

## Minerals of coal main seam in Parvade coalfield (Tabas - Iran)

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### Abstract

*Parvade coalfield is located in south of Tabas town and geologically this is part of Central Iran zone. Lithology and geological settings played key roles in determining the mineralogy of coals from the Parvade coalfield. The main rock units Parvade coalfield are shale, sandstone, siltstone and limestone. Environment of sediments is swampy. Petrographical studies and X-ray diffraction analyses indicate that clay minerals such as kaolinite, illite and carbonates (calcite, siderite) and sulfides mainly pyrite and marcasite, silica minerals especially quartz dominated in vitrinites and their fractures. Coal minerals played key roles in amount of coal ash. Present of pyrite increase amount of sulfur in coals.*

**Key words:** *petrography -coal minerals – ash -Parvade coalfield –Iran*

### INTRODUCTION

Considering their situation in the east of Iran, Parvade coalfield in Tabas has a special importance. They have been studied simply while preparing a geology map and report for Naybandan. This research is the first systematic study of their petrography and the aim is examining the petrogenesis of coals of this region.

### GEOLOGY SETTINGS:

Parvade area is one of coalfield Tabas region which located the longitude in the 75 Km south of Tabas between the longitudes of 56 46 30 56 51 10 East and latitudes 32 59 48 to 38 2 15 North (Fig.1). Average height region is 730 to 1050 m from sea level and average height of 850 meters. According to Iran geology organization, this area is considered eastern zone of Central Iran[1].in the northern part of Parvade area is located, quite plain and salt plain and located Shotori rang in east and Kamar Mahdi mountains in west and mountains of the Triassic and Jurassic sedimentary rocks in the south of Parvade. Parvade coalfield have 1200 square kilometers in extent, Parvade area divided into by faults with NE-SW strike to five regional names Parvade 1 to 4 and are East Parvade (Table 1), and although is divided into mining blocks whit the performance results of several fault structures and geology But the range is contiguous, so that outcrops of coals are continuing during the 38 kilometers West to the East and their qualitative and quantitative changes follow of certain process. Parvade area located between two major faults of Iran, Nayband fault in the east and Kalmard fault in the west. Performance of Nayband fault caused several faults with the strike East- West which fault Rostam is most of them in northern border Parvade area. Faults have strike the North east - South west. In addition to the terms and conditions sedimentation basin features, some geological features and some quality and technological characteristics of coal seams was similar in total area and its changes is relatively certain with the rule of law and the process.

## Formation Nayband

Upper Triassic sediments (formation Nayband) are marine in Parvade that with of forward its is covered mild a discontinuity. These sediments are mainly shale and sandy and have been sediment interferes with seams or carbonate facies changes little in different parts of the region.

Amonoides containing several seams of interaction and calcareous bivalve indicated by an open sea at the time of sedimentation. Thickness of the sediments in the area of 1800 meters measured that showed Parvade session is active sedimentary basin. In Ghadir formation are 15 to 18 veins coals of different thickness which 4 to 5 veins with the thickness is between 0.4 to 2.46 meters.

The receptor status of coal rocks sedimentation and expand the cross-coal deposits shall belong to Paralic type and expected the thick veins coal deposits have developed in central and western Parvade and deep horizons. Parvade coals are coking and fat coking. Coal sediments of Parvade have age upper Triassic age (Nayband formation). Amount of coal storage area Parvade Get a billion tons of coal coke.

## C1 coal seam

Seam c1 be the most important seam work area Parvade I considered and includes 50 percent of total deposits balance. C1 seam located 508 meters below average Badamo and its distance is fluctuating from the lower seam, namely B2 between 20 and 50 meters. long of outcrop is 10 Km which about 96 percent of its thick have to be to work.

According to information obtained from the boreholes been approved in almost all the C1 seam is available with thickness of these parts work. Thick ash and scattered parts workable in seams C1 is uniform and is placed in group fixed seam, only in the eastern region is slightly reduced seam thickness and the range of about 300 meters is cannot work thickness long from the beginning with the northern edge. seam C1 have fluctuations less In the southern edge and than the northern edge is identical with constant position. The degree of seam thickness mainly medium is placed in the group.

Coal seam C1 has in the most uniform between the coal seams Parvade. Vein thickness of C1 is reduced West to the East side, but there is appropriate thickness extracted in the Parvade.

