29	22.22	56.41	42.86	33.33
epidotization			18.82	19.57	12.93	26.48	27.12	6.90			25.64	14.29	8.33
propylitization	6.67		2.75	4.38	4.18	9.59	9.32	2.30	1.19	7.41			
arsenopyritization		14.63	3.53	5.84	23.19	2.28		8.05	8.33				
kaolinization	26.67	24.39	9.02	13.87	22.81	21.46	21.19	6.90	11.90	14.81	2.56		8.33
montmorillonite				2.19	0.76	0.46	2.54			3.70	14.29		
illinoisization			1.87	7.30	1.52	3.42	2.54		1.19	7.41	2.56	14.29	14.2
carbonatization	80.00	78.05	76.08	72.99	74.90	57.99	39.83	31.03	32.14	29.63	46.15	28.57	83.33
fluoritization	6.67	17.07	11.76	16.06	6.84	7.31	12.71	24.14	25.00	25.93		28.57	
sericitization	6.67	60.98	48.24	68.61	78.33	58.45	72.88	49.43	67.86	7.41	17.95		
silicification	93.33	85.37	85.88	91.97	96.96	80.82	91.53	71.26	90.48	37.04	33.33	71.43	
limonitization	13.33	14.63	13.73	10.95	23.19	14.16	8.47	8.05	1.19	7.41	5.13	28.58	16.67
pyritization	33.33	60.98	55.29	54.74	77.57	36.99	47.46	32.18	42.86		25.64	14.29	8.33
saussurtization			1.18			4.57				18.52			
topazization				0.73		1.37	1.69	11.49	7.14				
vesuvianitization						0.46	0.85	3.45	1.19				
skarnization		2.44	20.39	27.01	6.08	20.55	16.10	20.69	34.52	11.11	5.13		
magnesitization			5.10								7.69		16.67
biotitization			1.87	3.65		20.55	18.64	4.60	11.90	29.63	15.38		
tremolitization			5.88	2.92	0.76	9.59	1.69		2.38		46.15		16.67
pyrrhotinization			1.96	2.19		1.83		2.30	1.19		7.69		
albitization			4.71	2.92	9.51	5.94	5.08	16.09	14.29	14.81			
magnetitization					0.76	0.91	1.69	2.30		14.81		14.29	
tourmalinization		2.44	4.31	6.57	3.80	7.31	0.85	21.84	1.19	7.41			
marblization	6.67		10.20	10.95	2.28	7.76	8.47	11.49	15.48			14.27	
potash feldspathization		4.88	13.33	20.44	19.01	29.68	59.32	12.64	32.14	40.74			
muscovitization			1.87	4.38	1.52	1.14	5.08		14.29	14.81			
actinolitizationc			3.92	4.38	2.28	7.76	1.69	3.45	4.76		15.38		
talkization			2.75	0.73	0.76	5.02	1.69				30.77		66.67
pyrophyllitization		2.44	3.14	5.11	3.04	3.20	2.54	3.45	7.14				
baratization	46.67	24.39	18.04	13.14	8.36	5.48	3.39			18.52		14.29	

diopsidization			5.10	3.65	0.76	4.11	2.54	3.45		14.81	5.13		16.67
serpentinization		2.44	4.31	3.65	1.14		5.93	3.45	3.57		66.67	14.29	83.33

Geochemical anomalies elements distribution (%) form of gold silver and polymetallic deposits in China

