

World's Oil Shale Available Retorting Technologies And The Forecast Of Shale Oil Production

Jialin Qian, Jianqiu Wang, Shuyuan Li

School of Chemical Engineering, China University of Petroleum
 Beijing, China

ABSTRACT

This paper describes the world's shale oil resources; introduces the available oil shale retorting technologies including the lump oil shale retorting and particulate oil shale retorting. And this paper also gives the forecast of shale oil production.

KEY WORDS: Oil shale; shale oil; retorting; production., forecast.

INTRODUCTION

Due to the high crude oil price, the oil shale retorting for producing shale oil have been paid much attention. It is recognized that the world's proven shale oil reserves are higher than the crude oil exploitable resources. Now in the world, there are three countries produce shale oil commercially: China, Estonia and Brazil. China uses Fushun type retorting, Estonia uses Galoter and Kiviter retorting, Brazil uses Petrosix retorting. Total annual production of shale oil in the world accounts no more than one million tons currently. It is predicted that till 2015, it may reach 3.5 million tons.

WORLD'S SHALE OIL RESERVES

Based on the data, published by Dr. Dyni(2003), and modified by Jialin Qian(2008), the world. in place shale oil,(converted from the in-situ oil shale) accounts for about 400 billion tons, this resources are higher than that of crude oil(more than 300 billion tons).

Among the top ten countries, United States ranks first with highest reserves of in place shale oil(300billion tons), the rest nine countries with the decreasing order are as follows: Russia(39billion tons), Zaire(14billion tons), Brazil(12billion tons), Jordan(5.2billion tons), Morocco(5 billion tons), Australia(4.5billion tons), China (2.7billion tons),Estonia(2.5billion tons),and Italia(1.4billion tons) (Dyni,2003;Qian,2008).It should be mentioned that the above figures may not be so accurate, due to the fact that some countries have no proven figures , but only estimated resources. And for some countries such as United States , Russia, Brazil, Jordan, Australia , Estonia and China, the above figures represent their proven reserves. Besides, China's oil shale resources are estimated more than several hundred

billion tons, it means that extensive exploration work is to be done..

WORLD'S OIL SHALE AVAILABLE RETORTING TECHNOLOGIES

The in-situ retorting technologies are at the trial stage, and no commercial production of shale oil now.

At present, in the world, the commercial surface retorting technologies are: Estonian Kiviter lump shale retorting, Estonian Galoter particulate oil shale retorting, Brazilian Petrosix lump shale retorting, Chinese Fushun retorting; and Australia has scaled up Canadian Taciuk particulate shale retorting, called Aosta Taciuk Processing (ATP).

Table 1 is the list of world's oil shale available retorting technologies and its comparison (Qian and Wang,2006).

Table 1 Comparison of World's Commercial Oil Shale Retort Technologies

Retort	Chinese Generator	Kiviter	Galoter	Petrosix	Alberta Taciuk
Company	Fushun Shale Oil	Viru Keemia	Narva Power	Petrobras	SPP
Country	China	Estonia	Estonia	Brazil	Australia
Location	Fushun	Kohtla Jarve	Narva	Sao Mateus do Sul	Stuart
Oil Shale T/d	100 200	1,000/ 200	3,000	6200/ 1600	6,000
Size,mm	10-75	10-125	0-25	6-50	0-25
Configu- ration	Vertical Cylindri.	Vertical Cylindri.	Horiz. Cylindri.	Vertical Cylindri.	Horiz. Cylindri
Process	Shale Pyro. Coke Gasi	Shale Pyro. Coke Cool	Shale Pyro Coke Comb	Shale Pyro CokeCool	ShalePyro CokeComb
Heat Carrier	Gas	Gas	Ash	Gas	Ash
Oil Yield ,% Fisher Assay	65	75-80	85-90	90	85-90
Products	FuelOil low cal.gas ash	FuelOil low cal.gas coke	FuelOil high cal.gas ash	FuelOil high cal.gas coke	naphtha & oil high cal.gas ash