Rate of C1 ash is reduced the West to the East (from 35 percent to 17 percent in the West the East). Hanging Wall of the C1 seam formed 63 percent of the silt stone and rarely sandstone and siltstone thin seam and 37 percent above the this seam of coal – shale and shale whit thickness Average 1.20 m a very floppy are on the thin seam of silt

Footwall of the C1 seam formed 42 percent of the silt Stone moderately resistant and 51 percent of the coal- shale and shale (thickness of 0:15 to 2:00 m) consists of very weak and the weak Under is thin seam of silt . coals of C1 seam engender of tissue lignin - cellulose of plants in inhabitant and water full of swamp. Swamp conditions been highly regenerative and Ph Acidic and therefore coals shiny ultraclarn formed with lots of Vitrinite [2]. Regenerative environment increase the amount of pyrite and Siderite Syngenetic. the swamp floor is Gradual subsidence. Based on studies for each seam of coal is started peat swamp formation from the western part of the basin and gradually expand to the East. Therefore thick coal seams decreased from West to East, and some of them are completely disappeared[3]. The number and amount of impurities, coal seams increase in the West than

the East region and therefore increase amount of ash seams in the same direction .Due to building consisting of seams, the value of the coal ash can work up and changes between the average values is 17.7 to 35.0 percent. The average amount of ash changes the seam change of impurities between 22.6 to 41.6 percent.

### **Coal Minerals**

Coal Minerals are considered sector useful and impurities of coal .Identify minerals in coal, there are different ways that these methods have not difference in mineralogy at other rocks[4]. Identify coal minerals are important to determine the appropriate method of coal dressing. Minerals in coal are the two sources; they are may primary or secondary. The primary minerals are used for correlation and interpretation of sedimentary basin geological processes [5].

Separating of primary minerals is difficult during the coal dressing and thus increasing ash. Secondary minerals formed after the geneses of coal in joints and cracks of coal and be separated by coal dressing easily .The mineral impurities coals of Parvade make up more detrital materials and clay these materials are seen as thin string or lenses scattered in Vitrinite.

Other impurities in coal Parvade are carbonates calcium and iron impurities that make up small percentage of mineral and are more in joints of Vitrinite

### **Clay minerals**

Clay minerals are formed in the primary and secondary in coals. Primary minerals to come during sedimentation seams of coals[6] .Secondary minerals are formed in the weathering and erosion of other rocks forming the stone units of coalfield. Important clay minerals coals are: kaolinite, illite, montmorillonite that illite and montmorillonite are more abundant. Clay minerals destructive origin: they are maximum to 30 percent and 9 percent on average and more are parallel to the seams or lenses are scattered Vitrinite.

### **Carbonates**

There is calcite often as epigenetic. Micro concretions and large crystals of calcite are the carbonate veins in the joints of Vitrinite. Carbonates are maximum 20 percent and average 3 percent. Sometimes the carbonates are dispersed cavities circular to elliptical in Vitrinite. Siderite is also seen as concretion.

### **Sulfides**

Pyrite: pyrite is dispersed more a small and large seed inside vitrinite. Sometimes is seen the pseudomorph and concretion in the other Macerals. Pyrite is maximum 8 percent and average 3 percent. Pyritic sulfur ( $\text{FeS}_2$ ) occurs in mineral phases as agglomerates of pyrite and marcasite crystals. The sulfate exists mostly as sulfates of iron and calcium. Silica in different forms such as quartz, cristobalite, etc., clay minerals such as kaolinite, illite, etc., carbonates such as calcite, dolomite, siderite, etc., sulfate and sulfides, etc., are the major ash- forming minerals in coal[7].

## Quartz

Quartz: there is quartz ...parts unihedral and small size. Quartz is Maximum of 6 percent and its average is 1 percent.