Elements	Hg	Sb	PbZn	Ag	Au	Cu	Mo	Sn	W	REE	Ni	V	Cr
F	6.67	4.88	5.45	2.90	3.07	3.20	9.32	20.69	19.28	3.70	2.56	14.29	8.33
Hg	100	65.85	31.13	27.54	78.54	23.74	11.02	9.19	4.82				8.33
P		4.88	0.78	1.42	1.92	2.28	3.39			3.70	5.13	42.86	8.33
K	6.67			0.72		0.46	2.54		1.20	3.70			
Na				0.72			0.85			7.41			
Li		2.44	2.33	3.62	1.53	2.28	6.78	4.60	8.43	7.41			
Sn		21.95	22.18	22.46	17.62	24.66	25.42	79.31	71.08	7.41	2.56		
Bi		19.51	36.19	38.41	27.97	42.47	60.17	56.32	80.72	7.41	10.26		
Cd	6.67	7.32	47.08	38.41	14.56	26.94	30.51	26.43	24.10	3.70	5.13	14.29	8.33
Pb	26.67	31.71	95.33	86.96	52.87	58.90	69.49	55.17	66.27	7.41	15.38		8.33
Zn	40.00	21.95	95.72	86.96	52.49	60.73	72.88	51.72	71.08		17.95	14.29	16.67
Sb	80.00	100	47.86	57.25	57.85	42.92	38.14	29.89	40.96	3.70	15.38		16.67
Mg			0.78		0.38	1.83					5.13		66.67
Al						0.46	0.85			3.70			
Ba	6.67	9.76	8.95	3.62	2.68	2.74	4.24		2.41	14.81	2.56		
Sr	6.67	7.32	1.56	0.72	1.92	0.91		1.15					8.33
As	80.00	63.41	54.09	59.42	65.52	47.49	44.92	45.98	54.22	3.70	10.26		8.33
Ca			0.39		0.77	1.37	0.85	1.15					8.33
La		2.44	0.78	0.72	1.15	2.28	2.54	1.15	1.20	85.19			
Ag	6.67	17.07	85.21	97.83	68.58	71.69	79.66	52.87	72.29		23.08	14.29	
Au	26.67	58.54	40.86	61.59	98.08	50.68	46.61	17.24	31.33		23.08		25.00
Cu	20.00	19.51	63.81	71.74	57.47	94.52	72.03	47.13	73.49	3.70	53.85	14.29	25.00
U	6.67		4.28	0.72	1.92	2.74	3.39	2.30	2.41				
Mn		4.88	12.06	18.84	5.36	9.13	6.78	11.49	15.66	3.70	17.95	28.57	8.33
Be		4.88	2.33	0.72	3.06	2.28	8.47	11.49	13.25	18.52			
Si			0.39	0.72	0.38					3.70			
Ni		4.88	2.72	1.44	9.96	14.16	5.93	4.60	1.20		100.00	42.86	91.67
Co		7.32	5.06	4.35	6.51	18.72	4.24	2.30	1.20		71.79	14.29	75.00
Y		2.44	0.78	0.72	2.68	1.37	2.54	1.15	3.61	77.78			
Fe		7.32	5.06	5.80	2.68	10.96	4.24	4.60	7.23	3.70	33.33	28.57	41.67
Ti		4.88	1.95	3.62	3.45	3.65	3.39	1.15			17.95	28.57	8.33
Th			1.17	0.72	1.15	0.91	21.61	1.15	1.20	22.22			
Zr		2.44			1.53	0.91	1.69	1.15		18.52			
Cr		2.44	3.11	2.17	6.90	10.50	7.63	2.30	1.20		66.67	14.29	100
V		4.88	2.72	2.17	3.06	2.28	4.24	1.15			20.51	85.71	41.67
B		4.88	3.50	2.17	3.07	2.28	4.24	3.45	6.02	3.70			
Nb		2.44	1.17		0.77	2.28	1.69	3.45	1.20	25.93		14.29	

Mo	6.67	14.63	31.91	34.78	38.31	51.14	94.92	36.78	77.10		20.51	28.57	8.33
W		26.83	30.35	30.43	29.50	41.55	66.95	56.32	97.59	7.41	10.26		

Note: 1:20,0000 stream sediment geochemical survey analysis of 39 elements

Relational form of China main ore-bearing rock element enrichment factor and deposits surrounding rock distribution%

Rock	Enriched element sequence and Concentration coefficient	Proportion% of surrounding rock of ore deposit
Ls	$CO_2$9.88,Ca7.72,S1.93,Cd1.76,Sr1.73,Hg1.46,Cl1.34	Hg53.33,Sb43.90,PbZn41.63,W35.63,Ag35.51,Mo24.58, Sn24.14,Cu29.66,Au20.89,Cr16.67,V14.29,REE11.11
Dol	$CO_2$10.29,Mg7.72,Ca4.92,Cl2.75,S1.36,Hg1.08,N1.17	Hg53.33,PbZn31.91,V28.57,Mo22.88,Ag18.12,Cu15.53, Sb14.63,Sn12.64,REE11.11,W10.34,Au5.97
Ss	B1.90,S1.57,H_2O^+1.30,Sb1.26,Si1.18,Ge1.19,Se1.18	Sn48.28,W43.53,Cr33.33,Mo33.05,Cu31.96,Sb31.71,Ag 27.54,REE29.63,PbZn23.74,Hg20,Au22.76,Ni17.95
Gn	Sr1.73,Cl1.48,Ba1.48,S1.43,Na1.42,Cu1.47,F1.21,Al1.16	V42.86,Cr33.33,Ni28.21,REE18.52,Mo12.71,Au13.81,W 11.49,Hg6.67,Ag6.52,PnZn5.45,Sb4.88
St	W1.65,Au1.60,As1.47,Cu1.47,Ge1.33,S1.29,F1.21,Se1.19,Sn1. 10	V 42.86,Ag24.64,Sn24.14, REE 22.22,Au17.91, PbZn 17.90, Sb17.07,Cu16.89,W11.49,Mo9.32,Cr8.33,Ni2.56
am	Cr5.71,FeO4.58,Ni4.36,Cu3.87,V3.77,Mg3.42,Mn2.86,Cl2.32, $Fe_2O_3$2.00,S1.93,Zn1.76,F1.57,P1.51,Au1.47,Ca1.47,Au1.48,C d1.41	Ni33.33,V28.57,w9.19,Au8.96,Cu4.57,Ag4.35,Mo4.24 Sb2.44
Sl	Se2.26,As2.00,S1.79,Bi1.76,W1.75,Cu1.67,FeO1.66, Cr1.64, H_2O^+ 1.62, Au1.48, V1.45, Sb1.53, Sn1.43, V1.45, Zn1.24, F1.40, K1.24, Zn1.24, Al1.22	W29.89,Au18.28,Sb17.07,Cr16.67,PbZn13.23,Ag12.32, Cu16.44,Mo15.25,REE11.11,Ni10.26,Sn9.19
Mb	$CO_2$9.54,Ca6.33,Mg4.91,S1.14	Cr25,PbZn15.18,Cu13.24,Ni12.82%,W11.49,Sn10.34,M o10.17,Ag10.14,REE7.41,Au9.70,Sb4.88
tu	Mo1.94,Sb1.41,K1.32,Th1.27,Ba1.27,S1.21,Pb1.16,Si1.15	Ag29.71,Au27.99,Cu25.57,Cr25,REE22.22,PbZn22.18,S b14.63,Sn10.34,Ni10.26,W6.90,Hg6.67
γ	Th1.55,K1.43,Na1.38,Pb1.37,Tl1.29,U1.26,Si1.17,Al1.15	W62.07,Sn58.62,Sb58.54,PbZn49.03,Mo48.31,Ag47.83, Au37.50,REE37.04,Cu36.99,Ni2.56
γ δ	Sr1.80,FeO1.66,Ba1.48,Na1.37,s1.36,P1.29,Cl1.28,Cu1.23,F1. 20,Al1.19,Mo1.06	Cu36.53,Mo35.59,Au31.06,Ag31.16,PbZn28.02,W25.29, Sb19.51,Sn8.05,REE7.41,Ni5.13
η γ	Ba1.62,Sr1.42,Na1.37,Pb1.37,K1.36,Th1.36,Si1.15,Al1.11	REE37.14,Mo35.59,W27.59,Ag20.29,Hg20,Sn19.54,Sb1 7.07,Au17.05,PbZn15.95,Cu13.24,Ni2.56
δ	Sr2.98,FeO2.78,P2.48,Cl2.39,P2.33,V2.17,Cu2.00,Mg1.83,Cr1 .81,Ni1.73,S1.64,Mn1.68,Na1.44,Al1.31,Zn1.25,Ba1.24,Au1.2 3,Ga1.21,F1.15	Au25,PbZn23.35,Ag23.19,Cu20.55,Sb14.63,Mo14.41,W 11.49,Ni7.69,Hg6.67,Sn3.45
x	FeO4.28,S3.86,Cu3.80,V3.33,Mg3.32,Cl2.96,Cr2.74,Mn2.24,P 2.33,Se1.94,Ni1.73,P1.71,$Fe_2O_3$1.53,Ca1.50,Sr1.47,Zn1.47,Al1 .27,Ga1.21	Sb24.39,Hg20,Ag18.12,Ni17.95,PbZn16.73,Au15.91,Cu 14.61,W11.49,Sn9.19,Mo6.78,REE3.70
ϕ	Ni81.82, Cr57.14, Mg19.31,FeO3.13,Cl2.32, H_2O^+2.05, Fe_2O_3 1.56	Cr91.67,Ni58.97,V28.57,Mo1.69,Ag1.45,Sn1.15,PbZn0. 78
v	Cr4.76,Ni3.73,FeO3.71,Cu3.47,V3.47,Mg3.46,S2.50,Sr2.44,P2 .42,Mn2.19,Cl2.11, Fe_2O_3 1.61, Ca1.60, Zn1.54, Al1.32	V14.29,REE3.70,Ni2.56,Ag1.45,W1.15,Cu0.91,Au0.76
ϕ ι	Cr18.33,Ni12.05,Mg7.44,FeO3.21,Ca2.52,Cu2.07, V2.03,$Fe_2O_3$1.89,Mn1.78,Zn1.47,Cl1.41,S1.29	Ni38.46,V28.57,Cr25,Cu8.22,REE3.70,Ag2.17,Mo1.69, PbZn1.57,SnW1.15,Au0.38
ϕ ω	Cr76.5,Ni43.27,Mg17.38, Fe_2O_3 5.11, H_2O^+ 4.82, Cl2.77, Sn2.76,Mn1.89,Au1.36	Ni30.77,Cr25,Mo1.69,Au0.76,Ag0.72,PbZn0.39
ψ o	Cr20,Ni15.68,Mg6.94,FeO4.39,V2.75,F2.66,Mn2.54,Cu2.13,Z n1.76,Ca1.70,S1.50,Cd1.53,Cl1.55	V28.57,Ni12.82,V2.75,Cu1.83,Mo1.69,Pb0.78,Ag0.72,A u0.38