## CONCLUSION

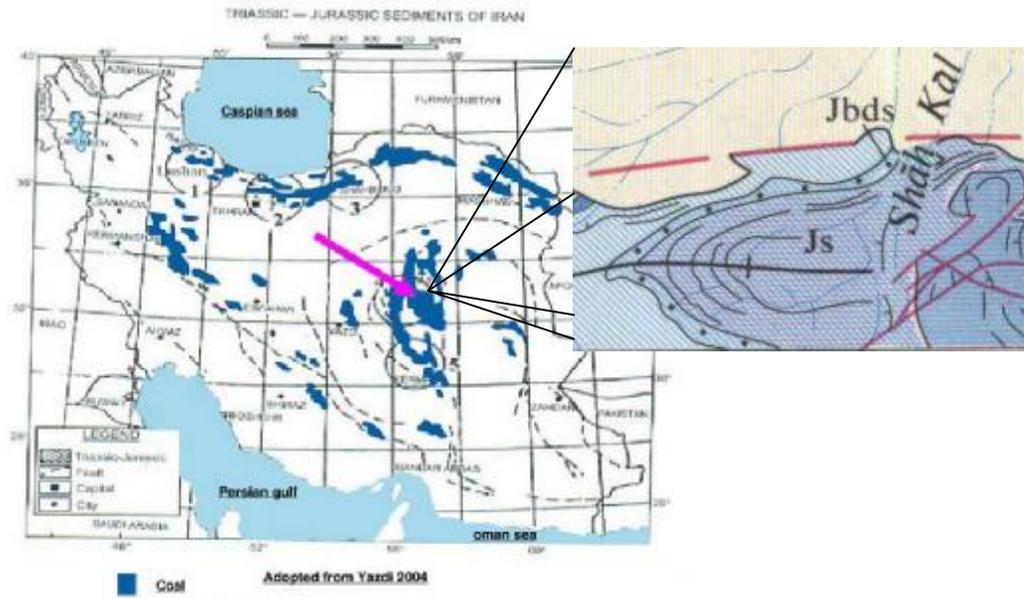
Nayband formation Lithology including shale, silt stone, sandstone and coal, and ages is Norian - Rethian. Identify coal minerals are important to determine the appropriate method of coal dressing. Ash in the coal will increase consumption too. Increasing 1 percent of ash coke coal reduced [8]. Steel significantly. High ash increases slag and Coke oxidation is increased. Sensitivity and drive of furnace is reduced. There is too much sulfur standard, which are fragility and friability of iron and also increases steel corrosion [9]. According to characterization studies, removal of fine sulfur particles from Tabas coal is impossible with conventional methods.

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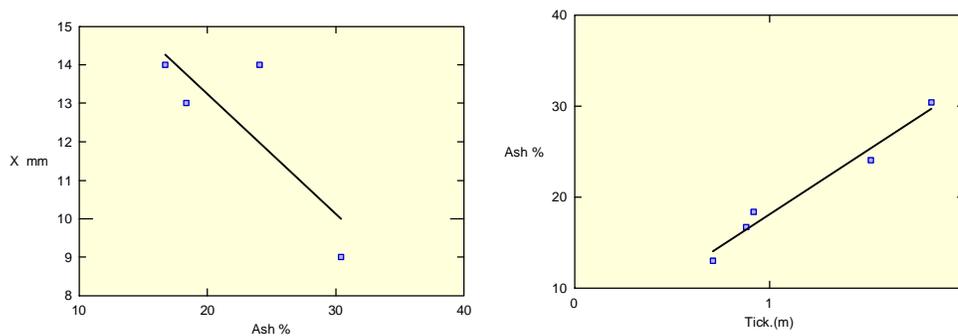
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**Table 1: characterizes of C1 seam coals in Parvade mines**

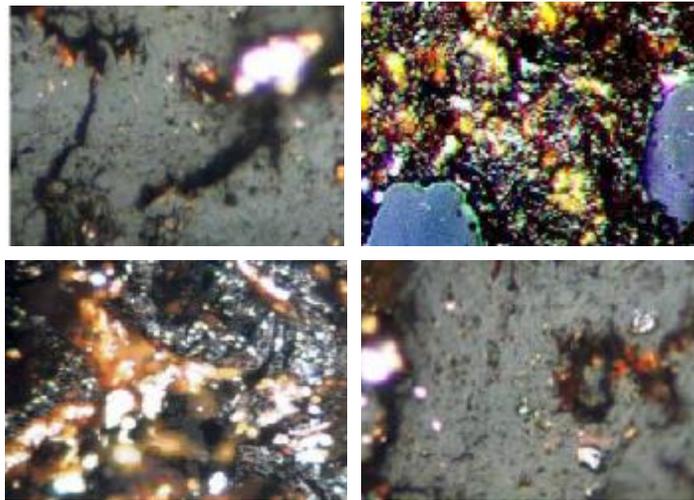
	Reserve(ht)	Tick.(m)	m %	Ash %	Vol. %	S %	P %	10R	X mm	Y mm
Parvade I	39130	1.83	0.77	30.39	21.38	1.32	0.017	98	9	17
Parvade II	39876	1.52	0.7	24.07	24.07	2.82	0.014	96	14	17
Parvade III	61452	0.92	0.61	18.36	24.75	2.27	0.016	93	13	18
Parvade IV	55346	0.88	0.59	16.7	25.66	2.28	0.01	92	14	18
Parvade V	7891	0.71	0.52	13.01	24.33	-	-	95	0	17



**Fig. 1: Triassic- Jurassic sediments of Iran, Parvade coalfield indicated**



**Fig 2:X parameter vis ash (left) and ash vis thickness (right) coal seam in Parvade**



**Fig3: Minerals in vitrinite (gray) of C1 seam coals, pyrite: shiny yellow, clay minerals (dusty), Carbonates and other minerals (orangey and white colors)**