Gold and silver polymetallic metallogenic density coefficient form of China's strata

Era	Hg	Sb	PbZn	Ag	Au	Cu	Mo	Sn	W	REE	Ni	V	Cr
Q	0	0	0	0	0.007	0	0	0	0	0	0.012	0	0
EN	0	0	0.615	0.094	0.022	0.280	0.005	0	0	0	0	0	0
K	0	0	1.618	0.460	0.120	0.697	0.272	0.002	0	0.015	0	0	0.300
J	0.414	0.064	0.451	1.415	0.742	2.734	0.252	0.336	0.047	0.054	0.034	0	1.215
T	0	1.117	0.215	0.726	0.801	0.986	0.002	2.199	0.199	0.008	0.005	0	0.933
P	0.489	5.049	1.190	2.594	1.005	1.021	0.844	4.594	1.312	0	0.292	0	1.115
C	0.078	0.031	1.488	1.726	1.920	3.499	1.145	2.441	2.581	0	2.457	0	8.566

D	5.335	14.75	10.761	8.158	5.283	4.040	1.915	7.673	7.250	0.129	1.132	0	5.482
S	0	0	1.338	0.029	2.985	0.565	0.019	0	0.251	0.092	0.039	0	0
O	0	0.299	0.402	1.170	0.794	1.258	0.613	0.485	2.959	0.021	0.758		0
€	28.901	2.131	3.719	2.033	0.737	0.763	9.146	3.496	8.631	0.004	2.018	0.157	0
Z	0	22.865	14.568	25.540	5.216	0.649	48.51	10.351	1.649	0.135	1.892	29.160	0
Nh	0	0.354	2.549	2.451	1.390	0.037	0	0.537	3.671	0	2.183	0	0
Qb	0	13.840	5.200	10.72	4.180	10.520	2.940	0.680	1.540	0	0.040	0	0
Jx	0	2.190	3.207	1.828	3.414	1.224	9.931	2.793	16.035	0.017	0	0	0
Ch	0	0.507	4.595	0.687	2.267	1.576	10.01	1.092	2.516	45.41	1.797	0	0.005
Pt_1	0	0.704	0.675	2.089	4.834	3.207	0.639	0	6.716	0.029	35.60	52.51	10.15
Ar_3	0.016	0	1.645	4.097	37.774	4.484	2.758	0	0.177	0.081	14.55	5.726	5.468
Ar_2	0	0	0.042	0.418	4.500	0.250	25.96	0.042	0.417	0.042	0.167	0	0.042

metallogenic density coefficient= Proportion of reserves distribution/ Proportion of strata exposed area

Association degree form of mineralization of gold - silver polymetallic deposit in Chinese intrusive rocks

Rock	Hg	Sb	PbZn	Ag	Au	Cu	Mo	Sn	W	REE	Ni	V	Cr
ρ			11.70	7.20	18.90	13.70		46.0	11.5	148.1			
υ π		24.4	19.5	65.2	22.7	18.3	25.4			37.0			
ι			15.6	29.0	72.0	18.3	8.5	23.0	11.5				
χ	100	48.8	21.4	43.45	60.6	34.25	29.65	23.00	23.00	18.50	38.45		
λ π		4.88	7.78	8.70	3.78	4.56	8.48		2.30				
q π		34.14	20.24	37.68	12.12	16.44	20.34	32.18	20.68		5.12		
ξ π			1.028	1.353	1.295	0.639	0.790	0.715	0.537	2.303			
η	3.610	0.440	0.702	0.392	0.821	0.825	0.612		0.415	0.668			
κ γ			1.394	0.997	0.939	0.504	2.102	1.267	0.634	5.102			
γ	1.533	4.486	3.757	3.665	2.874	2.834	3.702	4.492	4.756	2.838	0.196		
η γ	3.690	3.149	2.943	3.744	3.146	2.443	6.566	3.605	5.090	6.834	0.472		
γ ο			2.392	9.477	4.954	2.808	4.562	0.885	0.885	2.846			
γ δ		15.36	22.06	24.54	24.46	28.76	28.02	6.339	19.91	5.835	4.039		
δ	29.0	63.61	101.5	100.8	108.7	89.35	62.65	15.0	49.96		33.43		
α μ		1.627	2.333	2.900	2.273	4.260	1.693	1.533	2.300	2.467	1.707		
β μ		4.88	0.78		0.76	0.46		1.15					
ν δ				7.25	3.80	4.55			5.75	18.5	12.8	71.45	
β μ	285.7	348.4	239.0	258.9	227.3	208.7	96.86	131.3	164.1	52.86	256.4		
ν			5.815	26.85	11.22	30.44	12.56			27.44	161.4	52.93	61.74
ψ ο			65.0	60.0	31.67	152.5	140.8				1068	2381	
ψ ι			35.68	49.32	8.636	186.8	38.41	261.4	26.14	84.09	874.1	649.3	568.2
ϕ ω			39.0	72.0	76.0		169				3077		2500
ϕ			17.73	32.95	8.636		38.41	26.14			1340	649.3	2083

Association degree of mineralization= Ore deposit rock - bearing frequency/ Proportion of Rock Area Distribution in East China

Association degree form of mineralization of gold-silver polymetallic deposit in Chinese rocks

Rock	Hg	Sb	PbZn	Ag	Au	Cu	Mo	Sn	W	REE	Ni	V	Cr
tu	1.438	3.153	4.780	6.403	6.032	5.511	4.748	2.228	1.487	4.789	2.211		5.388
λ		0.665	0.990	1.252	0.780	0.996	0.925	0.209	0.314	1.346			
τ			1.123	5.181	0.404	1.155	0.610	0.415	1.245	1.336			
α	1.778	1.962	4.903	5.244	4.402	5.509	3.635	1.542	0.925	2.979	1.375		4.469
β		0.938	1.721	1.254	1.363	1.844	0.815	0.442	0.221		2.465	2.748	3.206
Ls	9.968	8.206	7.781	6.637	3.905	5.548	4.594	4.512	6.660	2.077	0.479	2.671	3.116
Dol	20.35	5.584	12.18	6.916	2.279	5.927	8.733	4.824	3.947	4.240	1.958	10.90	
Si	24.70	54.19	40.33	48.30	22.11	37.22	47.07	12.78	25.56		28.48	105.8	61.74
Sh	3.841	2.813	2.017	1.254	0.859	1.052	1.464	3.974	1.988	6.403	2.216	16.47	2.401
Ms	13.33	9.756	6.224	4.348	2.240	2.008	5.424	6.436	8.736	4.444	2.052		3.332
Cr	4.447	1.627	0.520		1.247	0.307							
St		20.82	21.83	30.05	21.84	20.60	11.37	29.44	14.01	27.10	3.122	52.27	10.16
Sf			2.378	5.305	4.098	5.573	5.171	5.610	7.012		17.43		
Ss	3.077	4.878	3.652	4.237	3.502	4.917	5.085	7.428	6.697	4.558	2.762		5.128
ar			0.082	0.076	0.039	0.193		0.121					
Hs			545			137	339	345	575	74	256		
qu		8.00	9.732	2.589	6.661	6.518	12.11	2.054	24.63		32.05		14.88
Cg	4.443	1.627	2.077	4.107	2.487	3.350	0.563	0.383	1.917	3.703			2.777
BIF			3.90		14.90	9.10	8.50		11.5		25.60		
Mb		1.220	3.795	2.535	2.425	3.31	2.543	2.585	2.873	1.853	3.205		6.250
Ph	2.940	10.78	10.47	12.59	8.253	8.169	8.313	11.08	4.458	6.181		20.08	
Sl		4.626	3.585	3.339	4.954	4.455	4.133	2.491	8.100	3.011	2.780		4.518
Sch		2.346	3.119	3.949	5.022	6.00	5.433	3.314	4.051	5.936	9.862		2.670
Le			0.777		0.747	0.610	0.563	0.383	1.15	2.470	0.853		2.777
Gn	1.803	1.319	1.473	1.762	3.732	1.727	3.435	0.311	3.105	5.005	7.624	11.58	9.008
Gr			4.756	8.056	12.86	4.056	6.589	5.111	7.667	24.69	5.70	15.88	9.256
Gg					3.74				2.300		5.120		16.66
am		1.877	1.500	3.346	6.892	3.515	3.262		7.069		25.64	21.98	